GULMOHAR

MATHS FIESTA

Class-6, 7, 8

CHAPTER 1 : INTEGER

Exercise-1A

1. **(a)** An increase of 47 = + 47

(b) Gaining ₹ 840 = + ₹ 840

(c) Losing weight of 10 kg = −10 kg

(d) Going 9000 km above sea level = + 9000 km

(e) 36°C below 0°C = −36°C

(f) Win by 28 runs = + 28

(g) 49°C above 0°C = + 49°C

(h) A deposit of ₹ 190 = ₹ 190

2. **(a)** 38 km due south

(b) Gaining ₹ 380

(c) Earning ₹ 970

(d) Rise in temperature

(e) Fall 35% in the east

(f) A loss of ₹ 780

(g) 40°C above freezing point

(h) Spending ₹ 9780

3. **(a)** −5, − 4 and −3 all integers between −6 and −2.

(b) −8, − 7, − 6, − 5, − 4, − 3, − 2 and −1 all integers between −9 and 0.

(c) −6, − 5, − 4, − 3, − 2, − 1, 0, 1, 2, 3, 4 and 5 all integers between −7 and 6.

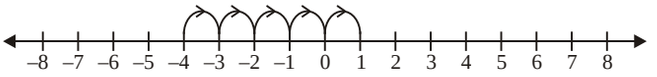
(d) 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13 all integers between 3 and 14.

(e) −2, − 1, 0, 1, 2 and 3 all integers between −3 and 4.

(f) −12, − 11, − 10, − 9, − 8, − 7, − 6, − 5, − 4, −3, −2, −1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 all integers between −13 and 13.

4. **(a)** 5 more than −4

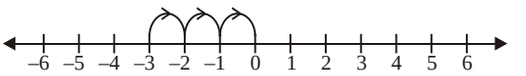
We will start from −4 and move 5 steps forward.



So, 5 more than −4 is 1.

(b) 3 more than −3

We will start from −3 and move 3 steps forward.

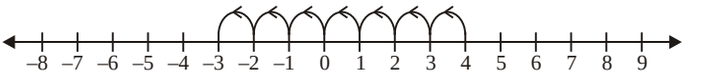


So, 3 more than −3 is 0.

(c) 7 less than 4.

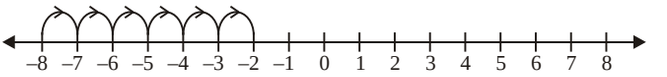
We will start from 4 and move 7 steps backward.

So, 7 less than 4 is −3.



(d) 6 more than −8

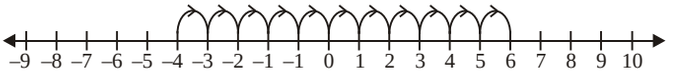
We will start from −8 and move 6 steps forward.



So, 6 more than −8 is −2.

(e) 10 less than 6.

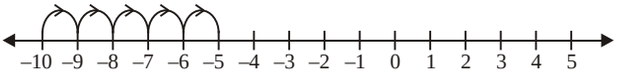
We will start from 6 and move 10 steps backward.



So, 10 less than 6 is −4.

(f) 5 less than −5

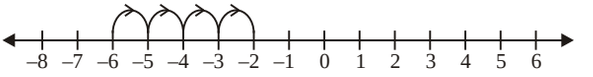
We will start from −5 and move 5 steps backward.



So, 5 less than −5 is −10.

(g) 4 more than −6

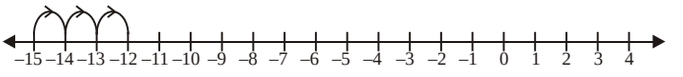
We will start from −6 and move 4 steps forward.



So, 4 more than −6 is −2.

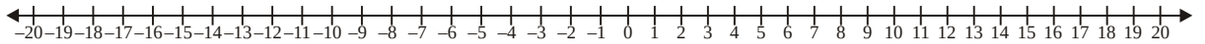
(h) 3 more than −15

We will start from −15 and move 3 steps forward.



So, 3 more than −15 is −12

5.



(a) $-16 < -8$, Since -8 is on right side of -16.

(b) $-18 < -4$, Since -4 is on right side of -18.

(c) $13 > -16$, Since 13 is on right side of -16.

(d) $-14 < 18$, Since 18 is on right side of -14.

(e) $4 > 0$, Since 4 is on right side of 0.

(f) $0 > -17$, Since 0 is on right side of -17.

(g) $-9 < 7$, Since 7 is on right side of -9.

(h) $13 > -13$, Since 13 is on right side of -13.

6. **(a)** -17 or -8

$17 > 8$, since 17 is on right side of 8.

but $-17 < 8$, since -17 is on left side of 8.

Also, $-17 < -8$, since -17 is on left side of -8.

(b) 0 or -16

Since, 0 is greater than every negative integer.

Therefore, $0 > -16$

(c) -858 or 83

Since, positive integer is greater than every negative integers.

Therefore, $-853 < 83$

(d) 13 or -14

Since, positive integer is greater than every negative integers.

Therefore, $13 > -14$

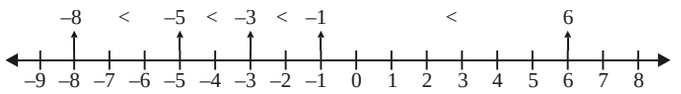
(e) -415 or -613

$415 < 613$, since 613 is on right side of 415.

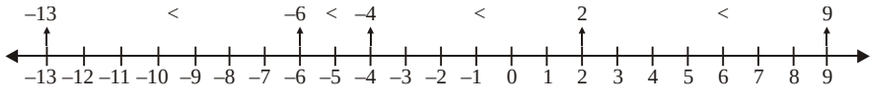
but $415 > -613$, since -613 is on left side of 415.

Also, $-415 > -613$ is on left side of -415.

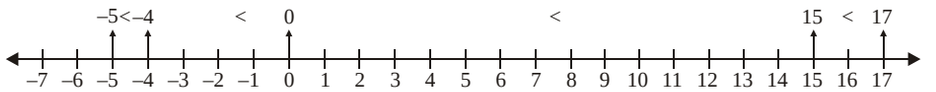
7. **(a)**



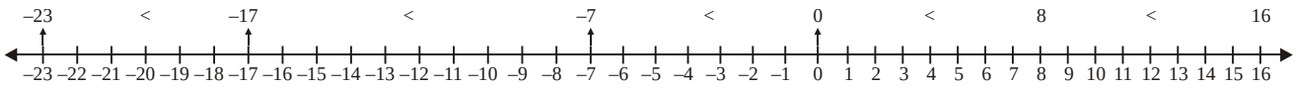
(b)



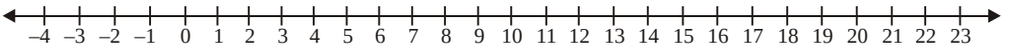
(c)



(d)



8. **(a)**



9. **(a)** $5 - |-6| + |8|$

$= 5 - 6 + 8$

$= (5 + 8) - 6$

$= 13 - 6$

$= 7$

(b) $|-8| - |-8| + |16|$

$= 8 - 8 + 16$

$= 16$

(c) $|23| + |-8| + |-11|$

$= 23 + 8 + 11$

$= 31 + 11$

$= 42$

(d) $|14| + |16| - |-14| - |-16|$

$= 14 + 16 - 14 - 16$

$= 30 - 30$

$= 0$

(e) $|10| - |-25| + |5|$

$= 10 - 25 + 5$

$= 15 - 25$

$= -10$

(f) $|-16|-|13|+|-23|-|47|$

$= 16-13+23-47$

$= 39-60$

$= -21$

(g) $|5|+|-11|-|16|$

$= 5+11-16$

$= 16-16$

$= 0$

(h) $|-237|+|-167|-|178|$

$= 237+167-178$

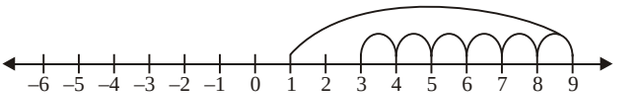
$= 404-178$

$= 226$

10. **(a)** F **(b)** T **(c)** F **(d)** F **(e)** T **(f)** F **(g)** T **(h)** F

Exercise-1B

1. **(a)** $9+(-6)=3$



We start from 0 and moves 9 steps to the right of 0 and then moves -6 steps backward.

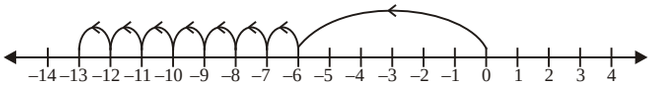
So, we get 3 as answer.

(b) $8+6=13$

We start from 0 and moves 8 steps to the right of 0 and then moves 5 steps more forward.

So, we get 13 as answer.

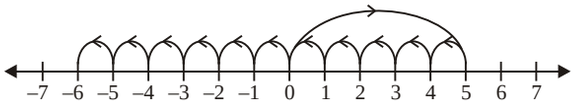
(c) $(-6)+(-7)=-13$



We start from 0 and moves 6 steps to the left of 0 and then moves 7 steps more backward.

So, we get -13 as answer.

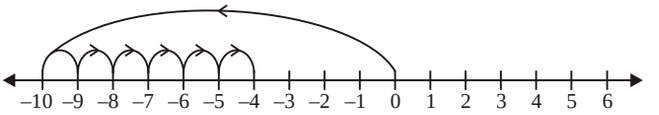
(d) $5+(-11)=-6$



We start from 0 and moves 5 steps to the right of 0 and then moves 11 steps backward.

So, we get -6 as answer.

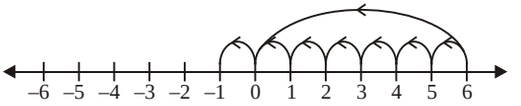
(e) $(-10)+6=-4$



We start from 0 and moves 10 steps to the left of 0 and then moves 6 steps forward.

So, we get -4 as answer.

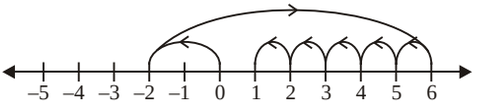
(f) $6+(-3)+(-4)=6-7=-1$



We start from 0 and moves 6 steps to the right of 0 and then moves 3 steps backward. After then 4 steps more backward.

So, we get -1 as answer.

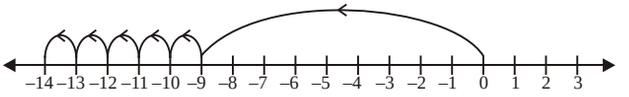
(g) $(-2)+8+(-4)=8+(-6)=2$



We start from 0 and moves 2 steps to the left of 0 and then moves 8 steps forward. After then 4 steps more backward.

So, we get +2 as answer.

(h) $(-9)+(-2)+(-3)=-14$



We start from 0 and moves 11 steps to the left of 0 and then moves 2 and 3 steps forward to the left more.

So, we get -14 as answer.

2. **(a)** $(-13)+(-18)$

$= -13-18$

$= -31$

(b) $(-10)+(-6)+41$

$= -10-6+41$

$= -16+41$

$= 25$

(c) $(-250)+(160)$

$= -250+160$

$= -90$

(d) $(-389)+(-163)$

$= -389-163$

$= -552$

(e) $(-93)+169$

$= -93+169$

$= 76$

(f) $3062+(-4064)$

$= 3062-4064$

$= -1002$

(g) $37+(-18)+(-16)$

$= 37-18-16$

$= 37-34$

$= 3$

(h) $71+(-16)+(-53)$

$= 71-16-53$

$= 71-69$

$= 2$

3. (a) $(-16)+17+(-32)+47+46$

$= (17+47+46)+(-16-32)$

$= 110-48$

$= 62$

(b) $906+(-9)+(-1)+(-138)$

$= 906+(-9-1-138)$

$= 906-148$

$= 758$

(c) $1056+(-786)+(-48)+(-150)$

$= 1056+(-786-48-150)$

$= 1056-984$

$= 72$

(d) $1000+(-514)+517+(-999)$

$= (1000+517)+(-514-999)$

$= 1517+(-1513)$

$= 1517-1513$

$= 4$

(e) $(-1)+(-304)+168+(-618)$

$= 168+(-1-304-618)$

$= 168-923$

$= -755$

(f) $(-243)+27+(-9)+729+(-1)$

$= (27+729)+(-243-9-1)$

$= 756-253$

$= 503$

4. (a) The additive inverse of -168 is 168.

(b) The additive inverse of -813 is 813.

(c) The additive inverse of 817 is -817.

(d) The additive inverse of 4108 is -4108.

(e) The additive inverse of 768 is -768.

(f) The additive inverse of -2046 is 2046.

(g) The additive inverse of 3196 is -3196.

(h) The additive inverse of 1876 is -1876.

5. (a) The successor of -483 is -482.

(a) The successor of -983 is -982.

(a) The successor of -103 is -102.

(a) The successor of 306 is 307.

(a) The successor of 106 is 107.

(a) The successor of -4086 is -4085.

(a) The successor of -1001 is -1000.

(a) The successor of -999 is -998.

6. (a) The predecessor of -7836 is $-7836-1 = -7837$

(b) The predecessor of 0 is $0-1=-1$

(c) The predecessor of 729 is $729-1=728$

(d) The predecessor of -1001 is $-1001-1 = -1002$

(e) The predecessor of -4186 is $-4186-1 = -4187$

(f) The predecessor of 317 is $317-1=316$

(g) The predecessor of -1999 is $-1999-1 = -2000$

(h) The predecessor of -3168 is $-3168-1=-3169$

7. (a) $x+27=0$

$\Rightarrow \quad x+27-27=0-27$

(On subtracting -27 both side)

$\Rightarrow \quad x=27$

(b) $x+46=0$

$\Rightarrow \quad x+46-46=0-46$

(On subtracting -46 both side)

$\Rightarrow \quad x=-46$

(c) $-15+x=0$

$\Rightarrow \quad -15+x+15=0+15$ (On adding 15 both side)

$\Rightarrow \quad x=15$

(d) $x-23=0$

$\Rightarrow$ $x-23+23=0+23$ (on adding 23 both side)

$\Rightarrow$ $x=23$

(e) $16+x=0$

$\Rightarrow$ $16+x-16=0-16$ (On subtracting -16 both side)

$\Rightarrow$ $x=-16$

(f) $x+(-61)=0$

$\Rightarrow$ $x+(-61)+61=0+61$ (on adding 61 both sides)

$\Rightarrow$ $x=61$

8. **(a)** T **(b)** F **(c)** T **(d)** T **(e)** F

Exercise-1C

1. **(a)** $(-4)+(-6)\ldots.(-4)-(-6)$

LHS $=(-4)+(-6)$

$=-4-6=-10$

RHS $=(-4)-(-6)$

$=-4+6=2$

Since, $-10<2$

So, $(-4)+(-6)<(-4)-(-6)$

(b) $31-(-42)\ldots.17+(-48)$

LHS $=31-(-42)$

$=31+42=73$

RHS $=17+(-48)$

$=17-48=-31$

Since, $73>-31$

So, $31-(-42)>17+(-48)$

(c) $45-(-11)\ldots.35-(-21)$

LHS $=45-(-11)$

$=45+11=56$

RHS $=35-(-21)$

$=35+21=56$

Since, $56=56$

So, $45-(-11)=35-(-25)$

(d) $(-63)+(-32)\ldots.18+(-38)$

LHS $=(-63)+(-32)$

$=-63-32=-95$

RHS $=18+(-38)$

$=18-38=-20$

Since, $-95<-20$

So, $(-63)+(-32)<18+(-38)$

(e) $(-21)-(-10)\ldots.(-21)+10$

LHS $=(-21)-(-10)$

$=-21+10=-11$

RHS $=(-21)+10$

$=-21+10=-11$

Since, $-11=-11$

So, $(-21)-(-10)=(-21)+10$

(f) $12-(-12)\ldots.(-12)-(12)$

LHS $=12-(-12)$

$=12+12=24$

RHS $=(-12)-12$

$=-12-12=-24$

Since, $24>-24$

So, $12-(-12)>(-12)-(12)$

2. **(a)** 826 from -81

$(-81)-(826)$

$=-81-826$

$=-907$

(b) -316 from -418

$(-418)-(-316)$

$=-418+316$

$=-102$

(c) 718 from -12

$(-12)-(718)$

$=-12-718$

$=-730$

(d) -63 from 123

$123-(-63)$

$=123+63$

$=186$

(e) 312 from -415

$(-415)-(312)$

$=-415-312$

$=-727$

(f) -98 from -613

$(-613)-(-98)$

$= -613+98$

$= -515$

(g) -412 from 0

$0-(412)$

$= 0+412$

$= 412$

(h) 8263 from -786

$(-786)-(8163)$

$= -786-8163$

$= -8949$

3. **(a)** $(-7)-8-(-25)$

$= -7-8+25$

$= -15+25$

$= 10$

(b) $(-12)-[(-15)+(-3)-4]$

$= -12-[-15-3-4]$

$= -12-[-22]$

$= -12+22$

$= 10$

(c) $50-(-40)-(-4)$

$= 50+40+4$

$= 94$

(d) $(-93)-(-61)+37$

$= -93+61+37$

$= -93+98$

$= 5$

(e) $50-(-48)-(-17)$

$= 50+40+17$

$= 94$

(f) $(-7)+(-8)-(-86)$

$= -7-8+86$

$= -15+86$

$= 71$

(g) $(-13)+42-18+(-6)$

$= -13+42-18-6$

$= 42-(13+18+6)$

$= 42-37$

$= 5$

(h) $42+(-73)+(-89)$

$= 42-73-89$

$= 42-162$

$= -120$

4. $1058-[584+(-376)]$

$= 1058-[584-376]$

$= 1058-208$

$= 850$

5. $[(-416)+(-519)]-[(-674)+(-216)]$

$= [-416-519]-[-674-216]$

$= (-935)-(-890)$

$= -935+890$

$= -45$

6. $(-69)+[6+74]$

$= -69+80$

$= 11$

7. -18 from 10 ..... 10 from -18

LHS $= 10-(-18)$

$= 10+18 = 28$

RHS $= (-18)-10$

$= -18-10 = -28$

Since, $28 \neq -28$

So, they are not equal in values.

8. Let the other integer be x.

Then $x+69 = -113$

$x = -113-69$

$x = -182$

Hence, other integer is -182.

9. Let the other integer be x.

Then $x+(-318) = 783$

$x-318 = 783$

$x = 783+318$

$x = 1101$

Hence, the other integer is 1101.

10. The temperature of 4 a.m. $= -34°$ C

And an same day at 10 a.m. $= -14°$ C

So, the temperature increase $= -34°$ C $-(-14°$ C$)$

$= (-34° +14)°$ C

$= -20°$ C

Exercise-1D

1. **(a)** LHS $= (-9)\times 6$

$= -54$ (an integer)

RHS $= 6\times(-9)$

$= -54$ (an integer)

In both case product is same, i.e., $a\times b = b\times a$

So, the property is verified.

(b) LHS $= 17\times(-8)$

$= -136$ (an integer)

RHS $= (-8)\times 17$

$= -136$ (an integer)

In both case product is same, i.e., $a\times b = b\times a$

So, the property is verified.

(c) LHS $= (21)\times(-4)$

$= -84$ (an integer)

RHS $= (-4)\times 21$

$= -84$ (an integer)

In both case product is same, i.e., $a\times b = b\times a$

So, the property is verified.

(d) LHS $= (-11)\times(-14)$

$= +154$ (an integer)

RHS $= (-14)\times(-11)$

$= +154$ (an integer)

In both case product is same, i.e., $a\times b = b\times a$

So, the property is verified.

2. **(a)** $-8, 9, 11$

LHS $= a\times(b\times c)$ $= (-8)\times[9\times 11]$

$= (-8)\times 99 = -792$

RHS $= (a\times b)\times c$ $= [(-8)\times 7]\times(11)$

$= -72\times 11 = -792$

LHS = RHS

So, the property is verified.

(b) $(-4), (-5), 6$

LHS $= a\times(b\times c)$ $= (-4)\times[(-5)\times 6]$

$= (-4)\times[-30] = +120$

RHS $= (a\times b)\times c$ $= [(-4)\times(-5)]\times 6$

$= [20]\times 6 = 120$

LHS = RHS

So, the property is verified.

(c) $(-6), 7, (-10)$

LHS $= a\times(b\times c)$ $= (-6)\times[7\times(-10)]$

$= (-6)\times[-70]$

$= (-6)\times(-70) = 420$

RHS $= (a\times b)\times c$ $= [(-6)\times 7]\times(-10)$

$= [-42]\times(-10)$

$= 420$

LHS = RHS

So, the property is verified.

(d) $13, (-14), 6$

LHS $= a\times(b\times c)$ $= 13\times[(-14)\times 6]$

$= 13\times[-84]$

$= -1092$

RHS $= (a\times b)\times c$ $= [(13)\times(-14)]\times 6$

$= (-182)\times 6 = -1092$

LHS = RHS

So, the property is verified.

3. **(a)** $9, (-11)$ and 8

LHS $= a+(b\times c)$ $= 9\times[(-11)+8]$

$= 9\times[-11+8]$

$= 9\times(-3) = -27$

RHS $= (a\times b)+(a\times c)$

$= [9\times(-11)]+[9\times 8]$

$= -99+72 = -27$

LHS = RHS

So, the property is verified.

(b) $6, (-4)$ and 5

LHS $= a\times(b+c)$ $= 6\times[(-4)+5]$

$= 6\times[-4+5]$

$= 6\times 1 = 6$

RHS $= (a\times b)+(a\times c)$

$= [6\times(-4)]+[6\times 5]$

$= [-6\times 4]+30$

$= -24+80 = 6$

LHS = RHS

So, the property is verified.

(c) $(-6), 8$ and (-9)

LHS $= a \times (b + c) = (-6) \times [8 + (-9)]$

$= (-6) \times [8 - 9]$

$= -6 \times (-1) = 6$

RHS $= (a \times b) + (a \times c)$

$= [(-6) \times 8] + [(-6) \times (-9)]$

$= -48 + 54 = 6$

LHS = RHS

So, the property is verified.

(d) $(-16), 14$ and (-8)

LHS $= a \times (b + c) = (-16) \times [14 + (-8)]$

$= (-16) \times [14 - 8]$

$= (-16) \times 6 = -96$

RHS $= (a \times b) + (a \times c)$

$= [(-16) \times 14] + [(-16) \times (-8)]$

$= (-224) + 128 = -96$

LHS = RHS

So, the property is verified.

4. **(a)** 13 by (-8)

$= 13 \times (-8)$

$= -104$

(b) (-36) by (-14)

$= (-36) \times (-14)$

$= 504$

(c) 35 by (-21)

$= 35 \times (-21)$

$= -735$

(d) $46 \times 11 = 506$

(e) 18 by (-106)

$= 18 \times (-106)$

$= -1908$

(f) 0 by (-42)

$= 0 \times (-42)$

$= 0$

(g) 72 by (-43)

$= 72 \times (-43)$

$= -3096$

(h) (-13) by (-15)

$= (-13) \times (-15)$

$= 195$

5. **(a)** $(-5) \times (-6) \times 8$

$= + [5 \times 6] \times 8$

$= 30 \times 8$

$= 240$

(b) $(-13) \times (-5) \times 4$

$= + [13 \times 5] \times 4$

$= 65 \times 4$

$= 260$

(c) $(-17) \times (-10) \times (-12)$

$= + [17 \times 10] \times (-12)$

$= 170 \times (-12)$

$= -2040$

(d) $38 \times (-17) \times (-5)$

$= 38 \times [17 \times 5]$

$= 38 \times 85$

$= 3230$

(e) $(-8) \times 0 \times (-37)$

$= - [8 \times 0] \times (-37)$

$= 0 \times (-37)$

$= 0$

(f) $(-16) \times 4 \times (-5)$

$= -[16 \times 4] \times (-5)$

$= -64 \times (-5)$

$= 320$

(g) $(-15) \times 14 \times (-10)$

$= - [15 \times 14] \times (-10)$

$= -210 \times (-10)$

$= 2100$

(h) $4 \times 6 \times (-15)$

$= 24 \times (-15)$

$= -360$

6. **(a)** $54 \times (-45) + 54 \times (-5)$

$= -2430 - 270$

$= -[2430 + 270]$

$= -2700$

(b) $(-183)\times -37+(-183)\times 17$

$= 6771-3111$

$= 3660$

(c) $16\times(-7)+3\times 7$

$= -112+21$

$= -91$

(d) $69\times 37+37\times(-59)$

$= 2553+(-2183)$

$= 2553-2183$

$= 370$

(e) $41\times(-42)+59\times(-42)$

$= -1722+(-2478)$

$= -4200$

(f) $3178\times(-10)+3178\times(-16)$

$= -31780-50848$

$= -82628$

7. **(a)** F **(b)** F **(c)** T **(d)** T **(e)** F

Exercise-1E

1. **(a)** $48\div(-6)$

$= -[48\div 6]$

$= -[8] = -8$

(b) $119\div 17$

$= 7$

(c) $(-639)\div(-71)$

$= +[689\div 71]$

$= 9$

(d) $(-108)\div(-12)$

$= +[108\div 12]$

$= 9$

(e) $(-1728)\div 12$

$= -[1728\div 12]$

$= -144$

(f) $(-125)\div(-125)$

$= 1$

(g) $0\div(-278)$

$= 0$

(h) $(-15625)\div 125$

$= -[15625\div 125]$

$= -125$

2. **(a)** $243\div \mathbf{3} = -81$

(b) $(-10)\div 0 =$ **not defined**

(c) $78\div \mathbf{-2} = -39$

(d) $72\div(-8) = \mathbf{-9}$

(e) $143\div \mathbf{-143} = -1$

(f) $968\div(-963) = \mathbf{-1}$

(g) $\mathbf{1352}\div 676 = 2$

(h) $\mathbf{1}\div 0 =$ not defined

MCQS

1. (c) **2.** (a) **3.** (b) **4.** (c) **5.** (b)

6. (a) **7.** (a) **8.** (b) **9.** (a) **10.** (a)

11. (b) **12.** (c)

Chapter 2 : Natural Numbers And Whole Numbers

Exercise-2A

1. Even numbers : 42, 48, 56, 102, 196, 206, 316 and 500

Odd numbers : 37, 39 and 131.

2. **(a)** Successor of 78965 = 78965 + 1

= 78966

(b) Successor of 123789 = 123789 + 1

= 1237890

(c) Successor of 456389 = 456389 + 1

= 456390

(d) Successor of 148392 = 148392 + 1

= 148393

(e) Successor of 512387 = 512387 + 1

= 512388

(f) Successor of 92341 = 92341 + 1

= 92342

(g) Successor of 678396 = 678396 + 1

= 678397

(h) Successor of 99999 = 99999 + 1

= 100000

3. **(a)** Predecessor of $10000 = 10000 - 1$

$= 9999$

(b) Predecessor of $87560 = 87560 - 1$

$= 87559$

(c) Predecessor of $97586 = 97586 - 1$

$= 97585$

(d) Predecessor of $912340 = 912340 - 1$

$= 912339$

(e) Predecessor of $347890 = 347890 - 1$

$= 347889$

(f) Predecessor of $938421 = 938421 - 1$

$= 938420$

(g) Predecessor of $678340 = 678340 - 1$

$= 678339$

(h) Predecessor of $71683 = 71683 - 1$

$= 71682$

4. Six Consecutive natural number just succeeding

$815069 =$ 815070, 815071, 815072, 815073, 815074 and 815075

5. Six consecutive whole numbers just preceeding

$768940 =$ 768939, 768938, 768937, 768936, 768935 and 768934

6. **(a)** T **(b)** F **(c)** T **(d)** T **(e)** F

Exercise-2B

1. **(a)** $516 + 218 =$ **734**

(Closure property of addition)

(b) $317 + 2137 = 2137 +$ **317**

(Commutative property of addition)

(c) $416 + (912 + 309) = (416 +$ **912**$) + 309$

(Associative property of addition)

(d) $(916 + 816) + 413 =$ **916** $+ (816 + 413)$

(Associative property of addition)

(e) $3169 + 0 =$ **3169**

(Additive property of zero)

(f) $1397 +$ **0** $= 1397$

(Additive property of zero)

2. **(a)** 3, 8 and 19

$LHS = a + (b + c) = 3 + (8 + 19)$

$= 3 + 27 = 30$

$RHS = (a + b) + c = (3 + 8) + 19$

$= 11 + 19 = 30$

$LHS = RHS$

The property $a + (b + c) = (a + b) + c$ is verified.

(b) 13, 23 and 41

$LHS = a + (b + c) = 13 + (23 + 41)$

$= 13 + 64 = 77$

$RHS = (a + b) + c = (13 + 23) + 41$

$= 36 + 41 = 77$

$LHS = RHS$

The property $a + (b + c) = (a + b) + c$ is verified.

(c) 11, 17 and 26

$LHS = (a + b) + c = (11 + 17) + 26$

$= 28 + 26 = 54$

$RHS = a + (b + c) = 11 + (17 + 26)$

$= 11 + 43 = 54$

$LHS = RHS$

The property $a + (b + c) = (a + b) + c$ is verified.

(d) 15, 16 and 17

$LHS = a + (b + c) = 15 + (16 + 17)$

$= 15 + 33 = 48$

$RHS = (a + b) + c = (15 + 16) + 17$

$= 31 + 17 = 48$

$LHS = RHS$

The property $a + (b + c) = (a + b) + c$ is verified.

3. **(a)** 16, 28 and 84

Suitable grouping : $(16 + 84) + 28$

$= 100 + 28$

$= 128$

(b) 837, 525 and 163

Suitable grouping : $(837 + 163) + 525$

$= 1000 + 525$

$= 1525$

(c) 192, 375 and 208

Suitable grouping : $(192 + 208) + 375$

$= 400 + 375$

$= 775$

(d) 306, 182 and 318

Suitable grouping : $(306 + 182) + 318$

$= 488 + 318$

$= 806$

(e) 7048, 313, 2952 and 587

Suitable grouping :

$(7048+313)+(2952+587)$

$=7361+3539$

$=10900$

(f) 89, 68, 47, 18, 2, 11, 3 and 12

Suitable grouping :

$(89+11)+(68+12)+(47+3)+(18+2)$

$=(100+80)+(50+20)$

$=180+70$

$=250$

4. (a) $2096+9$

$=2096+(10-1)$

$=2096+10-1$

$=2106-1$

$=2105$

(b) $4816+9$

$=4816+(10-1)$

$=4816+10-1$

$=4826-1$

$=4825$

(c) $1964+99$

$=1964+(100-1)$

$=1964+100-1$

$=2064-1$

$=2063$

(d) $3178+99$

$=3178+(100-1)$

$=3178+100-1$

$=3278-1$

$=3277$

(e) $4196+999$

$=4196+(1000-1)$

$=4196+1000-1$

$=5196-1$

$=5195$

(f) $30968+9999$

$=30968+(10000-1)$

$=30968+10000-1$

$=40968-1$

$=40967$

5. (a)

15	8	13
10	12	14
11	16	9

(b)

2	7	6
9	5	1
4	3	8

(c)

1	14	15	4
8	11	10	5
12	7	6	9
13	2	3	16

(d)

2	15	16	5
9	12	11	6
13	8	7	10
14	3	4	17

Exercise-2C

1. (a) $a=42, b=56$

LHS $=(a-b)=(42-56)=-14$

RHS $=(b-a)=(56-42)=14$

Since, $14\neq -14$

Therefore, $(a-b)\neq(b-a)$

(b) $a=19, b=17$

LHS $=(a-b)=(19-17)=2$

RHS $=(b-a)=(17-19)=-2$

Since, $2\neq -2$

Therefore, $(a-b)\neq(b-a)$

(c) $a=91, b=102$

LHS $=(a-b)=(91-102)$

$=-11$

RHS $=(b-a)=(102-91)$

$=11$

Since, $11\neq -11$

Therefore, $(a-b)\neq(b-a)$

(d) $a=39, b=112$

LHS $=(a-b)=(39-112)$

$=-73$

RHS $=(b-a)=(112-39)$

$=73$

Since, $-73\neq -73$

Therefore, $(a-b)\neq(b-a)$

(e) $a = 453, b = 762$

$\text{LHS} = (a-b) = (453-762)$

$= -309$

$\text{RHS} = (b-a) = (762-453)$

$= 309$

Since, $-309 \neq 309$

Therefore, $(a-b) \neq (b-a)$

(f) $a = 143, b = 918$

$\text{LHS} = (a-b) = (143-918)$

$= -775$

$\text{RHS} = (b-a) = (918-143)$

$= 775$

Since, $-775 \neq 775$

Therefore, $(a-b) \neq (b-a)$

2. (a) $a = 18, b = 15$ and $c = 23$

$\text{LHS} = a-(b-c) = 18-(15-23)$

$= 18-(-8)$

$= 18+8 = 26$

$\text{RHS} = (a-b)-c = (18-15)-23$

$= 3-23$

$= -20$

Since, $26 \neq -20$

Therefore, $a-(b-c) \neq (a-b)-c$

(b) 19, 16 and 41

$a = 19, b = 16$ and $c = 41$

$\text{LHS} = a-(b-c) = 19-(16-41)$

$= 19-(-25)$

$= 19+25 = 44$

$\text{RHS} = (a-b)-c = (19-16)-41$

$= 3-41$

$= -38$

Since, $44 \neq -38$

Therefore, $a-(b-c) \neq (a-b)-c$

(c) 27, 31 and 43

$a = 27, b = 31$ and 43

$\text{LHS} = a-(b-c) = 27-(31-43)$

$= 27-(-12)$

$= 27+12 = 39$

$\text{RHS} = (a-b)-c = (27-31)-43$

$= -4-43$

$= -47$

Since, $39 \neq -47$

Therefore, $a-(b-c) \neq (a-b)-c$

(d) 85, 96 and 32

$a = 85, b = 96$ and $c = 32$

$\text{LHS} = a-(b-c) = 85-(96-32)$

$= 85-64$

$= 21$

$\text{RHS} = (a-b)-c = (85-96)-32$

$= -11-32$

$= -33$

Since, $21 \neq -33$

Therefore, $a-(b-c) \neq (a-b)-c$

3. (a) $4532-1892 = 2640$

4 5 3 2
– 1 8 9 2
2 6 4 0

Check : $1892+2640 = 4532$

Since, $1892+2640 = 4532$, so, our answer is correct.

(b) $100000-45268 = 54732$

1 0 0 0 0 0
– 4 5 2 6 8
5 4 7 3 2

Check : $54732+45268 = 100000$

Since, $54732+45268 = 100000$, so our answer is correct.

(c) $96345-7235 = 89110$

96345
–7235
891 10

Check : $7235+89110 = 96345$

Since, $7235+89110 = 96345$, so our answer is correct.

(d) $91237-90064 = 1173$

91237
–90064
1 173

Check : $90064+1173 = 91237$

Since, $90064+1173 = 91237$, so our answer is correct.

4. (a) $x+7 = 10$

$x+7-7 = 10-7$

(Subtracting 7 on both sides)

$x = 3$

(b) $x-6=4$

$x-6+6=4+6$ (Adding 6 on both sides)

$x=10$

(c) $x-1=17$

$x-1+1=17+1$ (Adding 1 on both sides)

$x=18$

(d) $x+3=9$

$x+3-3=9-3$ (Subtracting 3 on both sides)

$x=6$

(e) $x+18=29$

$x+18-18=29-18$ (Subtracting 18 on both sides)

$x=11$

(f) $x-4=13$

$x-4+4=13+4$ (Adding 4 on both sides)

$x=17$

5. Saksham deposited = ₹ 58500

And he withdrew = ₹ 39400

The money left with him = ₹ (58500 − 39400)

= ₹ 19100

Hence, he was left with ₹ 12700.

6. Dinesh had total amount = ₹ 500000

The cost of a plot = ₹ 398000

So, the amount left with him

= ₹ (500000 − 398000)

= ₹ 102000

Hence, he was left with ₹ 102000 after purchasing the plot.

Exercise-2D

1. (a) $376\times542=\mathbf{542}\times376$

(Commutative property of multiplication)

(b) $4196\times1=\mathbf{4196}$

(Multiplicative property of 1)

(c) $7186\times\mathbf{0}=0$

(Multiplicative property of 0)

(d) $(37\times57)\times96=37\times(\mathbf{57}\times\mathbf{96})$

(Associative property of multiplication)

(e) $50\times500\times5000=500\times\mathbf{5000}\times500$

(Commutative property of multiplication)

(f) $75\times(50+6+8)=75\times50+75\times\mathbf{6}+75\times\mathbf{8}$

(Distributive property of multiplication over addition)

(g) $92\times37+92\times42-92\times16$

$=92\times\mathbf{(37+42-16)}$

(Distributive property of multiplication over subtraction)

(h) $318\times416\times\mathbf{(0)}=0$

(Multiplicative property of 0)

2. (a) $125\times137\times8$

$=(125\times8)\times137$

$=1000\times137$

$=137000$

(b) $625\times729\times16$

$=(625\times16)\times729$

$=10000\times729$

$=7290000$

(c) $285\times40\times5$

$=285\times(40\times5)$

$=285\times200$

$=57000$

(d) $125\times8\times45\times15$

$=(125\times8)\times(45\times15)$

$=1000\times675$

$=675000$

(e) $225\times140\times4\times5$

$=(225\times4)\times(140\times5)$

$=900\times700$

$=630000$

(f) $16\times1947\times25$

$=(16\times25)\times1947$

$=400\times1947$

$=778800$

3. By using distributive property of multiplication over addition.

(a) 487×102

$=487\times(100+2)$

$=487\times100+487\times2$

$=48700+974$

$=49674$

(b) 796×1006

$= 796 \times (1000 + 6)$

$= 796 \times 1000 + 796 \times 6$

$= 796000 + 4776$

$= 800776$

(c) 638×78

$= (600 + 38) \times 78$

$= 600 \times 78 + 38 \times 78$

$= 46800 + 2964$

$= 49764$

(d) 376×93

$= (300 + 76) \times 93$

$= 300 \times 93 + 76 \times 93$

$= 27900 + 7068$

$= 34968$

(e) 912×806

$= 912 \times (800 + 6)$

$= 912 \times 800 + 912 \times 6$

$= 729600 + 5472$

$= 735072$

(f) 549×84

$= (500 + 49) \times 84$

$= 500 \times 84 + 49 \times 84$

$= 42000 + 4116$

$= 46116$

4. By using distributive property of multiplication over subtraction.

(a) 563×98

$= 563 \times (100 - 2)$

$= 563 \times 100 - 563 \times 2$

$= 56300 - 1126$

$= 55174$

(b) 414×990

$= 414 \times (1000 - 10)$

$= 414 \times 1000 - 414 \times 10$

$= 414000 - 4140$

$= 409860$

(c) 436×96

$= 436 \times (100 - 4)$

$= 436 \times 100 - 436 \times 4$

$= 43600 - 1744$

$= 41856$

(d) 897×986

$= 897 \times (1000 - 14)$

$= 897 \times 1000 - 897 \times 14$

$= 897000 - 12558$

$= 884442$

(e) 2056×97

$= 2056 \times (100 - 3)$

$= 2056 \times 100 - 2056 \times 3$

$= 205600 - 6168$

$= 199432$

(f) 678×989

$= 678 \times (1000 - 11)$

$= 678 \times 1000 - 678 \times 11$

$= 678000 - 7458$

$= 670542$

5. **(a)** $625 \times 84 + 625 \times 9 + 625 \times 7$

$= 625 \times (84 + 9 + 7)$

[By using distributive property of multiplication over addition]

$= 625 \times 100$

$= 62500$

(b) $568 \times 999 + 568$

$= 568 \times (999 + 1)$

[By using distributive property of multiplication over addition]

$= 568 \times 1000$

$= 568000$

(c) $493 \times 67 + 493 \times 18 + 493 \times 15$

$= 493 \times (67 + 18 + 15)$

[By using distributive property of multiplication over addition]

$= 493 \times 100$

$= 49300$

(d) $918 \times 1006 - 918 \times 6$

$= 918 \times (1006 - 6)$

[By using distributive property of multiplication over subtraction]

$= 918 \times 1000$

$= 918000$

(e) $3845\times5\times782+769\times25\times218$

$=1538\times25\times5\times782+769\times25\times218$

$=25\times(1538\times5\times782+769\times218)$

[By using distributive property of multiplication over addition]

$=25\times(1538\times3910+167642)$

$=25\times(6013580+167642)$

$=25\times6181222$

$=154530550$

(f) $518\times56+518\times43+518\times18-518\times17$

$=518\times(56+43+18-17)$

$=518\times(117-17)$

[By using distributive property of multiplication over addition or subtraction

$=518\times100$

$=51800$

(g) $4125\times6+4125\times18-4125\times10-4125\times14$

$=4125\times(6+18-10-14)$

$=4125\times(24-24)$

[By using distributive property of multiplication over addition or subtraction

$=4125\times0$

$=0$

(h) $3186\times5+3186\times14-3186\times9$

$=3186\times(5+14-9)$

[By using distributive property of multiplication over addition or subtraction

$=3186\times(19-9)$

$=3186\times10$

$=31860$

6. Yes, the product of two even whole numbers is always an even whole number.

7. The product of two whole numbers will be zero, the one whole number must be zero.

8. If $p=0$

Then, $p+p=p$

$0+0=0$

LHS = RHS

9. The cost of one LCD computer = ₹ 29980

So, total cost of 129 such computers

= ₹ (129×29980)

= ₹ 3867420

Hence, the cost of 129 such computers is ₹ 3867340.

10. The cost of one flat = ₹ 1214500

So, total cost of 132 such flat

= ₹ (132×1214500)

= ₹ 160314000

Hence, the cost of 132 such flats is ₹ 160314000.

Exercise-2E

1. **(a)** $235\div1=$ **235**

(b) $418\div418=$ **1**

(c) $149\div149=$ **1**

(d) $983\div0=$ **not define**

(e) $0\div729=$ **0**

(f) $345\div1=$ **345**

(g) $729\div0=$ **not define**

(h) $976\div$ **1** $=976$

2. **(a)** $472-(472\div1)$

$=472-472$

$=0$

(b) $746+(0\div10)$

$=746+0$

$=746$

(c) $638-(683\div683)$

$=638-1$

$=637$

(d) $94464\div(288-32)$

$=94464\div256$

$=369$

(e) $(15625\div125)\div25$

$=125\div25$

$=5$

(f) $478+(580\div58)$

$=478+10$

$=488$

3. **(a)** By actual division, we have

$\therefore$ dividend = 45683, divisor = 49

quotient = 932 and remainder = 15

Check : We have,

Divisor × Quotient × Remainder

$= 49 \times 932 + 15$

$= 45668 + 15$

$= 45683 = \text{Dividend}$

Hence, the above result is correct.

```
   932
49)45683(
  -441
   158
  -147
    113
    -98
     15
```

(b) By actual division, we have

$\therefore$ dividend = 56812, divisor = 237

quotient = 239 and remainder = 169

Check : We have,

Divisor × Quotient × Remainder

$= 237 \times 239 + 169$

$= 56643 + 169$

$= 56812 = \text{Dividend}$

Hence, the above result is correct.

```
   239
237)56812(
  -474
   941
  -711
    2302
   -2133
     169
```

(c) By actual division, we have

$\therefore$ dividend = 91864, divisor = 53

quotient = 1733 and remainder = 15

Check : We have,

Divisor × Quotient × Remainder

$= 53 \times 1733 + 15$

$= 91849 + 15$

$= 91869 = \text{Dividend}$

Hence, the above result is correct.

```
   1733
53)91864(
  -53100
    388
   -371
     176
    -159
      174
     -159
       15
```

(d) By actual division, we have

$\therefore$ dividend = 91261, divisor = 450

quotient = 202 and remainder = 361

Check : We have,

Divisor × Quotient × Remainder

$= 450 \times 202 + 361$

$= 90900 + 361$

$= 91261 = \text{Dividend}$

Hence, the above result is correct.

```
   202
237)91261(
  -900
   1261
  -900
    361
```

(e) By actual division, we have

$\therefore$ dividend = 31784, divisor = 1000

quotient = 31 and remainder = 784

Check : We have,

Divisor × Quotient × Remainder

$= 1000 \times 31 + 784$

$= 31000 + 784$

$= 31784 = \text{Dividend}$

Hence, the above result is correct.

```
   31
1000)31784(
  -3000
    1784
   -1000
     784
```

(f) By actual division, we have

$\therefore$ dividend = 768123, divisor = 506

quotient = 1518 and remainder = 15

Check : We have,

Divisor × Quotient × Remainder

$= 506 \times 1518 + 15$

$= 768108 + 15$

$= 768123 = \text{Dividend}$

Hence, the above result is correct.

```
   1518
506)768123(
  -506
   2621
  -2530
     912
    -506
     4063
    -4048
       15
```

4. The largest 4-digit number = 9999

We have,

```
32)9999(312
  -96
   39
  -32
    79
   -64
    15
```

Since, the remainder is 15, so, if we subtract 15 from 9999, we get the largest 4-digit number divisible by 32, i.e., $9999 - 15 = 9984$.

Hence, the required number is 9984.

5. The smallest 6-digit number = 100000

We have,

```
43)100000(2325
  -86
   140
  -129
    110
   -86
    240
   -215
     25
```

Since, the remainder is 25, so, if we add $(43 - 25)$ to 100000, we get the smallest 6-digit number divisible by 43, i.e., $100000 + (43 - 25) = 100018$. Hence, the required number is 100018.

6. Dividing 2562 by 41, we have

$$\begin{array}{r|l} 41 & 2562 \\ -246 & 62 \\ \hline 102 & \\ -82 & \\ \hline 20 & \end{array}$$

We get remainder 20

Hence, required number is 20.

7. We have, first we divide 10000 by 28 and find the remainder,

$$\begin{array}{r|l} 28 & 10000 \\ -84 & 357 \\ \hline 160 & \\ -140 & \\ \hline 200 & \\ -196 & \\ \hline 4 & \end{array}$$

Here, remainder = 4

Required number = divisor – remainder

$$= 28 - 4 = 24$$

Thus, required number is 24.

MCQs

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(b)	**5.**	(b)
6.	(c)	**7.**	(c)	**8.**	(a)	**9.**	(b)	**10.**	(a)
11.	(c)	**12.**	(b)	**13.**	(b)	**14.**	**(b)**	**15.**	(b)

CHAPTER 3 : FACTORS AND MULTIPLES

Exercise-3A

1. **(a)** Factors of 15 are 1, 3, 5 and 15.

(b) Factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24.

(c) Factors of 27 are 1, 3, 9 and 27.

(d) Factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18 and 36.

(e) Factors of 89 are 1 and 89.

(f) Factors of 108 are 1, 2, 3, 4, 6, 9, 12, 18, 36, 54 and 108.

(g) Factors of 144 are 1, 2, 3, 4, 6, 9, 12, 18, 24, 36, 48, 72 and 144.

(h) Factors of 95 are 1, 5, 19 and 95.

(i) Factors of 125 are 1, 5, 25 and 125.

(j) Factors of 253 are 1, 11, 23 and 253.

2. **(a)** First six multiples of 5 are 5, 10, 15, 20, 25 and 30.

(b) First six multiples of 7 are 7, 14, 21, 28, 35 and 42.

(c) First six multiples of 8 are 8, 16, 24, 32, 40 and 48.

(d) First six multiples of 9 are 9, 18, 27, 36, 45 and 54.

(e) First six multiples of 15 are 15, 30, 45, 60, 75 and 90.

(f) First six multiples of 19 are 19, 38, 57, 76, 95 and 114.

(g) First six multiples of 22 are 22, 44, 66, 88, 110 and 132.

(h) First six multiples of 33 are 33, 66, 99, 132, 165 and 198.

(i) First six multiples of 37 are 37, 74, 111, 148, 185 and 222.

(j) First six multiples of 47 are 47, 94, 141, 188, 235 and 282.

3. **a, c** and **d.**

4. **(a)** 7, 11, and 13 are the prime numbers between 5 and 17.

(b) 13, 17 and 19 are the prime numbers between 11 and 23.

(c) 19, 23, 29, 31, 37, 41, 43, 47 and 53 are the prime numbers between 18 and 54.

(d) 41, 43, 47, 53, 59, 61 and 67 are the prime numbers between 37 and 69.

(e) 31, 37, 41, 43, 47, 53, 59, 61, 67 and 71 are the prime numbers between 29 and 73.

(f) 61, 67, 71, 73, 79, 83 and 89 are the prime numbers between 59 and 97.

5. Check whether the given numbers are divisible by each of the prime number less than 15 i.e., 2, 3, 5, 7, 11, 13 or not.

(a) 23 is not divisible by any one so it is prime number.

(b) 27 is divisible by 3, so it is not prime number.

(c) 39 is not divisible 3 and 13, so it is not prime number.

(d) 71 is not divisible by any one so it is prime number.

(e) 76 is divisible by 2, 4, so it is not prime number.

(f) 85 is divisible by 5, so it is not prime number.

(g) 93 is not divisible by 3, 31, so it is not prime number.

(h) 115 is divisible by 5, 23, so it is not prime number.

(i) 183 is divisible by 3, 61, so it is not prime number.

(j) 194 is divisible by 2, 97, so it is not prime number.

6. **(a)** $24 = 11+13$ **(b)** $44 = 13+31$

(c) $84 = 13+71$ **(d)** $98 = 19+79$

(e) $100 = 11+89$

7. **(a)** $31 = 5+7+19$ **(b)** $53 = 5+7+41$

(c) $49 = 3+5+41$ **(d)** $63 = 3+7+53$

(e) $61 = 13+17+31$

8. 90, 91, 92, 93, 94, 95 and 96 are seven consecutive composite numbers less than 100.

9. Yes, 9 is the smallest odd composite number.

10. Two consecutive odd prime numbers are known as twin primes. (71, 73), (101, 103) and (107, 109) are all the pairs of twin primes between 70 and 120.

11. No, (3, 4), (4, 9) are co-prime number.

12. (17, 71), (37, 73) and (79, 97).

13. **(a)** T **(b)** F **(c)** F **(d)** T **(e)** F

(f) T **(g)** F **(h)** F

14. **(a)** A number which has only two factors is called a **prime number**.

(b) **1** is neither prime nor composite.

(c) The smallest prime number is **2**.

(d) **2** is the only even prime number.

(e) It is not necessary to being **prime** for co-primes.

Exercise-3B

1. **A number is divisible by 4, if the number by its tens place and unit place is divisible by 4 :**

(a) In 5500, number formed by tens place and unit place digit is 00, which is divisible by 4, so, 5500 is divisible by 4.

(b) In 14560, number formed by tens place and unit place 60, which is divisible by 4, so 14560 is divisible by 4.

(c) In 973008, number formed by tens place and unit place digit is 08, which is divisible by 4, so 973008 is divisible by 4.

(d) In 56318, number formed by tens place and unit place digit is 18, which is divisible by 4, so 56318 is not divisible by 4.

(e) In 21084, number formed by tens place and unit place digit is 84, which is divisible by 4, so 21084 is divisible by 4.

(f) In 29216, number formed by tens place and unit place digit is 16, which is divisible by 4, so 29216 is divisible by 4.

(g) In 32868, number formed by tens place and unit place digit is 68, which is divisible by 4, so 32868 is divisible by 4.

(h) In 10062, number formed by tens place and unit place digit is 62, which is not divisible by 4, so 10062 is not divisible by 4.

(i) In 56344, number formed by tens place and unit place digit is 44, which is divisible by 4, so 56344 is divisible by 4.

(j) In 28232, number formed by tens place and unit place digit is 32, which is divisible by 4, so 28232 is divisible by 4.

A number is divisible by 8 if the number formed by its digit at the hundreds, tens and unit place is divisible by 8 :

(a) In 5500, the number 500 is not divisible by 8, so 5500 is not divisible by 8.

(b) In 14560, the number 560 is divisible by 8, so 14560 is divisible by 8.

(c) In 973008, the number 008 is divisible by 8, so 973008 is divisible by 8.

(d) In 56318, the number 318 is not divisible by 8, so 56318 is not divisible by 8.

(e) In 21084, the number 084 is not divisible by 8, so 21084 is not divisible by 8.

(f) In 29216, the number 216 is divisible by 8, so 29216 is divisible by 8.

(g) In 32868, the number 868 is not divisible by 8, so 32868 is not divisible by 8.

(h) In 10062, the number 062 is not divisible by 8, so 10062 is not divisible by 8.

(i) In 56344, the number 344 is divisible by 8, so 56344 is divisible by 8.

(j) In 21084, the number 084 is not divisible by 8, so 21084 is not divisible by 8.

2. **A number is divisible by 3, if the sum of its digit is divisible by 3 :**

(a) In 9162, sum of its digit $= 9+1+6+2 = 18$.

18 is divisible by 3, so 9162 is also divisible by 3.

(b) In 51670, sum of its digit $= 5+1+6+7+0 = 19$.

19 is not divisible by 3, so 51670 is not divisible by 3.

(c) In 901352, sum of its digit = 9+0+1+3+5+2= 20

20 is divisible by 3, so 901352 is not divisible by 3.

(d) In 639210, sum of its digit = 6+3+9+2+1+0 = 21.

21 is divisible by 3, so 639210 is also divisible by 3.

(e) In 17852, sum of its digit = 1+7+8+5+2= 23.

23 is not divisible by 3, so 17852 is not divisible by 3.

(f) In 62883, sum of its digit = 6+2+8+8+3 = 27.

27 is divisible by 3, so 62883 is also divisible by 3.

(g) In 31734, sum of its digit = 3+1+7+3+4 = 18.

18 is divisible by 3, so 31734 is also divisible by 3.

(h) In 438750, sum of its digit = 4+3+8+7 +5+0 = 27.

27 is divisible by 3, so 438750 is also divisible by 3.

(i) In 21924, sum of its digit = 2+1+9+2+4 = 18.

18 is divisible by 3, so 21924 is also divisible.

(j) In 217505, sum of its digit = 2+1+7+5 +0+5 = 20.

20 is not divisible by 3, so 217505 is not divisible

A number is divisible by 6, if it is divisible by both 2 and 3 :

(a) 9162 is a even number, which is divisible by 2.

And sum of its digit = 9+1+6+2 = 18, which is also divisible by 3.

Hence, 9162 is divisible by 6.

(b) 51670, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 5+1+6+7+0 = 19, which is not divisible by 3.

Hence, 51670 is not divisible by 6.

(c) 901352, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 9+0+1+3+5+2 = 20, which is not divisible by 3.

Hence, 901352 is not divisible by 6.

(d) 639210, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 6+3+9+2+1+0 = 21, which is also divisible by 3.

Hence, 639210 is also divisible by 6.

(e) 17852, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 1+7+8+5+2 = 23, which is not divisible by 3.

Hence, 17852 is not divisible by 6.

(f) 62883, its unit place digit is not even number, which is not divisible by 2.

Hence, 62883 is not divisible by 6.

(g) 31734, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 3+1+7+3+4 = 18, which is also divisible by 3.

Hence, 31734 is divisible by 6.

(h) 438750, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 4+3+8+7+5+0 = 27, which is also divisible by 3.

Hence, 438750 is divisible by 6.

(i) 21924, its unit place digit is even number, which is divisible by 2.

And sum of its digit = 2+1+9+2+4 = 18, which is also divisible by 3.

Hence, 21924 is divisible by 6.

(j) 217505, its unit place digit is not even number, which is not divisible by 2.

Hence, 217505 is not divisible by 6.

A number is divisible by 9, if the sum of its digit is divisible by 9 :

(a) 9162, sum of its digit = 9+1+6+2 = 18, which is divisible by 9.

Hence, 9162 is also divisible by 9.

(b) 51670, sum of its digit = 5+1+6+7+0 = 19, which is not divisible by 9.

Hence, 51670 is not divisible by 9.

(c) 901352, sum of its digit = 9+0+1+3+5 + 2 = 20, which is not divisible by 9.

Hence, 901352 is not divisible by 9.

(d) 639210, sum of its digit 6+3+9+2+1 +1= 21, which is divisible by 9.

Hence, 639210 is also divisible by 9.

(e) 17852, sum of its digit = 1+7+8+5+2 = 23, which is not divisible by 9.

Hence, 17852 is not divisible by 9.

(f) 62883, sum of its digit = $6+2+8+8+3=27$, which is divisible by 9.

Hence, 62883is also divisible by 9.

(g) 31734, sum of its digit = $3+1+7+3+4=18$, which is divisible by 9.

Hence, 31734 is also divisible by 9.

(h) 438750, sum of its digit = $4+3+8+7+5+0=27$, which is divisible by 9.

Hence, 438750 is also divisible by 9.

(i) 21924, sum of its digit = $2+1+9+2+4=18$, which is divisible by 9.

Hence, 21924 is also divisible by 9.

(j) 217505, sum of its digit = $2+1+7+5+0+5=20$, which is not divisible by 9.

Hence, 217505 is not divisible by 9.

3. A number is divisible by 5, if its unit place digit is 0 and 5 :

(a) 67850, its unit place digit is 0, which is divisible by 5. Hence, 67850 is also divisible by 5.

(b) 31863, its unit place digit is 3, which is not divisible by 5. Hence, 31863 is not divisible by 5.

(c) 106005, its unit place digit is 5, which is divisible by 5. Hence, 106005 is also divisible by 5.

(d) 51556, its unit place digit is 6, which is not divisible by 5. Hence, 51556 is not divisible by 5.

(e) 106080, its unit place digit is 0, which is divisible by 5. Hence, 106080 is also divisible by 5.

(f) 71895, its unit place digit is 5, which is divisible by 5. Hence, 71895 is also divisible by 5.

(g) 98146, its unit place digit is 6, which is not divisible by 5. Hence, 98146 is not divisible by 5.

(h) 31895, its unit place digit is 5, which is divisible by 5. Hence, 31895 is also divisible by 5.

(i) 31895, its unit place digit is 5, which is divisible by 5. Hence, 31895 is also divisible by 5.

(j) 51865, its unit place digit is 5, which is divisible by 5. Hence, 51865 is also divisible by 5.

A number is divisible by 10, if its unit place digit is 0 :

(a) 67850, its units place digit is 0, which is divisible by 10. Hence, 67850 is also divisible by 10.

(b) 31863, its units place digit is 3, which is not divisible by 10. Hence, 31863 is not divisible by 10.

(c) 106005, its units place digit is 5, which is divisible by 10. Hence, 106005 is not divisible by 10.

(d) 51556, its units place digit is 6, which is not divisible by 10. Hence, 51556 is not divisible by 10.

(e) 106080, its units place digit is 0, which is divisible by 10. Hence, 106080 is also divisible by 10.

(f) 71895, its units place digit is 5, which is not divisible by 10. Hence, 71895 is not divisible by 10.

(g) 98146, its units place digit is 6, which is not divisible by 10. Hence, 98146 is not divisible by 10.

(h) 7138965, its units place digit is 5, which is not divisible by 10. Hence, 7138965 is not divisible by 10.

(i) 31895, its units place digit is 5, which is not divisible by 10, Hence, 31895 is not divisible by 10.

(j) 51865, its units place digit is 5, which is not divisible by 10. Hence, 51865 is not divisible by 10.

4. A number is divisible by 11, if the difference of the sum of its digit at odd places and the sum of its digit at even places is either 0 or multiple of 11 :

(a) 402479,

Sum of its digit at odd places = $4+2+7 = 13$

Sum of its digit at even places = $0+4+9=13$

So, difference of their sum = $13-13=0$

So, 402479 is divisible by 11.

(b) 724823,

Sum of its digit at odd places = $7+4+2 = 13$

Sum of its digit at even places = $2+8+3=13$

So, difference of their sum = $13-13=0$

So, 724823 is divisible by 11.

(c) 901153

Sum of its digit at odd places = $9+1+5 = 15$

Sum of its digit at even places = $0+1+3=4$

So, difference of their sum = $15-4=11$

Since, 11 is multiple of itself,

So, 901153 is divisible by 11.

(d) 1569543

Sum of its digit at odd places = $1+6+5+3=15$

Sum of its digit at even places = $5+9+4=18$

So, difference = $18-15=3$

Since, 3 is not multiple of 11.

So, 15 = 69543 is not divisible by 11.

(e) 106859

Sum of its digit at odd places $= 1+6+5 \quad = 12$

Sum of its digit at even places $= 0+8+9 = 17$

So, difference $= 17-12 = 5$

Since 5 is not multiple of 11.

So, 106859is not divisible by 11.

(f) 6538164,

Sum of its digit at odd places $= 6+3+1 \quad +4 = 14$

Sum of its digit at even places $= 5+8+6 = 19$

So, difference $= 19-14 = 5$

Since, 5 is not multiple of 11.

So, 6538164 is not divisible by 11.

(g) 5717232,

Sum of its digit at odd places $= 5+1+2 \quad +2 = 10$

Sum of its digit at even places $= 7+7+3 = 13$

So, difference $= 13-10 = 3$

Since, 3 is not multiple of 11.

So, 5717232 is not divisible by 11.

(h) 7138965

Sum of its digit at odd places $= 7+3+9 \quad +5 = 24$

Sum of its digit at even places $= 1+8+6 = 15$

So, difference $= 24-15 = 9$

Since, 9 is not multiple of 11.

So, 7138965 is not divisible by 11.

(i) 786594,

Sum of its digit at odd places $= 7+6+9 \quad = 22$

Sum of its digit at even places $= 8+5+4 = 17$

So, difference $= 22-17 = 5$

Since, 5 is not multiple of 11.

So, 786594 is not divisible by 11.

(j) 413867,

Sum of its digit at odd places $= 4+3+6 \quad = 13$

Sum of its digit at even places $= 1+8+7 = 16$

So, difference $= 16-13 = 3$

Since, 3 is not multiple of 11.

So, 413867 is divisible by 11.

5. **(a)** 768_4

$7+6+8+4 = 25$

27 is the least number greater than 25 which is divisible by 9, so 2 is the smallest digit to be filled in the blanck so that the number so formed is divisible by 9.

Thus, 76824 is divisible by 9.

(b) 912_65

$9+1+2+6+5 = 23$

27 is the least number greater than 23 which is divisible by 9, so 4 is the smallest digit to be filled in the blanck so that the number so formed is divisible by 9.

Thus, 912465 is divisible by 9.

(c) 178_06

$1+7+8+0+6 = 22$

27 is the least number greater than 22 which is divisible by 9, so 5 is the smallest digit to be filled in the blanck so that the number so formed is divisible by 9.

Thus, 178506 is divisible by 9.

(d) 514_21

$5+1+4+2+1 = 13$

13 is the least number greater than 13 which is divisible by 9, so 5 is the smallest digit to be filled in the blanck so that the number so formed is divisible by 9.

Thus, 514521is divisible by 9.

6. A number is said to be divisible by 11, if the difference of 'A' and 'B' is either 0 or multiple of 11, where 'A' is the sum of digits at odd places of the number from the right and 'B' is the sum of digits at even places from the right.

Let's put in the blank space :

S.No.	Number	Sum of all digits at odd places from the right, i.e., 'A'	Sum of all 0 digits at even places from the right, i.e., 'B'	Difference A and B	Value of *
(a)	$92*389$	$9+*+8 = 17+*$	$2+3+9 = 14$	$17+*-14 = 3+*$	For the given no. to be divisible by 11 we must have $3+* = 11$

(b)	$4168*32$	$4+6+*+2 = 12+*$	$1+8+3 = 12$	$12+*-12 = *$	For the given no. to be divisible by 11 we must have $*=0$
(c)	$8*4483$	$8+9+8 = 25$	$*+4+3 = 7+*$	$25-7-* = 18-*$	For the given no. to be divisible by 11 we must have $18-*=11$ i.e., $*=7$
(d)	$71*865$	$7+*+6 = 13+*$	$1+8+5 = 14$	$14-13-* = 1-*$	For the given no. to be divisible by 11 we must have $1-*=0$ i.e., $*=1$

Exercise-3C

(b) Multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 32, 40, 44, 48, 52, 56, 60.

Multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60.

First three common multiples of 4 and 5 are 20, 40, 60.

(c) Multiples of 12 are 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132...

Multiples of 18 are 18, 36, 54, 72, 90, 108, 126, 144....

First three common multiples of 12 and 18 are 36, 72, 108.

(d) Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60... 90 ....

Multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, ... 90, 96

First three common multiples are 30, 60, 90.

(e) Multiples of 3 are 3, 6, ... 30, 33, 36 .... 69, 72, ... 102, 105, 108 .....

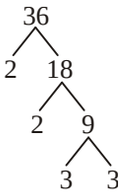
Multiples of 9 are 9, 18, 27, 36 .... 63, 72 ... 99, 108, ...

First three common multiples are 36, 72, 108.

3. Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99.

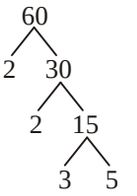
Multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 32, 36 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96.

4. **(a)**



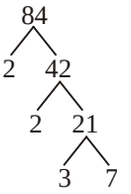
Thus, $2\times2\times3\times3=36$

(b)



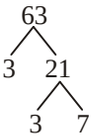
Thus, $2\times2\times3\times5=60$

(c)



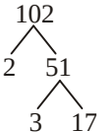
Thus, $2\times2\times3\times7=84$

(d)



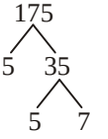
Thus, $3\times3\times7=63$

(e)



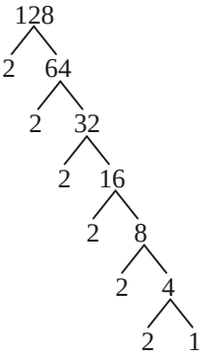
Thus, $2\times3\times17=102$

(f)



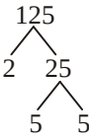
Thus, $5\times5\times7=175$

(g)



Thus, $2\times2\times2\times2\times2\times2\times2=128$

(h)



Thus, $5\times5\times5=125$

5. **(a)**

7	637
7	91
13	13
	1

Thus, $7\times7\times13=7^2\times13$

$=637$

(b)

2	540
2	270
3	135
3	45
3	15
5	5
	1

Thus, $2\times2\times3\times3\times3\times5$

$=2^2\times3^3\times5=540$

(c)

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

Thus, $2\times2\times2\times2\times2\times2\times2\times2$

$= 2^8 = 256$

(d)

2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Thus, $2\times2\times2\times2\times2\times2\times3\times3\times3$

$= 2^6 \times 3^3 = 1728$

(e)

2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

Thus, $2\times2\times2\times2\times2\times2\times2\times2\times2\times2$

$= 2^{10} = 1024$

(f)

2	522
3	261
3	87
29	29
	1

Thus, $2\times3\times3\times29$

$= 2\times3^2\times29 = 522$

(g)

2	1008
2	504
2	252
2	126
3	63
3	21
7	7
	1

Thus, $2\times2\times2\times2\times3\times3\times7$

$= 2^4\times3^2\times7 = 1008$

(h)

2	1276
2	638
11	319
29	29
	1

Thus, $2\times2\times11\times29$

$= 2^2\times11\times29 = 1276$

6. **(a)**

2	44100
2	2250
3	1125
3	375
5	125
5	25
5	5
	1

Thus, $2\times2\times3\times3\times5\times5\times5$

$= 2^2\times3^2\times5^3 = 44100$

(b)

3	6561
3	2187
3	729
3	243
3	81
3	27
3	9
3	3
	1

Thus, $3\times3\times3\times3\times3\times3\times3\times3$

$= 3^8$

(c)

2	91770
3	45885
5	15295
7	3059
19	437
23	23
	1

Thus, $2\times3\times5\times7\times19\times23$

$= 91770$

(d)

5	13915
11	2783
11	253
23	23
	1

Thus, $5\times11\times11\times23$

$= 13915$

(e)

11	17303
11	1573
11	143
13	13
	1

Thus, $11\times11\times11\times13$

$= 11^3\times13$

$= 17303$

(f)

5	175175
5	35035
7	7007
7	1001
11	143
13	13
	1

Thus, $5\times5\times7\times7\times11\times13$

$= 5^2\times7^2\times11\times13$

$= 175175$

(g)

2	145530
3	72765
3	24255
3	8085
5	2695
7	539
7	77
11	11
	1

Thus, $2\times3\times3\times3\times5\times7\times7\times11$

$= 2\times3^3\times5\times7^2\times11 = 145530$

(h)

2	194480
5	97240
11	19448
13	1768
17	136
2	8
2	4
2	2
	1

Thus, $2\times2\times2\times2\times11\times13\times17$

$= 24\times11\times13\times17 = 194480$

Exercise-3D

1. (a) Factors of 18 are 1, 2, 3, 6, 9, 18.

Factors of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24, 48.

Common factors are 1, 2, 3, 6.

So, HCF is 6.

(b) Factors of 18 are 1, 2, 3, 6, 9, 18.

Factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60.

Common factors are 1, 2, 3, 6.

So, HCF is 6.

(c) Factors of 27 are 1, 3, 9, 27.

Factors of 63 are 1, 3, 7, 9, 21 63.

Common factors are 1, 3, 9.

So, HCF is 9.

(d) Factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, 36.

Factors of 84 are 1, 2, 3, 4, 6, 7, 12, 14, 42, 84.

Common factors are 1, 2, 3, 4, 6, 12.

So, HCF is 12.

(e) Factors of 70 are 1, 2, 5, 7, 10, 14, 35, 70.

Factors of 105 are 1, 3, 5, 7, 15, 25, 105.

Common factors are 1, 5, 7, 35.

So, HCF is 35.

(f) Factors of 35 are 1, 5, 7, 35.

Factors of 63 are 1, 3, 7, 9, 63.

Common factors are 1, 7

So, HCF is 7.

2. (a)

47	47
	1

61	61
	1

$47 = 1\times47$

$61 = 1\times61$

So, HCF of $(47, 61) = 1$

(b)

2	84
2	42
2	21
7	7
	1

2	96
2	48
2	24
2	12
2	6
3	3
	1

$84 = 2\times2\times3\times7$

$96 = 2\times2\times2\times2\times2\times3$

So, HCF of $(84, 96) = 2\times2\times3 = 12$

(c)

2	34
17	17
	1

2	102
3	51
17	17
	1

$34 = 2\times17$

$102 = 2\times3\times17$

So, HCF of $(34, 102) = 2\times17 = 34$

(d)

3	225
3	75
5	25
5	5
	1

5	475
5	95
19	19
	1

$225 = 3\times3\times5\times5$

$475 = 5\times5\times19$

So, HCF of $(225, 475) = 5\times5 = 25$

(e)

2	170
5	85
17	17
	1

2	238
7	119
17	17
	1

$170 = 2\times5\times17$

$238 = 2\times7\times17$

So, HCF of $(170, 238) = 2\times17 = 34$

(f)

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	198
3	99
3	33
11	11
	1

$144 = 2\times2\times2\times2\times3\times3$

$198 = 2\times3\times3\times11$

So, HCF of $(144, 198) = 2\times3\times3 = 18$

(g)

2	18
3	9
3	3
	1

2	54
3	27
3	9
3	3
	1

3	81
3	27
3	9
3	3
	1

$18 = 2 \times 3 \times 3$

$54 = 2 \times 3 \times 3 \times 3$

$81 = 3 \times 3 \times 3 \times 3$

So, HCF of $(18, 54, 81) = 3 \times 3 = 9$

(h)

2 | 72
2 | 36
2 | 18
3 | 9
3 | 3
| 1

2 | 120
2 | 60
2 | 30
3 | 15
5 | 5
| 1

5 | 145
29 | 29
| 1

$72 = 1 \times 2 \times 2 \times 2 \times 3 \times 3$

$120 = 1 \times \times 2 \times 2 \times 2 \times 3 \times 5$

$145 = 1 \times 5 \times 29$

So, HCF of $(72, 120, 145) = 1$

(i)

2 | 84
2 | 42
3 | 21
7 | 7
| 1

2 | 120
2 | 60
2 | 30
3 | 15
5 | 5
| 1

2 | 138
3 | 69
23 | 23
| 1

$84 = 2 \times 2 \times 3 \times 7$

$120 = 2 \times 2 \times 2 \times 3 \times 5$

$138 = 2 \times 3 \times 23$

So, HCF of $(84, 120, 138) = 2 \times 3 = 6$

(j)

2 | 106
53 | 53
| 1

3 | 159
53 | 53
| 1

5 | 265
53 | 53
| 1

$106 = 2 \times 53$

$159 = 3 \times 53$

$265 = 5 \times 53$

So, HCF of $(106, 159, 265) = 53$

(k)

2 | 144
2 | 72
2 | 36
2 | 18
3 | 9
3 | 3
| 1

2 | 252
2 | 126
3 | 63
3 | 21
7 | 7
| 1

2 | 630
3 | 315
3 | 105
5 | 35
7 | 7
| 1

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$

$252 = 2 \times 2 \times 3 \times 3 \times 7$

$630 = 2 \times 3 \times 3 \times 5 \times 7$

So, HCF of $(144, 252, 630) = 2 \times 3 \times 3 = 18$

(l)

2 | 522
3 | 261
3 | 87
29 | 29
| 1

2 | 1276
2 | 638
11 | 319
29 | 29
| 1

2 | 1624
2 | 812
2 | 406
7 | 203
29 | 29
| 1

$522 = 2 \times 3 \times 3 \times 29$

$1276 = 2 \times 2 \times 11 \times 29$

$1624 = 2 \times 2 \times 2 \times 7 \times 29$

So, HCF of $(522, 1276, 1624) = 2 \times 29 = 58$

3. (a)

$225 \overline{)425} (1$
-225
$200 \overline{)225} (1$
-200
$25 \overline{)200} (8$
-200
$\times$

Hence, the HCF of 225 and 425 is 25.

(b)

$95 \overline{)171} (1$
-95
$76 \overline{)95} (1$
-76
$19 \overline{)76} (4$
-76
$\times$

Hence, the HCF of 95 and 171 is 19.

(c)

$2241 \overline{)8217} (3$
-6723
$1494 \overline{)2241} (1$
-1494
$747 \overline{)1494} (2$
-1494
$\times$

Hence, the HCF of 2241 and 8217 is 747.

(d)

$1045 \overline{)1520} (1$
-1045
$475 \overline{)1045} (1$
-950
$95 \overline{)475} (5$
475
$\times$

Hence, the HCF of 1045 and 1520 is 95.

(e) First we find the HCF of 91 and 112.

$91 \overline{)112} (1$
-91
$21 \overline{)91} (4$
-84
$7 \overline{)21} (3$
-21
$\times$

Thus, the HCF of 91 and 112 is 7. Now, we find the HCF of 7 and 49.

$$7\overline{)49}\,(3$$
$$\underline{49}$$
$$\times$$

The HCF of 7 and 49 is 7.

Hence, the HCF of 91, 112 and 49 is 7.

(f)
$$4875\overline{)7845}\,(1$$
$$-4875$$
$$2970\overline{)4875}\,(1$$
$$-2970$$
$$1905\overline{)2970}\,(1$$
$$-1905$$
$$1065\overline{)1905}\,(1$$
$$-1065$$
$$840\overline{)1065}\,(1$$
$$-840$$
$$225\overline{)840}\,(3$$
$$-675$$
$$165\overline{)225}\,(1$$
$$-165$$
$$60\overline{)165}\,(1$$
$$-120$$
$$45\overline{)60}\,(1$$
$$45$$
$$15\overline{)45}\,(3$$
$$45$$
$$\times$$

Hence, the HCF of 4875 and 7845 is 15.

(g) First we find the HCF of 475 and 650.

$$475\overline{)650}\,(1$$
$$-475$$
$$175\overline{)475}\,(2$$
$$-350$$
$$125\overline{)175}\,(1$$
$$-125$$
$$50\overline{)125}\,(2$$
$$-100$$
$$25\overline{)50}\,(2$$
$$-50$$
$$\times$$

Thus, the HCF of 475 and 650 is 25.

Now, we find the HCF of 25 and 825

$$25\overline{)825}\,(33$$
$$-825$$
$$\times$$

The HCF of 25 and 825 is 25.

Hence, the HCF of 475, 650 and 825 is 25.

(h) First we find the HCF of 106 and 159.

$$106\overline{)159}\,(1$$
$$-106$$
$$53\overline{)106}\,(2$$
$$-106$$
$$\times$$

Thus, the HCF of 106 and 159 is 53.

Now, we find the HCF of 53 and 265

$$53\overline{)265}\,(5$$
$$-265$$
$$\times$$

The HCF of 53 and 265 is 53.

Hence, the HCF of 106, 157, 265 is 53.

(i) First we find the HCF of 658 and 940.

$$658\overline{)940}\,(1$$
$$-658$$
$$282\overline{)658}\,(2$$
$$-564$$
$$94\overline{)282}\,(3$$
$$-282$$
$$\times$$

Thus, the HCF of 658 and 940 is 94.

Now, we find the HCF of 94 and 1128

$$94\overline{)1128}\,(12$$
$$-1128$$
$$\times$$

The HCF of 94 and 1128 is 94.

Hence, the HCF of 658, 940 and 1079 is 94.

(j) First we find the HCF of 101 and 573.

$$101\overline{)573}\,(5$$
$$-505$$
$$68\overline{)101}\,(2$$
$$-68$$
$$33\overline{)68}\,(2$$
$$-66$$
$$2\overline{)33}\,(16$$
$$-32$$
$$1\overline{)2}\,(1$$

Thus, the HCF of 101 and 573 is 1.

Now, we find the HCF of 1 and 1079.

$$1\overline{)1079}\,(1079$$
$$-1079$$
$$\times$$

The HCF of 1 and 1079 is 1.

Hence, the HCF of 101, 573 and 1079 is 1.

(k) First we find the HCF of 7800 and 5136.

$$5136\overline{)7800}\,(1$$
$$-5136$$
$$2664\overline{)5136}\,(1$$
$$-2664$$
$$2472\overline{)2664}\,(1$$
$$-2472$$
$$192\overline{)2472}\,(12$$
$$-2304$$
$$168\overline{)192}\,(1$$
$$-168$$
$$24\overline{)168}\,(7$$
$$-168$$
$$\times$$

Thus, the HCF of 7800 and 5136 is 24.

Now, we find the HCF of 24 and 1560.

$$24\overline{)1560}(65$$
$$-1560$$
$$\times$$

The HCF of 24 and 1560 is 24.

Hence, the HCF of 7800, 5136 and 1560 is 24.

(l) First we find the HCF of 2176 and 3008.

$$2176\overline{)3008}(1$$
$$-2176$$
$$832\overline{)2176}(2$$
$$-1664$$
$$512\overline{)832}(1$$
$$-512$$
$$320\overline{)512}(1$$
$$-320$$
$$192\overline{)320}(1$$
$$-192$$
$$128\overline{)192}(1$$
$$-128$$
$$64\overline{)128}(2$$
$$-128$$
$$\times$$

Thus, the HCF of 2176 and 3008 is 64.

Now, we find the HCF of 64 and 1824.

$$64\overline{)1824}(28$$
$$-1742$$
$$32\overline{)64}(2$$
$$-64$$
$$\times$$

The HCF of 64 and 1824 is 32.

Hence, the HCF of 2176, 3008 and 1824 is 32.

4. Two numbers are known as co-primes if they have not a common factor other than 1.

(a) Find HCF of 23 and 79.

Thus, the HCF of 23 and 79 is 1.

Since HCF of 23 and 79 is 1.

So, 23 and 79 are co-primes.

$$23\overline{)79}(3$$
$$-69$$
$$10\overline{)23}(2$$
$$-20$$
$$10\overline{)10}(3$$
$$-9$$
$$1\overline{)3}(3$$
$$-3$$
$$\times$$

(b) Find the HCF of 39 and 68.

Thus, the HCF of 39 and 68 is 1.

Since HCF of 39 and 68 is 1.

So, 39 and 68 are co-primes.

$$39\overline{)68}(1$$
$$-39$$
$$29\overline{)39}(2$$
$$-29$$
$$10\overline{)29}(2$$
$$-20$$
$$9\overline{)10}(3$$
$$-9$$
$$1\overline{)9}(9$$
$$-9$$
$$\times$$

(c) Find the HCF of 47 and 61.

Thus, the HCF of 47 and 61 is 1.

Since HCF of 47 and 61 is 1.

So, 47 and 61 are co-primes.

$$39\overline{)68}(1$$
$$-39$$
$$29\overline{)39}(2$$
$$-29$$
$$10\overline{)29}(2$$
$$-20$$
$$9\overline{)10}(3$$
$$-9$$
$$1\overline{)9}(9$$
$$-9$$
$$\times$$

(d) Find the HCF of 315 and 475.

Thus, the HCF of 315 and 475 is 5.

Since HCF of 315 and 475 is 1.

So, 315 and 475 are not co-primes.

$$315\overline{)475}(1$$
$$-315$$
$$160\overline{)315}(1$$
$$-160$$
$$155\overline{)160}(1$$
$$-155$$
$$5\overline{)155}(31$$
$$-155$$
$$\times$$

(e) Find the HCF of 81 and 118.

Thus, the HCF of 81 and 118 is 1.

Since HCF of 81 and 118 is 1.

So, 81 and 118 are co-primes.

$$81\overline{)118}(1$$
$$-81$$
$$37\overline{)81}(2$$
$$-74$$
$$7\overline{)37}(5$$
$$-35$$
$$2\overline{)7}(2$$
$$-6$$
$$1\overline{)2}(2$$
$$-2$$
$$\times$$

(f) Find the HCF of 512 and 945.

$$512\overline{)945}(1$$
$$-512$$
$$433\overline{)512}(2$$
$$-433$$
$$79\overline{)433}(5$$
$$-395$$
$$38\overline{)79}(2$$
$$-76$$
$$3\overline{)38}(12$$
$$-36$$
$$2\overline{)3}(1$$
$$-2$$
$$1\overline{)2}(2$$
$$-2$$
$$\times$$

Thus, the HCF of 512 and 945 is 1.

Since HCF of 512 and 945 is 1.

So, 512 and 945 are co-primes.

5. (a) The HCF of two consecutive numbers is 1, as 1 is the only common factor in two consecutive numbers.

(b) The HCF of two consecutive odd numbers is 1, as 1 is the only common factor in two consecutive odd numbers.

(c) The HCF of two consecutive even numbers is 2, as 2 is the only common factor in two consecutive even numbers.

(d) The HCF of any two primes hence two consecutive prime numbers is 1.

6. Clearly, we must the greatest number which divides $(245-5)$ and $(1030-6)$ exactly.

$$\begin{array}{l} 240\overline{)1024}(4 \\ \quad -960 \\ \quad\overline{\quad 64\overline{)240}(3} \\ \quad\quad -192 \\ \quad\quad\overline{\quad 48\overline{)64}(1} \\ \quad\quad\quad -48 \\ \quad\quad\quad\overline{\quad 16\overline{)48}(3} \\ \quad\quad\quad\quad -48 \\ \quad\quad\quad\quad\overline{\quad\times} \end{array}$$

So, the required number = HCF of 240 and 1024 = 16.

Hence, the required number is 16.

7. Clearly, we must the greatest number which divides $(245-5)$ and $(1029-5)$ exactly.

$$\begin{array}{l} 246\overline{)1024}(4 \\ \quad -960 \\ \quad\overline{\quad 64\overline{)240}(3} \\ \quad\quad -192 \\ \quad\quad\overline{\quad 48\overline{)64}(1} \\ \quad\quad\quad -48 \\ \quad\quad\quad\overline{\quad 16\overline{)48}(3} \\ \quad\quad\quad\quad -48 \\ \quad\quad\quad\quad\overline{\quad\times} \end{array}$$

So, the required number = HCF of 240 and 1024 = 16.

Hence, the required number is 16.

7. The greatest number = HCF of $(530-8)$, $(1279-3)$ and $(1629-5)$.

= HCF of 522, 1276 and 1624.

We first find the HCF of 522 and 1276.

$$\begin{array}{l} 522\overline{)1276}(2 \\ \quad -1044 \\ \quad\overline{\quad 232\overline{)522}(2} \\ \quad\quad -464 \\ \quad\quad\overline{\quad 58\overline{)232}(4} \\ \quad\quad\quad -232 \\ \quad\quad\quad\overline{\quad\times} \end{array}$$

$\therefore$ HCF of 522 and 1276 is 58.

Now, we find the HCF of 58 and 1624.

$\therefore$ HCF of 522, 1276 and 1624 is 58.

Hence, the greatest number is 58.

$$\begin{array}{l} 58\overline{)1624}(28 \\ \quad -1624 \\ \quad\overline{\quad\times} \end{array}$$

Exercise-3E

1. **(a)** Multiple of 3 are : 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60 .....

Multiples of 5 are : 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60 .....

Multiples of 12 are : 12, 24, 36, 48, 60 .....

Common multiples of 3, 5, and 12 are : 60, 120.

Hence, LCM of 3, 5 and 12 is 60.

(b) Multiples of 4 are : 4, 8, 12, 16, 20, 24, 28, 32, 36.

Multiples of 6 are : 6, 12, 18, 24, 30, 36, 42, 48, 54.

Multiples of 8 are : 8, 16, 24, 32, 40, 48, 56, 64.

Common multiples of 4, 6 and 8 are : 24, 48, 72, ...

Hence, LCM of 4, 6 and 8 is 24.

(c) Multiples of 6 are : 6, 12, 18, 24, 30, 36, 42, 48, 54, ...

Multiples of 8 are : 8, 16, 24, 32, 40, 48, 56, 64, 72, ...

Multiples of 12 are : 12, 24, 36, 48, 60, 72, 84, ...

Common multiples are 24, 48, 72, ...

Hence, LCM of 6, 8 and 12 is 24.

(d) Multiples of 5 are : 5, 10, 15, 20, 25, 30, 35, 40, 45, ...

Multiples of 10 are : 10, 20, 30, 40, 50 , 60, 70, 80, 90, ...

Common multiples are : 15, 30, 45, 60, 90, 120, ...

Hence, LCM of 5, 10 and 15 is 30.

(e) Multiples of are : 8, 16, 24, 40, 32, 48, 56, 64, ...

Multiples of 12 are : 12, 24, 36, 48, 60, 72, 84, 96, ...

Common multiples are : 24, 48, 72, ...

Multiples of 24 are : 24, 48, 72, ...

Hence, the LCM of 8, 12 and 24 is 24.

(f) Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, ... 72, 75, ...

Multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, 54, ... 72, 78, ...

Multiples of 9 are : 9, 18, 27, 36, 45, 54, 63, 72, ...

Multiples of 18 are 18, 36, 54, 72, ...

Common multiples are : 18, 36, 54, ...

Hence, the LCM of 3, 6, 9 and 18 is 18.

2. **(a)** We have,

2	80
2	40
2	20
2	10
5	5
	1

2	108
2	54
3	27
3	9
3	3
	1

$80 = 2^4 \times 5$

$108 = 2^2 \times 3^3$

LCM of 80 and $108 = 2^4 \times 3^3 \times 5 = 2160$

Hence, LCM of 80 and 108 is 2160.

(b) We have,

5	85
17	17
	1

7	119
17	17
	1

$85 = 5 \times 17$

$119 = 7 \times 17$

LCM of 85 and $119 = 5 \times 7 \times 17 = 595$

Hence, LCM of 85 and 119 is 595.

(c) We have

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	180
2	90
3	45
3	15
5	5
	1

$144 = 2^4 \times 3^2$

$180 = 2^2 \times 3^2 \times 5$

LCM of 144 and $180 = 2^4 \times 3^2 \times 5 = 720$

Hence, LCM of 144 and 180 is 720.

(d) We have,

3	45
3	15
5	5
	1

3	105
5	35
7	7
	1

3	165
5	55
11	11
	1

$45 = 3^2 \times 5$

$105 = 3 \times 5 \times 7$

$165 = 3 \times 5 \times 11$

LCM of 45, 105 and $165 = 3^2 \times 5 \times 7 \times 11 = 3466$

Hence, LCM of 45, 105 and 165 is 3466.

(e) We have

2	180
2	90
3	45
3	15
5	5
	1

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	384
2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

$180 = 2^2 \times 3^2 \times 5$

$144 = 2^4 \times 3^2$

$384 = 27 \times 3$

LCM of 180, 144 and $384 = 2^7 \times 3^2 \times 5 = 5760$

Hence, LCM of 180, 144 and 384 is 5760.

(f) We have,

2	108
2	54
3	27
3	9
3	3
	1

3	135
3	45
3	15
5	5
	1

2	162
3	81
3	27
3	9
3	3
	1

$108 \times 2^2 \times 3^3$

$135 = 3^3 \times 5$

$162 = 2 \times 3^4$

LCM of 108, 135 and $162 = 2^2 \times 3^4 \times 5 = 1620$

Hence, LCM of 108, 135 and 162 is 1620.

(g) We have,

2	106
53	53
	1

3	159
53	53
	1

7	371
53	53
	1

$106 = 2 \times 53; 159 = 3 \times 53; 371 = 7 \times 53$

LCM of 106, 159 and $371 = 2 \times 3 \times 7 \times 53 = 2226$

Hence, LCM of 106, 159 and 371 is 2226.

(h) We have,

3	45
3	15
5	5
	1

3	105
5	35
7	7
	1

2	180
2	90
3	45
3	15
5	5
	1

$45 = 3^2 \times 5; 105 = 3 \times 5 \times 7$ and $180 = 2^2 \times 3^2 \times 5$

LCM of 45, 105 and $180 = 2^2 \times 3^2 \times 5 \times 7 = 1260$

Hence, LCM of 45, 105 and 180 is 1260.

(i)

2 | 20
2 | 10
5 | 5
| 1

5 | 25
5 | 5
| 1

2 | 30
3 | 15
5 | 5
| 1

2 | 40
2 | 20
2 | 10
5 | 5
| 1

$20 = 2^2 \times 5$; $25 = 5^2$; $30 = 2 \times 3 \times 5$ and

$40 = 2^3 \times 5$

LCM of 20, 25, 30 and $40 = 2^3 \times 3 \times 5^2 = 600$

Hence, LCM of 20, 25, 30 and 40 is 600.

(j) We have,

2 | 150
3 | 75
5 | 25
5 | 5
| 1

3 | 225
3 | 75
5 | 25
5 | 5
| 1

3 | 375
5 | 125
5 | 25
5 | 5
| 1

$150 = 2 \times 3 \times 5^2$; $225 = 3^2 \times 5^2$; $375 = 3 \times 5^3$

LCM of 150, 225 and $375 = 2 \times 3^2 \times 5^3 = 2250$

(k) We have,

2 | 112
2 | 56
2 | 28
2 | 14
7 | 7
| 1

2 | 168
2 | 84
2 | 42
3 | 21
7 | 7
| 1

2 | 266
133 | 133
| 1

$112 = 2^4 \times 7$; $168 = 2^3 \times 3 \times 7$; $266 = 2 \times 133$

LCM of 112, 168 and 266

$= 2^4 \times 3 \times 7 \times 133 = 44688$

Hence, LCM of 112, 168 and 266 is 44688.

(l) We have,

2 | 80
2 | 40
2 | 20
2 | 10
5 | 5
| 1

2 | 120
2 | 60
2 | 30
3 | 15
5 | 5
| 1

2 | 180
2 | 90
3 | 45
3 | 15
5 | 5
| 1

$80 = 2^4 \times 5$; $120 = 2^3 \times 3 \times 5$;

$180 = 2^2 \times 3^2 \times 5$

LCM of 80, 120 and $180 = 2^4 \times 3^2 \times 5 = 720$

Hence, LCM of 80, 120 and 180 is 720.

3. (a) We have,

2 | 22, 54, 108, 135
2 | 11, 27, 54, 135
3 | 11, 27, 27, 135
3 | 11, 9, 9, 45
3 | 11, 3, 3, 15
5 | 11, 1, 1, 5
11 | 11, 1, 1, 1
| 1, 1, 1, 1

Since LCM of 22, 54, 108 and 135

$= 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 11 = 5940$

Hence, LCM of 22, 54, 108 and 135 is 5940.

(b) We have,

2 | 49, 99, 108, 144
2 | 49, 99, 54, 72
2 | 49, 99, 27, 36
2 | 49, 99, 27, 18
3 | 49, 99, 27, 9
3 | 49, 33, 9, 3
3 | 49, 11, 3, 1
7 | 49, 11, 1, 1
7 | 7, 11, 1, 1
11 | 1, 11, 1, 1
| 1, 1, 1, 1

Since LCM of 49, 99, 108 and 144

$= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 7 \times 7 \times 11$

$= 232848$

Hence, LCM of 49, 99, 108 and 144 is 232848.

(c) We have,

2 | 36, 60, 84, 90
2 | 18, 30, 42, 30
3 | 9, 15, 21, 15
3 | 3, 5, 7, 5
5 | 1, 5, 7, 5
7 | 1, 1, 7, 1
| 1, 1, 1, 1

Since LCM of 36, 60, 84 and 90

$= 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 1260$

Hence, LCM of 36, 60, 84 and 90 is 1260.

(d) We have,

2 | 35, 105, 140, 180
2 | 35, 105, 70, 90
3 | 35, 105, 35, 45
3 | 35, 35, 35, 15
5 | 35, 35, 35, 5
7 | 7, 7, 7, 1
| 1, 1, 1, 1

Since LCM of 35, 105, 140 and 180

$= 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 1260$

Hence, LCM of 35, 105, 140 and 180 is 1260.

(e) We have,

2 | 68, 119, 120, 140
2 | 34, 119, 60, 70
2 | 17, 119, 30, 35
3 | 17, 119, 15, 35
5 | 17, 119, 5, 35
7 | 17, 119, 1, 7
17 | 17, 17, 1, 1
| 1, 1, 1, 1

Since LCM of 68, 119, 120 and 140

$= 2\times2\times2\times3\times5\times7\times17$

$= 14280$

Hence, LCM of 68, 119, 120 and 140 is 14 280.

(f) We have,

2	90, 120, 150, 160
2	45, 60, 75, 80
2	45, 30, 75, 40
2	45, 15, 75, 20
2	45, 15, 75, 10
3	45, 15, 75, 5
3	15, 5, 25, 5
5	5, 5, 25, 5
5	1, 1, 5, 1
	1, 1, 1, 1

Since LCM of 90, 120, 150 and 160

$= 2\times2\times2\times2\times2\times3\times3\times3\times5\times5$

$= 7200$

Hence, LCM of 90, 1 = 20, 150 and 160 is 7200.

(g) We have,

2	225, 150, 300, 375
2	225, 75, 150, 375
3	225, 75, 75, 375
3	75, 25, 25, 125
5	25, 25, 25, 125
5	5, 5, 5, 25
5	1, 1, 1, 5
	1 1 1 1

Since LCM of 225, 150, 300 and 375

$= 2\times2\times3\times3\times5\times5\times5 = 4500$

Hence, LCM of 225, 150, 300 and 375 is 4500.

(h) We have,

2	45, 108, 144, 180
2	45, 54, 72, 90
2	45, 27, 36, 45
2	45, 27, 18, 45
3	45, 27, 9, 45
3	15, 9, 3, 15
3	5, 3, 1, 5
5	5, 1, 1, 5
	1, 1, 1, 1

Since, LCM of 45, 108, 144 and 180

$= 2\times2\times2\times2\times3\times3\times3\times5 = 2160$

Hence, LCM of 45, 108, 144 and 180 is 2160.

(i) We have,

2	52, 78, 108, 117
2	26, 39, 54, 117
3	13, 39, 27, 117
3	13, 13, 9, 39
3	13, 13, 3, 13
13	13, 13, 1, 13
	1, 1, 1, 1

Since, LCM of 52, 78, 108 and 117

$= 2\times2\times3\times3\times3\times13 = 1404$

Hence, LCM of 52, 78, 108 and 117 is 1404.

(j) We have,

2	45, 64, 96, 120, 144
2	45, 32, 48, 60, 72
2	45, 16, 24, 30, 36
2	45, 8, 12, 15, 18
2	45, 4, 6, 15, 9
2	45, 2, 3, 15, 9
3	45, 1, 3, 15, 9
3	15, 1, 1, 5, 3
5	5, 1, 1, 5, 1
	1, 1, 1, 1, 1

Since LCM of 45, 64, 96, 120 and 144

$= 2\times2\times2\times2\times2\times2\times3\times3\times5 = 2880$

Hence, LCM of 45, 64, 96 and 120 is 2880.

(k) We have,

2	180, 144, 200, 240
2	90, 72, 100, 120
2	45, 36, 50 , 60
2	45, 18, 25, 30
3	45, 9, 25, 15
3	15, 3, 25, 5
5	5, 1, 25, 5
5	1, 1, 5, 1
	1 1, 1, 1

Since, LCM of 180, 144, 200 and 240

$= 2\times2\times2\times2\times3\times3\times5\times5 = 3600$

Hence, LCM of 180, 144, 200 and 240 is 3600.

(l) We have,

2	350, 108, 54, 220
2	175, 54 27, 110
3	175, 27, 27, 55
3	175, 9, 9, 55
3	175, 3, 3, 55
5	175, 1, 1, 55
5	35, 1, 1, 11
7	7, 1, 1, 11
11	1, 1, 1, 11
	1, 1, 1, 1

Since LCM of 350, 108, 54 and 220

$= 2\times2\times3\times3\times3\times5\times5\times7\times11$

$= 207900$

Hence, LCM of 350, 108, 54 and 220 is 207900.

4. We first the LCM of 45, 108, 144 and 180.

2	45, 108, 144, 180
2	45, 54, 72, 90
2	45, 27, 36, 45
2	45, 27, 18, 45
3	45, 27, 9, 45
3	15, 9, 3, 15
3	5, 3, 1, 5
5	5, 1, 1, 5
	1, 1, 1, 1

So, LCM of 45, 108, 144 and 180

$= 2\times2\times2\times2\times3\times3\times3\times5$

$= 2160$

Here, 2160 is the least number which when divided by 45, 108, 144 and 180 leaves a remainder 0 in each case.

Hence, the required least number = 2160 + 12

$= 2172$

5. We first find the LCM of 112, 168, 266 and 399.

2	112, 168, 266, 399
2	56, 84, 133, 133
2	28, 42, 133, 133
2	14, 21, 133, 133
3	7, 21, 133, 133
7	7, 7, 133, 133
133	1, 1, 133, 133
	1, 1, 1, 1

So, LCM of 112, 168, 266 and 399

$= 2\times2\times2\times2\times3\times7\times133$

$= 44688$

Here, 44688 is the least number which when divided by 112, 168, 266 and 399 leaves a remainder 0 in each case.

Hence, the required least number = 44688 + 11 = 44699

6. We first find the LCM of 18, 24, 64 and 108.

2	18, 24, 64, 108
2	9, 12, 32, 54
2	9, 6, 16, 27
2	9, 3, 8, 27
2	9, 3, 4, 27
2	9, 3, 2, 27
3	9, 3, 1, 27
3	3, 1, 1, 9
3	1, 1, 1, 3
	1, 1, 1, 1

So, LCM of 18, 24, 64 and 108

$= 2\times2\times2\times2\times2\times2\times3\times3\times3$

$= 1728$

Here, 1728 is the least number which when divided by 18, 24, 64 and 108 leaves a remainder 0 in each case.

Hence, the required least number = 1728 – 3 = 1725

7. We first find the LCM of 36, 60, 75 and 180.

2	36, 60, 75, 180
2	18, 30, 75, 90
3	9, 15, 75, 45
3	3, 5, 25, 15
5	1, 5, 25, 5
5	1, 1, 5, 1
	1, 1, 1, 1

$900\overline{)99999}(111$
-900
999
-900
999
-900
99

Since LCM of 36, 60, 75 and 180

$= 2\times2\times3\times3\times5\times5 = 900$

Now, greatest number of 5-digits = 99999.

We find that when 99999 is divided by 900, the remainder is 99.

So, the greatest number of six digit exactly divisible by 36, 60, 75 and 180 = 99999 – 99 = 99900

Hence, the required number = 99900.

Exercise-3F

1. To find the maximum capacity of the container that can measure the kerosene oil of the two tanks exact number of times, we need to find the HCF of 850 and 680.

$680\overline{)850}(1$
-680
$170\overline{)680}(4$
-680
$\times$

Since HCF of 850 and 680 is 170.

Hence, the maximum capacity of the tank = 170 litre.

2. To find the longest tape which can measure the two dimensions of the park exactly.

We need to find the HCF of 185 and 145.

$145\overline{)185}(1$
-145
$40\overline{)145}(3$
-120
$25\overline{)40}(1$
-25
$15\overline{)25}(1$
-15
$10\overline{)15}(1$
-10
$3\overline{)10}(2$
-10
$\times$

Since HCF of 185 and 145 is 5.

Hence, the longest tape that can measure the two dimensions exactly is 5 m long.

3. To find the capacity of the container that can measure the diesel of the three containers exact number of times, we need to find the HCF of 403, 434 and 465.

All possible prime factors of $403 = 13 \times 31$

All possible prime factors of $434 = 2 \times 7 \times 31$

All possible prime factors of $465 = 3 \times 5 \times 31$

The common factors of 403, 434 and 465 is 31.

Therefore, HCF of 403, 434 and 465 is 31.

Hence, the maximum capacity of the container = 31*l*.

4. Measure of their steps is 63 cm, 70 cm and 77 cm. Minimum distance each should cover is obtained by finding the LCM of 63, 70 and 77.

2	63, 70, 77
3	63, 35, 77
3	21, 35, 77
5	7, 35, 77
7	7, 7, 77
11	1, 1, 11
	1, 1, 1

Therefore, LCM = $2 \times 3 \times 3 \times 5 \times 7 \times 11 = 6930$ cm

Here, the least distance that can be covered in complete steps is 69.30 m.

5. Required time = LCM of 9, 15 and 18 minutes

2	9, 15, 18
3	9, 15, 9
3	3, 5, 3
5	1, 5, 1
	1, 1, 1

So, LCM of 9, 12 and 18 = $2 \times 3 \times 3 \times 5 = 90$ minutes

So, all the bells will toll together again after 90 minutes i.e., 10 : 45 + 1 : 30 = 12 : 15 PM.

6. Let's find the LCM of 48, 72 and 108.

2	48, 72, 108
2	24, 36, 54
2	12, 18, 27
3	6, 9, 27
3	2, 3, 9
	2, 1, 3

The LCM of 48, 72, and 108

$$= 2 \times 2 \times 2 \times 3 \times 3 \times 2 \times 3 = 432$$

i.e., 432 seconds or 7 minutes 12 seconds.

Therefore, the traffic lights will change simultaneously again at 8 : 07 : 12 a.m. or 7 minutes 12 seconds past 8 a.m.

7. The required distance is

2	60, 75, 90, 108
2	30, 75, 45, 54
3	15, 75, 45, 27
3	5, 25, 15, 9
3	5, 25, 5, 3
5	5, 25, 5, 1
5	1, 5, 1, 1
	1, 1, 1, 1

So, the LCM of 60, 75, 90 and 108

$$= 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5$$

$$= 2700 \text{ cm}$$

Hence, the required distance is 27 m.

Exercise-3G

1. We know that

$$\text{HCF} = \frac{\text{Product of two numbers}}{\text{LCM}}$$

$$= \frac{64}{16}$$

$$\text{HCF} = 4$$

Hence, HCF is 4.

2. We know that,

$$\text{The other number} = \frac{\text{HCF} \times \text{LCM}}{\text{One number}}$$

$$= \frac{145 \times 2175}{725} = 435$$

Hence the other number is 435.

3. We know that

$$\text{LCM} = \frac{\text{Product of two numbers}}{\text{HCF}}$$

$$\text{LCM} = \frac{167475}{29}$$

$$\text{LCM} = 5775$$

Hence, the LCM is 5775.

4. We first find the HCF of 2923 and 3239.

$$\begin{array}{r} 2923\overline{)3239}(1 \\ -2923 \\ \hline 316\overline{)2923}(9 \\ -2844 \\ \hline 79\overline{)316}(4 \\ -316 \\ \hline \times \end{array}$$

So, HCF of 2923 and 3239 is 79.

So, $\text{LCM} = \dfrac{\text{Product of two numbers}}{\text{HCF}}$

$\text{LCM} = \dfrac{2923 \times 3239}{79}$

$\text{LCM} = 119843$

Hence, the LCM is 119843.

5. We know that,

$\text{HCF} = \dfrac{\text{Product of two numbers}}{\text{LCM}}$

$= \dfrac{861 \times 1353}{9471}$

$\text{HCF} = 123$

Hence, HCF is 123.

6. We know that,

$\text{HCF} = \dfrac{\text{Product of two numbers}}{\text{LCM}}$

$= \dfrac{85 \times 1651}{1615}$

$\text{HCF} = 85$

Hence, HCF is 85.

MCQs

1. (a) **2.** (b) **3.** (b) **4.** (c) **5.** (b)

6. (c) **7.** (b) **8.** (c) **9.** (b) **10.** (a)

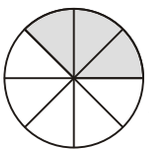
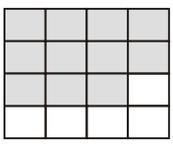
11. (b) **12.** (b)

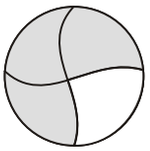
4. FRACTIONS

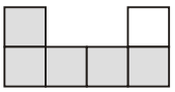
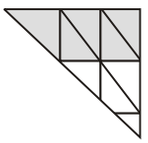
Exercise-4A

1. **(a)** $\dfrac{2}{12} = \dfrac{1}{6}$ **(b)** $\dfrac{1}{4}$ **(c)** $\dfrac{4}{9}$

(d) $\dfrac{2}{8} = \dfrac{1}{4}$ **(e)** $\dfrac{3}{7}$ **(f)** $\dfrac{6}{18} = \dfrac{1}{3}$

2. **(a)**  $\dfrac{3}{8}$ **(b)**  $\dfrac{11}{16}$

(c)  $\dfrac{3}{4}$ **(d)**  $\dfrac{7}{10}$

(e)  $\dfrac{5}{6}$ **(f)**  $\dfrac{5}{9}$

3. **(a)** $\dfrac{2}{3}$ **(b)** $\dfrac{5}{6}$ **(c)** $\dfrac{4}{12}$

(d) $\dfrac{3}{5}$ **(e)** $\dfrac{8}{9}$ **(f)** $\dfrac{7}{10}$

4. **(a)** three-eleventh

(b) four-fifteenth

(c) ten-seventeenth

(d) eleven-thirteenth

(e) thirteen-seventeenth

(f) eleven-twentythreeth

5. **(a)** Numerator = 5

Denominator = 11

(b) Numerator = 6

Denominator = 13

(c) Numerator = 17

Denominator = 23

(d) Numerator = 9

Denominator = 16

(e) Numerator = 4

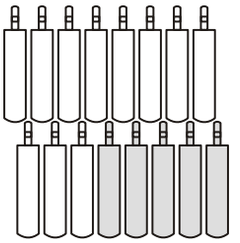
Denominator = 19

6. **(a)** $\dfrac{16}{23}$ **(b)** $\dfrac{4}{18}$ **(c)** $\dfrac{5}{9}$ **(d)** $\dfrac{3}{25}$

7. **(a)** $\dfrac{1}{3}$ of 15 bats

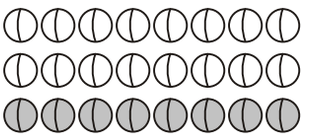
$= \dfrac{1}{3} \times 15 = 5$ bats

Hence, $\dfrac{1}{3}$ of 15 bats = 5 bats



(b) $\dfrac{1}{3}$ of 24 balls

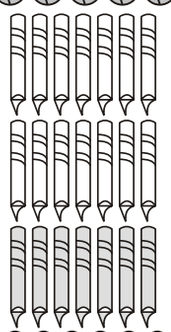
$= \dfrac{1}{3} \times 24 = 8$ balls



Hence, $\dfrac{1}{3}$ of 24 balls = 8 balls

(c) $\dfrac{1}{3}$ of 21 pens

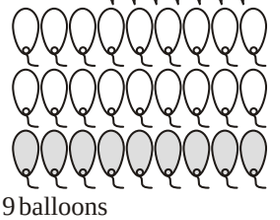
$= \dfrac{1}{3} \times 21 = 7$ pens



Hence, $\dfrac{1}{3}$ of 21 pens = 7 pens

(d) $\dfrac{1}{3}$ of 27 balloons

$= \dfrac{1}{3} \times 27 = 9$ balloons



Hence, $\dfrac{1}{3}$ of 27 balloons = 9 balloons

4. Number of teachers = 119

Number of students = 3400

So, the ratio of the number of teachers to the number of students $= \frac{119}{3400} = \frac{7}{200}$

$= 7 : 200$

Hence, the ratio of the number of teachers to the number of students is 7 : 200.

5. Adesh's monthly salary = ₹ 28800

His savings = ₹ 4200

His expenditure = ₹ (28800 − 4200)

= ₹ 24600

(a) Ratio of income to savings

= ₹ 28800 : ₹ 4200

$= \frac{28800}{4200} = \frac{144}{21} = \frac{48}{7}$

$= 48 : 7$

(b) Ratio of income to expenditure

= ₹ 28800 : ₹ 24600

$= \frac{28800}{24600} = \frac{144}{123} = \frac{48}{41}$

$= 48 : 41$

(c) Ratio of savings to expenditure

= ₹ 4200 : ₹ 24600

$= \frac{4200}{24600} = \frac{42}{246} = \frac{21}{123}$

$= \frac{7}{41} = 7 : 41$

6. Mr Singh's incomes = ₹ 256000 ÷ 12

= ₹ 21333

Mrs Singh's incomes = ₹ 320000 ÷ 12

= ₹ 26666

(a) Their incomes ₹ 21333 and ₹ 26666 respectively.

(b) Ratio of Mr Singh to total in come of both

= ₹ 21333 : ₹ (21333 + 26666)

= 21333 : 47999

$= \frac{21333}{47999}$

= 21333 : 47999

(c) Ratio of Mrs Singh to total income of both

= ₹ 26666 : ₹ (21333 + 26666)

= 26666 : 47999

7. Total number of students = 4320

Number of girls = 2300

So, Number of boys = 4320 − 2300 = 2020

(a) Ratio of number of boys to the total number of students = 2020 : 4320

$= \frac{2020}{4320} = \frac{101}{216}$

$= 101 : 216$

(b) Ratio of number of girls to the total number of students = 2300 : 4320

$= \frac{2300}{4320} = \frac{230}{432}$

$= \frac{115}{216} = 115 : 216$

8. Total number of students = 1600

Number of students opted cricket = 480

Number of students opted football = 780

So, number of students opted basket ball

= [1600 − (480 + 780)]

= (1600 − 1260)

= 340

(a) Ratio of students opted cricket to students opted football = 480 : 780

$= \frac{480}{780} = \frac{24}{39}$

$= 24 : 39$

(b) Ratio of students opted football to students opted basketball = 780 : 340

$= \frac{780}{340} = \frac{39}{17}$

$= 39 : 17$

(c) Ratio of students opted basketball to total students

= 340 : 1600

$= \frac{340}{1600} = \frac{17}{80}$

$= 17 : 80$

9. Sum of the term of the ratio = (11 + 13) = 24

First number $= \frac{11}{24} \times 720$

$= 11 \times 30 = 330$

Second number $= \frac{13}{24} \times 720$

$= 13 \times 30 = 390$

10. Sum of the term of the ratio = (2 + 3 + 1) = 6

A's share $= ₹ \frac{2}{6} \times 642 = ₹ 2 \times 107$

= ₹ 214

B's share $= ₹\ \frac{3}{6} \times 642 = ₹\ 3 \times 107$

$= ₹\ 321$

C's share $= ₹\ \frac{1}{6} \times 642 = ₹\ 1 \times 107$

$= ₹\ 107$

11. Sum of the term of the ratio $= (7 + 8 + 10) = 25$

A's share $= ₹\ \frac{7}{25} \times 300 = ₹\ 7 \times 12$

$= ₹\ 84$

B's share $= ₹\ \frac{8}{25} \times 300 = ₹\ 8 \times 12$

$= ₹\ 96$

C's share $= ₹\ \frac{10}{25} \times 300 = ₹\ 10 \times 12$

$= ₹\ 120$

12. The total weight of the alloy = 48 kg

Sum of ratio of the zinc and copper in an alloy

$= (5 + 7) = 12$

So, the weight of zinc in an alloy $= \left(\frac{5}{12} \times 4.8\right)$ kg

$= (5 \times 0.4)$ kg

$= 2.0$ kg

The weight of copper in an alloy $= \left(\frac{7}{12} \times 4.8\right)$ kg

$= (7 \times 0.4)$ kg $= 2.8$ kg

Hence, the weight of the zinc and copper is 2 kg and 2.8 kg respectively.

13. The perimeter of the triangle = 70 cm

Ratio of sum of the sides of a triangle $= (2 + 2 + 3) = 7$

First side of a triangle $= \left(\frac{2}{7} \times 70\right)$ cm

$= 2 \times 10$ cm $= 20$ cm

Second side of a triangle $= \left(\frac{2}{7} \times 70\right)$ cm

$= 2 \times 10$ cm $= 20$ cm

Third side of a triangle $= \left(\frac{3}{7} \times 70\right)$ cm

$= 3 \times 10$ cm $= 30$ cm

Hence, the length of each side of the triangle is 20 cm, 200 m and 300 cm respectively.

14. Let the amount received by Rahul be ₹ x.

So, amount received by Udit = ₹ $2x$

and amount received by Naman = ₹ $(2 \times 2x)$

$= ₹\ 4x$

So, the ratio of their amounts $= x : 2x : 4x$

or $= 1 : 2 : 4$

Sum of the ratio $= 1 + 2 + 4 = 7$

So, Rahul received $= ₹ \left(\frac{1}{7} \times 630\right) = ₹\ 90$

Udit received $= ₹ \left(\frac{2}{7} \times 630\right)$

$= ₹\ 2 \times 90 = ₹\ 180$

and Naman received $= ₹ \left(\frac{4}{7} \times 360\right)$

$= ₹\ 4 \times 90 = ₹\ 360$

Hence, Naman received ₹ 360, Udit received ₹ 180 and Rahul received ₹ 90.

15. Let the number of articles received by Shaleeni be x.

So, the number of articles received by Sakshi = $5x$

and the number of articles received by Vaishali

$= 3 \times 5x = 15x$

So, the ratio of their amounts $= x : 5x : 15x$

or $= 1 : 5 : 15$

Sum of the ratio $= 1 + 5 + 15 = 21$

So, Shaleeni received the article $= \frac{1}{21} \times 1260$

$= 60$

Shakshi received the article $= \frac{5}{21} \times 1260$

$= 5 \times 60 = 300$

and Vaishali received the article $= \frac{15}{21} \times 1260$

$= 15 \times 60 = 900$

Hence, Vaishali received 900 articles, Sakshi received 300 article and Shaleeni received 60 article.

Exercise-6B

1. **(a)** We have, 32, 8, 16 and 4

So, $32 : 8 = \frac{32}{8} = \frac{4}{1}$

and $16 : 4 = \frac{16}{4} = \frac{4}{1}$

Here, $32 : 8 = 16 : 4$

Hence, 32, 8, 16 and 4 are in proportion.

(b) 19, 20, 38 and 40

So, $19 : 20 = \frac{19}{20}$

and $38 : 40 = \frac{38}{40} = \frac{19}{20}$

Here, $19 : 20 = 38 : 40$

Hence, 19, 20, 38 and 40 are in proportion.

(c) We have, 24, 28, 36 and 48.

So, $24 : 28 = \frac{24}{28} = \frac{6}{7}$

and $36 : 48 = \frac{36}{48} = \frac{6}{8}$

Here, $24 : 28 \neq 36 : 48$

Hence, 24, 28, 36 and 48 are not in proportion.

(d) We have, 42, 16, 84 and 32

So, $42 : 16 = \frac{42}{16} = \frac{21}{8}$

and $84 : 32 = \frac{84}{32} = \frac{21}{8}$

Here, $42 : 16 = 84 : 32$

Hence, 24, 28, 36 and 48 are in proportion.

(e) We have, 15, 45, 40 and 120

So, $15 : 45 = \frac{15}{45} = \frac{15}{45} = \frac{1}{3}$

and $40 : 120 = \frac{40}{120} = \frac{1}{3}$

Here, $15 : 45 = 40 : 120$

Hence, 15, 45, 40 and 120 are in proportion.

(f) We have, 15, 25, 36 and 18

So, $15 : 25 = \frac{15}{25} = \frac{3}{5}$

and $36 : 18 = \frac{36}{18} = \frac{2}{1}$

Here, $15 : 25 \neq 36 : 18$

Hence, 15, 25, 36 and 18 are not in proportion.

(g) We have, 18, 20, 45 and 50

So, $18 : 20 = \frac{18}{20} = \frac{9}{10}$

and $45 : 50 = \frac{45}{50} = \frac{9}{10}$

Here, $18 : 20 = 45 : 50$

Hence, 18, 20, 45 and 50 are in proportion.

(h) We have, 15, 20, 25 and 30.

So, $15 : 20 = \frac{15}{20} = \frac{3}{4}$

and $25 : 30 = \frac{25}{30} = \frac{5}{6}$

Here, $15 : 20 \neq 25 : 30$

Hence, 15, 20, 25 and 50 are not in proportion.

2. (a) Given number are in proportion

So, $9 : 12 = 9 : 8$

or $\frac{9}{12} = \frac{x}{8}$

$\Rightarrow$ $9 \times 8 = 12 \times x$

$\Rightarrow$ $x = \frac{9 \times 8}{12}$

$\Rightarrow$ $a = 6$

Hence, $a = 6$

(b) Given number are in proportion.

So, $a : 4 = 15 : 30$

or $\frac{a}{4} = \frac{15}{30}$

$\Rightarrow$ $a \times 30 = 15 \times 4$

$\Rightarrow$ $a = \frac{15 \times 4}{30}$

$\Rightarrow$ $a = 2$

Hence, $a = 2$

(c) Given number are in proportion.

So, $30 : a = 45 : 60$

or $\frac{30}{a} = \frac{45}{60}$

$\Rightarrow$ $30 \times 60 = a \times 45$

$\Rightarrow$ $a = \frac{30 \times 60}{45}$

$\Rightarrow$ $a = 40$

Hence, $a = 40$

(d) Given number are in proportion.

So, $14 : a = 7 : 9$

or $\frac{14}{a} = \frac{7}{9}$

$\Rightarrow$ $a \times 7 = 14 \times 9$

$\Rightarrow$ $a = \frac{14 \times 9}{7}$

$\Rightarrow$ $a = 18$

Hence, $a = 18$

(e) Given number are in proportion.

So, $25 : 30 = 40 : a$

or $\frac{25}{30} = \frac{40}{a}$

$\Rightarrow$ $\frac{25}{30} = \frac{40}{a}$

$\Rightarrow$ $25 \times a = 30 \times 40$

$\Rightarrow$ $a = \frac{30 \times 40}{25}$

$\Rightarrow$ $a = 48$

Hence, $a = 48$.

(f) Given number are in proportion.

So, $16 : 24 = 6 : a$

or $\frac{16}{24} = \frac{6}{a}$

$\Rightarrow \quad 16 \times a = 6 \times 24$

$\Rightarrow \quad a = \frac{6 \times 24}{16}$

$\Rightarrow \quad a = 9$

Hence, $a = 9$

(g) Given number are in proportion.

So, $8 : 10 = a : 25$

or $\frac{8}{10} = \frac{a}{25}$

$\Rightarrow \quad 8 \times 25 = 10 \times a$

$\Rightarrow \quad a = \frac{8 \times 25}{10}$

$\Rightarrow \quad a = 20$

Hence, $a = 20$

(h) Given number are in proportion.

So, $36 : 24 = a : 16$

$\Rightarrow \quad \frac{36}{24} = \frac{a}{16}$

$\Rightarrow \quad 36 \times 16 = 24 \times a$

$\Rightarrow \quad a = \frac{36 \times 16}{24}$

$\Rightarrow \quad a = 24$

Hence, $a = 24$

3. (a) If 18, 42 and 98 are in proportion.

Then, 18 : 42 : : 42 : 98

or $\frac{18}{42} = \frac{42}{98}$

$\Rightarrow \quad \frac{3}{7} = \frac{3}{7}$

Here, $18 : 42 = 42 : 98$

Hence, 18, 42 and 98 are in proportion.

(b) If 25, 30 and 36 are in proportion.

Then, 25 : 30 : : 30 : 36

or $\frac{25}{30} = \frac{30}{36}$

$\Rightarrow \quad \frac{5}{6} = \frac{5}{6}$

Here, $25 : 30 = 30 : 36$

Hence, 25, 30 and 36 are in proportion.

(c) If 25, 20 and 16 are in proportion.

Then, 25 : 20 : : 20 : 16

or $\frac{25}{20} = \frac{20}{16}$

$\Rightarrow \quad \frac{5}{4} = \frac{5}{4}$

Here, $25 : 20 = 20 : 16$

Hence, 25, 20 and 16 are in proportion.

(d) If 48, 60 and 75 are in proportion.

Then, 48 : 60 : : 60 : 75

or $\frac{48}{60} = \frac{60}{75}$

$\Rightarrow \quad \frac{4}{5} = \frac{4}{5}$

Here, $48 : 60 = 60 : 75$

Hence, 48, 60 and 75 are in proportion.

4. (a) Since, 24, 36 and 0 are in continued proportion.

$\therefore \quad 24 : 36 : : 36 : b$

$\Rightarrow \quad \frac{24}{36} = \frac{36}{b}$

$\Rightarrow \quad b = \frac{36 \times 36}{24}$

$\Rightarrow \quad b = 54$

Hence, $b = 54$

(b) Since 25, b and 36 are in continued proportion.

$\therefore$ Product of extreme terms = Product of middle terms

$\Rightarrow \quad 25 \times 36 = b \times b$

$\Rightarrow \quad b^2 = 900$

$\Rightarrow \quad b = 30$

Hence, $b = 30$

(c) Since, b, 45 and 81are in continued proportion.

$\therefore$ Product of extreme terms = Product of middle terms

$\Rightarrow \quad b \times 81 = 45 \times 45$

$\Rightarrow \quad b = \frac{45 \times 45}{81}$

$\Rightarrow \quad b = \frac{2025}{81}$

$\Rightarrow \quad b = 25$

Hence, $b = 25$

(d) Since, b, 42 and 98 are in continued proportion.

$\therefore$ Product of extreme terms = Product of middle terms

$\Rightarrow \quad b \times 98 = 42 \times 42$

$\Rightarrow \quad b = \frac{42 \times 42}{98}$

$\Rightarrow \quad b = \frac{1764}{98}$

$\Rightarrow \quad b = 18$

Hence, $b = 18$

5. Let the length and width of a field be $8x$ and $5x$ respectively.

So, the length of the field = 400 m

$8x = 400 \text{ m}$

$x = (400 \div 8) \text{ m}$

$x = 50 \text{ m}$

Therefore, the width of the field = $5x$

$= 5 \times 50$ m

$= 250$ m

6. Let the length and width of a park be $5x$ and $4x$ respectively.

So, the width of the park = 100 m

$4x = 100$ m

$x = (100 \div 4)$ m $= 25$ m

Therefore, the length of a park = $5x$

$= (5 \times 25)$ m

$= 125$ m

Hence, the length of a park is 125 m.

7. Let the weight of copper and zinc be $6x$ and $7x$ respectively.

So, the weight of the copper = 37.5 g

$6x = 37.5$ g

$x = (37.5 \div 6)$ g

$x = 6.25$ g

Therefore, the weight of zinc in the alloy

$= 7x = (7 \times 6.25)$ g

$= 43.75$ g

Hence, the weight of zinc in the alloy is 43.75 g.

8. Let the income and saving of a family be $13x$ and $4x$ respectively.

So, the saving of a family = ₹ 1696

$4x =$ ₹ 1696

$x =$ ₹ $(1696 \div 4)$

$x =$ ₹ 424

Therefore, the expenditure of a family

$= 13x =$ ₹ 13×424

$=$ ₹ 5512

Hence, the expenditure of a family is ₹ 5512.

9. Let the income and expenditure of a family be $15x$ and $13x$ respectively.

So, the income of a family = ₹ 50625

$15x =$ ₹ 50625

$x =$ ₹ $(50625 \div 15)$

$x =$ ₹ 3375

Therefore, the expenditure of a family

$= 13x =$ ₹ 13×3375

$=$ ₹ 43875

So, the saving of a family = ₹ $(50625 - 43875)$

$=$ ₹ 6750

Hence, the saving of a family is ₹ 6750.

10. Let the number of boys and girls be $5x$ and $4x$ respectively.

The given,

Number of boys = 630

So, Number of boys = 630

$5x = 630$

$x = 126$

(a) So, the number of girls in the school

$= 4x = 4 \times 126$

$= 504$

(b) The number of students in the school

$= 630 + 504$

$= 1134$

Exercise-6C

1. The cost of 7 pens = ₹ 84

So, the cost of 1 pen = ₹ $(84 \div 7)$ = ₹ 12

Therefore, the cost of 19 pens = ₹ (12×19)

$=$ ₹ 228

Hence, the cost of 19 pens is ₹ 288.

2. The cost of 24 m cloth = ₹ 552

So, the cost of 1 m cloth = ₹ $(552 \div 24)$

$=$ ₹ 23

Therefore, cost of 18 m cloth = ₹ (23×18)

$=$ ₹ 414

Hence, the cost of 18 m cloth is ₹ 414.

3. Cost of 24 bathing soaps = ₹ 288

So, cost of 1 bathing soap = ₹ $(288 \div 24)$ = ₹ 12

Therefore, cost of 3 dozen or 36 bathing soap

$=$ ₹ (12×36)

$=$ ₹ 432

Hence, the cost of 3 dozen bathing soap is ₹ 432.

4. Cost of 6 boxes of apples = ₹ 210

So, cost of 1 box = ₹ $(210 \div 6)$ = ₹ 35

Therefore, cost of 11 such boxes = ₹ (35×11)

$=$ ₹ 385

Hence, the cost of 11 such boxes is ₹ 385.

5. 96 pins are packed = 3 boxes

So, 1 pin are packed = $\frac{3}{96}$ boxes

Therefore, 640 pins are packed = $\left(\frac{3}{96} \times 640\right)$ boxes

$= \left(\frac{1}{32} \times 640\right)$ boxes

$= 20$ boxes

Hence, 20 boxes are required to park 640 pins.

6. In 12 litres, a car travels = 180 km

So, in 1 litre, it will travel = $(180 \div 12)$ km

$= 15$ km

Therefore, in 22 litres, it will be travel = (15×22) km

$= 330$ km

Hence, car will travel 330 km in 22 litres of petrol.

7. In 2 litres, a motorbike travels = 128 km

So, in 1 litre, it will travel = $(128 \div 2)$ km

$= 64$ km

Therefore, the petrol required in going 416 km

$= 416$ km $\div 64$ km

$= 6.5$ litres

Hence, 6.5 litres of petrol are required in going 416 km.

8. The rent for 4 months = ₹ 7200

The rent for 1 months = ₹ $(7200 \div 4)$ = ₹ 1800

Therefore, the rent for 1 year = ₹ 1800×12

= ₹ 21600

Hence, she has ₹ 21600 to pay for a whole year.

9. To cover 62 km a car takes = 1 hour

So, to cover 1 km it will take = $\frac{1}{62}$ hours

So, to cover 496 km it will take = $\left(\frac{1}{62} \times 496\right)$ hours

= 8 hours

Hence, in 8 hours it will cover 496 km.

10. The weight of 72 books = 9 kg

So, the weight of 1 book = $\frac{9}{72}$ kg

So, the weight of 20 such books = $\left(\frac{9}{72} \times 20\right)$ kg

= 2.5 kg

Hence, 48 kg is the weight of 20 such books.

11. The weight of 25 bag = 60 kg

So, the weight of 1 bags = $\frac{60}{25}$ kg

So, the weight of 35 such bags = $\left(\frac{60}{25} \times 35\right)$ kg

= 84 kg

Hence, 84 kg is the weight of 35 such bags.

12. 36 men can reap a field in 25 days

So, 1 man can reap a field in (25×36) days

Therefore, 45 men can reap a field in = $\left(\frac{25 \times 36}{45}\right)$ days

= 20 days

Hence, 45 men can reap a field in 20 days.

13. 49 men can build a wall in 15 days

So, 1 man can build a wall in (15×49) days

Therefore, 35 men can build a wall in = $\left(\frac{15 \times 49}{35}\right)$ days

= 21 days

Hence, 35 men can build a wall in 21 days.

14. 280 men consume provisions in 32 days.

So, 1 man will consume provisions in (32×280) days

Therefore, $(280 - 56)$ men will consume provisions in

= $\left(\frac{32 \times 280}{224}\right)$ days

= 40 days

Hence, 224 men will consume in 40 days.

15. The cost of 15 pens purchased by Naman = ₹ 150

So, the cost of 1 pen purchased by Naman = ₹ $(150 \div 15)$

= ₹ 10

Similarly,

The cost of 8 pens purchased by Manish = ₹ $(72 \div 8)$

= ₹ 9

Since, ₹ 10 > ₹ 9

Clearly, Manish got the pens cheaper.

16. In 7 overs, Dhoni made = 56 runs

In 1 over, Dhoni made = $(56 \div 7)$ runs = 8 runs

Similarly,

In 9 overs, Yuvraj made = 63 runs

In 1 over, Yuvraj made = $(63 \div 9)$ runs = 7 runs

Since, $8 > 7$

Clearly, Dhoni made more runs than Yuvraj.

MCQs

1.	(c)	**2.**	(a)	**3.**	(b)	**4.**	(c)	**5.**	(a)
6.	(b)	**7.**	(a)	**8.**	(c)	**9.**	(c)	**10.**	(b)

CHAPTER 7 : ALGEBRAIC EXPRESSION

Exercise-7A

1. **(a)** $x + 7$ **(b)** $x + 11$

(c) $y - 8$ **(d)** $xz + 10$

(e) $\frac{1}{3}y + 10$ **(f)** $\frac{5}{3}z - 9$

(g) $4x = 4y$ **(h)** $\frac{2}{3}yz + 4$

(i) $9x \div z = 4y$ **(j)** $x \div 12 = 5$

(k) $12 - 3x = x$ **(l)** $9y - 4z$

2. **(a)** $a\times a\times a\times a\times a\times b\times b\times b\times b = a^5\times b^4$

$= a^5b^4$

(b) $5\times5\times5\times a\times a\times a\times a\times c\times c\times c\times c\times c\times c$

$= 5^3\times a^4\times c^6$

$= 5^3a^4c^6$

(c) $3\times3\times4\times4\times x\times x\times x\times x\times x\times x\times y\times y$

$= 3^2\times4^2\times x^5\times y^2$

$= 3^2 4^2 x^5 y^2$

(d) $15\times15\times y\times y\times y\times y\times y\times z\times z\times z\times z\times z$

$= 15^2\times y^5\times z^5$

$= 15^2 y^5 z^5$

(e) $6\times6\times6\times6\times6\times x\times x\times x\times x\times y\times y\times z\times z\times z$

$= 6^5\times x^3\times y^2\times z^3$

$= 6^5x^3y^2z^3$

(f) $4\times4\times5\times5\times5\times x\times x\times x\times x\times z\times z\times z\times z\times z\times z$

$= 4^2\times5^3\times x^3\times z^6$

$= 4^2 5^3 x^3 z^6$

3. **(a)** $x^3y^6 = x\times x\times x\times y\times y\times y\times y\times y\times y$

(b) $a^4b^9 = a\times a\times a\times a\times b\times b\times b\times b\times b\times b\times b\times b\times b$

(c) $5^8 3^4 x^4 = 5\times5\times5\times5\times5\times5\times5\times5\times3\times3\times3\times3\times x\times x\times x\times x\times x$

(d) $11^3x^5y^2z^2 = 11\times11\times11\times x\times x\times x\times x\times x\times x\times y\times y\times z\times z$

(e) $9x^2y^3c^3 = 3\times3\times x\times x\times y\times y\times y\times c\times c\times c$

(f) $5^3x^3y^3z^6 = 5\times5\times5\times x\times x\times x\times x\times y\times y\times y\times z\times z\times z\times z\times z\times z$

4. Number of mangoes in a box = 60

So, number of mangoes in b boxes = $60\times b$

$= 60b$

Hence, total number mangoes in b boxes are $60b$.

5. Number of pencils = 6

So, number of pencils for x students = $6x$

Hence, $6x$ pencils are required.

6. In one minute, a bird flies = 2 km

So, in t minute, a bird flies = $(2\times t)$ km

$= 2t$ km

Hence, $2t$ km is the distance covered by bird in time t minute.

7. Meera's age = m years

Since, Rama is younger than Meera by 5 years.

So, Rama's age = $(m-5)$ years.

Exercise-7B

1. **(a)** $3x+6y^2-4$, it consists three terms, so it is trinomials.

(b) $\frac{4}{3}x^2y$, it consists one terms, so it is monomials.

(c) $7x^2+4t$, it consists two terms, so it is binomials.

(d) $9y^2-6z^2+4x+6$, it consists four terms, so it is polynomials.

(e) $17x-6y^2$, it consists two terms, so it is binomials.

(f) $16xy+7z+9$, it consists three terms, so it is trinomials.

(g) $xy+yz-6x+9$. it consists four terms, so it is polynomials.

(h) $\frac{14}{9}x^2zt-9x^2y+6z$, it consists more than two terms, so it is polynomial.

2. **(a)** $4x^2y, -6yx^2, 14xy, \frac{6}{5}x^2y, 5yx, 3xy$

Like terms are : $14xy, 5yx$ and $3xy$

Like terms are : $4x^2y, -6yx^2$ and $\frac{6}{5}x^2y$

(b) $9t^2z, 14xyz, 3zt^2, 5yzx, -19zt^2, \frac{14}{19}t^2z$

Like terms are : $14xyz$ and $5yzx$

Like terms are : $9t^2z, 3zt^2, -19zt^2$ and $\frac{14}{19}t^2z$.

(c) $4x^2yz, -\frac{1}{3}yx^2z, 16y^2zx, 4zxy^2, 4zyx^2, -5xy^2z$

Like terms are : $4x^2yz, -\frac{1}{3}yx^2z$ and $4zyx^2$

Like terms are : $16y^2zx, 4zxy^2$ and $-5xy^2z$

(d) $ab^2c, acb^2, abc, acb^2, -b^2ac, 4cba$

Like terms are : ab^2c, acb^2, acb^2 and $-b^2ac$

Like terms are : abc, and $4cba$

3. **(a)** In $-2x^2y$, numerical coefficient is -2.

(b) In $-\frac{16xy^2}{z}$, numerical coefficient is -16.

(c) In $19zp^2$, numerical coefficient is 19.

(d) In $\frac{13}{7}yzt$, numerical coefficient is $\frac{13}{7}$.

(e) In $1.8y^2z$, numerical coefficient is 1.8.

(f) In $\frac{-17}{6}xy^2z$, numerical coefficient is $-\frac{17}{6}$.

4. **(a)** Coefficient of 5 in $5\frac{x^2y}{z}$ is $\frac{x^2y}{z}$.

(b) Coefficient of $13p^2$ in $-13\frac{p^2y}{x}$ is $-\frac{x}{y}$.

(c) Coefficient of x^2yz in $-x^2yz$ is -1.

(d) Coefficient of y^2 in $-3xy^2$ is $-3x$.

(e) Coefficient of $4xy$ in $-4z^2xy$ is $-z^2$.

(f) Coefficient of t in p^2ty is p^2y.

5. **(a)** In $5x^2yz$, constant term is 0.

(b) In $5xy^2+10$, constant term is 10.

(c) In $-\frac{9}{5}+x^2y$, constant term is $\frac{-9}{5}$.

(d) In $4x^2-5$, constant term is -5.

(e) In $8+3xyz$, constant term is 8.

(f) In $7xy^2z-15$, constant term is -15.

6. **(a)** $5x^2$, $6yz$ and $-15y$

(b) $\frac{14}{9}x^2y^2t$

(c) $13y^2z$, $\frac{9}{7}x$ and -5

(d) $9x^3$, $4x^2y$, $-9yz$ and 7

(e) $-19y$, $7t^2$ and $4z^2$

(f) $93z^2$ and $57x^2y$

7. **(a)** Factors of $4x^2yz$ are $4, x^2, y, z$.

(b) Factors of $-19yz^2t$ are $-19, y, z^2, t$.

(c) Factors of $\frac{9}{7}x^2yt$ are $\frac{9}{7}, x^2, y, t$.

(d) Factors of $17xpz^2$ are $17, x, p, z^2$.

(e) Factors of $9xp^2y$ are $9, x, p^2, y$.

(f) Factors of $\frac{-13}{8}y^2tm$ are $-\frac{13}{8}, y^2, t, m$.

8. **(a)** On substituting the values of x, y and z in $4xy+5y^2z-9$

$$=4\times1\times2+5\times(2)^2\times(-3)-9$$
$$=8+5\times4\times(-3)-9$$
$$=8-60-9$$
$$=9-69$$
$$=-61$$

(b) On substituting the values of x, y and z in $37x-4y^2z+4$

$$=37\times1-4\times(2)^2\times(-3)+4$$
$$=37+4\times4\times3+4$$
$$=37+48+4$$
$$=89$$

(c) On substituting the values of x, y and z in $13x^2y+5z-4y^2$

$$=13\times(1)^2\times2+5\times(-3)-4\times(2)^2$$
$$=26-15-4\times4$$
$$=26-15-16$$
$$=26-31$$
$$=-5$$

(d) On substituting the values of x, y and z in $14y+13z-6x^3$

$$=14\times2+13\times(-3)-6\times(1)^3$$
$$=28-39-6$$
$$=28-45$$
$$=-17$$

9. Substituting $a=1, b=2, c=-2$ and $t=-1$ in the given expressions, we get

(a) $4ab^2t+5c$

$$=4\times1\times(2)^2\times(-1)+5\times(-2)$$
$$=4\times4\times(-1)-10$$
$$=-16-10$$
$$=-26$$

(b) $4b^3c-5a^3+17$

$$=4\times2\times(-2)-5\times(1)^3+17$$
$$=-16-5+17$$
$$=-4$$

(c) $-19c^2b+3abc$

$$=-19\times(-2)^2\times(2)+3\times(1)\times(2)\times(-2)$$
$$=-19\times4\times2+3\times(-4)$$
$$=-19\times8+(-12)$$
$$=-152-12$$
$$=164$$

(d) $17t^2+4t-9a+4c^2$

$$=17\times(-1)^2+4\times(-1)-9\times1+4\times(-2)^2$$
$$=17-4-9+16$$
$$=33-13$$
$$=20$$

Exercise-7C

1. **(a)** $14yx+(-3xy)$

$$=14yx-3xy$$
$$=(14-3)xy$$
$$=11xy$$

(b) $7xyz+(-3xyz)+(5xyz)$

$$=7xyz-3xyz+5xyz$$
$$=(7-3+5)xyz$$
$$=9zyz$$

(c) $15x^2y + (-14yx^2) + 3x^2y$

$= 15x^2y - 14yx^2 + 3x^2y$

$= (15 - 14 + 3)xy^2$

$= 4xy^2$

(d) $(-3x^2 + xy) + (4x^2 - 6xy)$

$= -3x^2 + xy + 4x^2 - 6xy$

$= (4x^2 - 3x^2) + (xy - 6xy)$

$= x^2 - 5xy$

(e) $(3xy + 7y^2 + 9xy^2) + (7xy^2 - 6y^2 + 4xy)$

$= (7y^2 - 6y^2) + (9xy^2 + 7xy^2) + (3xy + 4xy)$

$= y^2 + 16xy^2 + 7xy$

(f) $(9abc + 3b^2c - 4) + (5abc - 5b^2c)$

$= (3b^2c - 5b^2c) + (9abc + 5abc) - 4$

$= -2b^2c + 14abc - 4$

(g) $(3x^3 + 5xy - 6) + (6xy + 8 - 8x^3)$

$= (3x^3 - 8x^3) + (5xy + 6xy) + (8 - 6)$

$= -5x^3 + 11xy - 2$

(h) $(3c^2b - 4a^2c + 7ab) + (4bc^2 - 4ab)$

$= (3bc^2 + 4bc^2) - 4a^2c + (7ab - 4ab)$

$= 7bc^2 - 4a^2c + 3ab$

(i) $(4xy^2 + 6xy - 4) + (7xy^2 - 8xy)$

$= (4xy^2 + 7xy^2) + (6xy - 8xy) - 4$

$= 11xy^2 - 2xy - 4$

(j) $(a + b + cd - 7) + (b + a - 3cd + 5)$

$= (a + a) + (b + b) + (cd - 3cd) + (5 - 7)$

$= 2a + 2b - 2cd - 2$

2. On writing the given expressions in column with like terms one below the other, as given below :

(a)
$$\begin{array}{r} 8x^4 + 5x^3 - 9x^2 + 7 \\ +\ 5x^4 - 6x^3 + 8x^2 + 4 \\ \hline 13x^4 - x^3 - x^2 + 11 \end{array}$$

(b)
$$\begin{array}{r} 3b^2 - 9a^2 + 6ab + 4 \\ +\quad -8a^2 + 3ab + 7 \\ \hline 3b^2 - 17a^2 + 9ab + 11 \end{array}$$

(c)
$$\begin{array}{r} x^3 + y^3 - z^3 - 3zyz \\ 3x^3 + y^3 - 4z^3 + 6xyz \\ +\quad 3x^3 + 4y^3 + z^3 + 5xyz \\ \hline 7x^3 + 6y^3 - 2z^3 + 8xyz \end{array}$$

(d)
$$\begin{array}{r} 4xy - 5y^2z + 7 \\ 9xy - 9zy^2 + 8 \\ +\ -4xy + 5zy^2 \\ \hline 9xy - 9y^2z + 15 \end{array}$$

(e)
$$\begin{array}{r} -7x^2 + 2y^2 - 5xy + 8 \\ 9x^2 - 3y^2 + 4xy + 7 \\ +\quad 4x^2 \qquad + 8xy - 6 \\ \hline 6x^2 - y^2 + 7xy + 9 \end{array}$$

(f)
$$\begin{array}{r} y^2 + z^2 + 8xy \\ -9y^2 + 3yz^2 - 4xy \\ +\quad 8y^2 + 5z^2 + 3xy \\ \hline +9z^2 + 7xy \end{array}$$

3. (a) $-5x - 14x$

$= (-5 - 14)x$

$= -19x$

(b) $7xy^2 - (-9xy^2)$

$= 7xy^2 + 9xy^2$

$= (7 + 9)xy^2$

$= 16xy^2$

(c) $(-15xy) - (5xy)$

$= -15xy - 5xy$

$= -20xy$

(d) $(-4y^3z) - 10y^3z$

$= -4y^2z - 10y^3z$

$= -14y^3z$

(e) $(-x^2yz) - 13x^2yz$

$= -x^2yz - 13x^2yz$

$= -14x^2yz$

(f) $(-9x^2z) - (-4x^2z)$

$= -9x^2z + 4x^2z$

$= -5x^2z$

(g) $(-4xy^2t) - 17xy^2t$

$= -4xy^2t - 17xy^2t$

$= -21xy^2t$

(h) $(-13p^2m) - 5p^2m$

$= -13p^2m - 5p^2m$

$= -18p^2m$

(i) $(-4a^2b^2) - (a^2b^2)$

$= -4a^2b^2 - a^2b^2$

$= -5a^2b^2$

(j) $-5mtl-14mtl$

$= -5mtl-14mtl$

$= -19mtl$

4. **(a)**

$$\begin{array}{r} 5a+4b-3c \\ -\ 6a-5b+7c \\ \hline -a-9b-10c \end{array}$$

(b)

$$\begin{array}{r} 5x^2+y^2+4xy-8 \\ -\ -x^2-6y^2+3xy+5 \\ \hline 6x^2-7y^2-xy-13 \end{array}$$

(c)

$$\begin{array}{r} 4y^2-3z^2-4yz \\ -\ 20y^2+3z^2+6yz \\ \hline -16y^2-6z^2-10yz \end{array}$$

(d)

$$\begin{array}{r} -6xy^2+10x^2y^2+7 \\ -\ 6xy^2+11x^2y^2-7 \\ \hline -12xy+21x^2y+14 \end{array}$$

(e)

$$\begin{array}{r} -9y^2+8xy+12 \\ -\ +8y^2-7xy+9 \\ \hline -17y^2+15xy+3 \end{array}$$

(f)

$$\begin{array}{r} -x^3+4x^2y-3xy \\ -\ x^3+2x^2y+6xy \\ \hline -2x^3+2x^2y-9xy \end{array}$$

5. **(a)** $3x^3y-6x+4xy^2+4x^3y-2x^3y+8x-8xy^2$

$= 3x^3y+4x^3y-2x^3y+4xy^2-8xy^2+8x-6x$

$= (3+4-2)x^3y+(4-8)xy^2+(8-6)x$

$= 5x^3y-4xy^2+2x$

(b) $a^3b+ba^3+2ab^3-3a^3b-6ab^3+4a^3b$

$= a^3b+ba^3+4a^3b-3a^3b+2ab^3-6ab^3$

$= (b+b+4b-3b)a^3+(2a-6a)b^3$

$= 3ba^3+(-4a)b^3$

$= 3a^3b-4ab^3$

(c) $x^4+4x^3y^2-3x^3+4x^3-4x^4+9x^3y^2$

$= x^4-4x^4+4x^3-3x^3+4x^3y^2+9x^3y^2$

$= (1-4)x^4+(4-3)x^3+(4+9)x^3y^2$

$= -3x^4+x^3+13x^3y^2$

(d) $2x^3-4x^2+y^3+4x^3-6y^3+8x^2+7y$

$= 2x^3+4x^3+y^3-6y^3+8x^2-4x^2+7y$

$= (2+4)x^3+(1-6)y^3+(8-4)x^2+7y$

$= 6x^3-5y^3+4x^2+7y$

$= 6x^3+4x^2-5y^3+7y$

(e) $9xyz-7y^2z+6xyz+6zy^2-3yzx-3y^2z$

$= 9xyz+6xyz-3xyz-7y^2z+6zy^2-3y^2z$

$= (9+6-3)xyz+(-7+6)y^2z-3y^2z$

$= 12xyz-y^2z-3y^2z$

$= 12xyz+(-1-3)y^2z$

$= 12xyz-4y^2z$

6. **First Step :**

Add $4x^3-2x^2+3+5x$ and $4x^2-9x+8-3x^3$

$$\begin{array}{r} 4x^3-2x^2+5x+3 \\ +\ -3x^3+4x^2-9x+8 \\ \hline x^3+2x^2-4x+11 \end{array}$$

Second Step :

Now, subtract $x^3+2x^2-4x+11$ from

$8x^3+4x^2-9x+5$

$$\begin{array}{r} x^3+2x^2-4x+11 \\ -\ 8x^3+4x^2-9x+5 \\ \hline -7x^3-2x^2+5x+6 \end{array}$$

$-7x^3-2x^2+5x+6$ is the answer.

7. Let A should be added to $4x^2y+5x^3-6x+4$ to get $-6x^3-2x^2y+8x-5$.

$A+4x^2y+5x^3-6x+4=-6x^3-2x^2y+8x-5$

$A=(-6x^3-2x^2y+8x-5)-(4x^2y+5x^3-6x+4)$

$A=-6x^3-2x^2y+8x-5-4x^2y-5x^3+6x-4$

$A=-11x^3-6x^2y+14x-9$

Hence, $-11x^3-6x^2y+14x-9$ should be added to $4x^2y+5x^3-6x+4$ to get $-6x^3-2x^2y+8x-5$.

8. Required expression

$= (10a^3b-6b^2+5)-(-8a^3b+5b^2)$

$= 10a^3b-6b^2+5+8a^3b-5b^2$

$= 18a^3b-11b^2+5$

9. Required expression

$= (7x^2y+3xyz)-(-9x^2y+4xyz+8)$

$= 9x^2y+4xyz+8+7x^2y-3xyz$

$= 16x^2y-xyz-8$

10. The given,

$A=3x^2-4x+8,\ B=x^2+7x-10$ and

$C=-6x^2-3x+2$

$A-B-C=3x^2-4x+8-x^2-7x+10$

$+6x^2+3x-2$

$= 3x^2-x^2-6x^2-4x-7x+3x$

$+8+10-2$

$= (3-1+6)x^2+(-4-7+3)x+16$

$= 8x^2-8x+16$

MCQs :

1. (a) **2.** (c) **3.** (b) **4.** (c) **5.** (a)

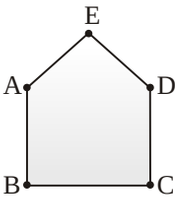
6. (b) **7.** (c) **8.** (b) **9.** (a) **10.** (c)

11. (a) **12.** (c) **13.** (a) **14.** (b)

CHAPTER 8 : BASIC GEOMETRICAL IDEAS

Exercise-8A

1.



Line-segment are : AB, DE, DC, CB and BA.

2. **(a)** Six points are : P, Q, O, R, S and M.

(b) Four rays are : $\vec{OP}, \vec{OR}, \vec{OS}$ and $\vec{OM}$.

(c) Five line-segments are : $\overline{OQ}, \overline{PQ}, \overline{OS}, \overline{OR}$ and $\overline{OM}$..

(d) A line is $\overleftrightarrow{PR}$.

3. **(a)** Line-segments are : $\overline{JK}, \overline{JM}, \overline{KM}, \overline{LM}$ and $\overline{JL}$.

(b) rays are : $\vec{JC}, \vec{JA}, \vec{JE}, \vec{KB}, \vec{KG}, \vec{LP}, \vec{LE}, \vec{MQ}\ \vec{MH}$ and $\vec{MD}$

(c) Lines are : $\overleftrightarrow{AB}, \overleftrightarrow{PQ}, \overleftrightarrow{CD}, \overleftrightarrow{EF}$ and $\overleftrightarrow{GH}$

(d) Intersecting lines : $\overleftrightarrow{AB}, \overleftrightarrow{CD}, \overleftrightarrow{EF}, \overleftrightarrow{ED}, \overleftrightarrow{GH}$ and $\overleftrightarrow{PQ}$

4. **(a)** Line-segments are : $\overline{PR}, \overline{RM}, \overline{MK}$ and $\overline{PK}$

(b) Rays are : $\vec{PQ}, \vec{RS}, \vec{MN}, \vec{KJ}$ and $\vec{KL}$

(c) Line is : $\overleftrightarrow{JL}$

(d) Collinear points are : J, K, L; P, R, M, K.

5. **(a)** Line-segments are : $\overline{KA}, \overline{AF}, \overline{FG}, \overline{GC}$, $\overline{MA}, \overline{AE}, \overline{EH}, \overline{HB}, \overline{DE}, \overline{EF}$ and $\overline{HG}$.

(b) Rays are : $\vec{AK}, \vec{AM}, \vec{GC}, \vec{HB}, \vec{ED}$

(c) Line is : $\overleftrightarrow{KC}, \overleftrightarrow{MB}$ and $\overleftrightarrow{HG}$

(d) Collinear points are : K, A, F, G and C; M, A, E, H and B; D, E, F.

6. Three or more points are collinear points, if they lie on the same line.

One line passing through five collinear points.

7. When two straight lines cut each other at a common points are called intersecting.

Crossing-roads and black board are two examples of intersecting lines.

8. Infinite number of lines can be drawn from one point.

9. Only one line can be drawn by two fixed point.

10. **(a)** A point has **No** dimension.

(b) A line-segment has a **definite** length.

(c) A ray has **one** end point.

(d) Three or more points are **collinear** if they all lie on a line.

(e) Three or more lines are **intersecting** if they all pass through the same point.

(f) A line can extend in **both** directions.

Exercise-8B

1. Opposite edges of ruler, opposite edges of a table and railway track are three examples of parallel lines.

2. Two line-segments are parallel, if the corresponding lines determined by them are parallel to each other. And two rays are parallel, if the corresponding lines determined by them are parallel.

3. AB, EF; AB; CD; CD, GH; EF, GH etc.

4. **(a)** $AB \parallel DC$ and $AD \parallel BC$ are parallel lines.

(b) $PQ \parallel SR$ is parallel lines.

5. Since the perpendicular distance, between two parallel lines neither increases nor decreases.

So, $RS = PQ$ $(\because\ PQ = 3.2\,\text{cm})$

$RS = 3.2\,\text{cm}$

6. **(a)** The perpendicular distance between two parallel lines are equal. (T)

(b) If two line-segments do not intersect, they are parallel. (F)

(c) If two rays do no intersect, they are parallel. (F)

(d) The opposite edges of a table are not parallel. (F)

(e) The opposite walls of a room are parallel. (T)

Exercise-8C

1. Hands of a clock, arms of a divider, a pair of scissors and sides of a table are four examples of angles.

2. $\angle A, \angle B, \angle C, \angle D$ and $\angle E$ are the angles in the given figure.

3. **(a)** Vertex = 0
Arms = OP, OR
Angle = $\angle POR$

(b) Vertex = 0
Arms = OM
Angle = $\angle MON$

(c) Vertex = 0
Arms = OP, OQ
Angle = $\angle POQ$

4. **(a)** 12 angles are forming in the given figures.

$\angle DAE, \angle AED, \angle ADE, \angle DBF, \angle DFB,$

$\angle DEF, \angle DFE, \angle EDF, \angle ECF, \angle EFC,$

$\angle FEC$ and $\angle BDF$.

(b) 6 angles are forming in the given figure :

$\angle ADB, \angle BDC, \angle BCD, \angle CBD, \angle DBA$

and $\angle DAB$.

(c) 6 angles are forming in the given figure :

$\angle NPQ, \angle PQR, \angle QRS, \angle RSM, \angle SMN$

and $\angle MNP$.

5. $\angle 1 = \angle DCA$; $\angle 2 = \angle DBA$; $\angle 3 = \angle DAC$;

$\angle 4 = \angle DAB$; $\angle 5 = \angle CDA$; $\angle 6 = \angle BDA$.

6. **(a)** M, N and K are in the interior points of $\angle PQR$.

(b) A and are in the exterior points of $\angle PQR$.

(c) D and C are lie on the $\angle PQR$.

7. **(a)** T **(b)** F **(c)** T **(d)** T **(e)** F

Exercise-8D

1. **(a)** In figure **(a)** it is clear that $\angle 1$ is less than $\angle 2$.

(b) In figure **(b)** it is clear that $\angle y$ is greater than $\angle x$.

2. Do it yourself.

3. **(a)** Obtuse **(b)** Acute **(c)** Reflex

(d) Right **(e)** Obtuse **(f)** Obtuse

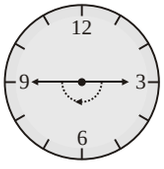
(g) Straight **(h)** Complete **(i)** Reflex

(j) Reflex

4. **(a)** Right angle **(b)** Straight angle

(c) Right angle **(d)** Right angle

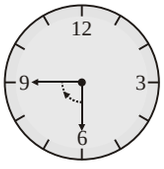
5. **(a)**



$\frac{1}{2}$ of a revolution or 2 right angles or equal to 180°,

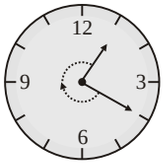
9

(b)



$\frac{1}{4}$ of a revolution or 1 right angle or equal to 90°, 9

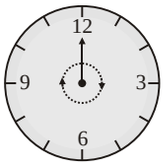
(c)



$\frac{3}{4}$ of a revolution or 3 right angles or equal to 270°,

1

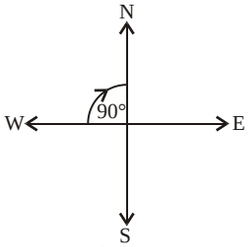
(d)



1 of revolution or 4 right angles or equal to 360°,

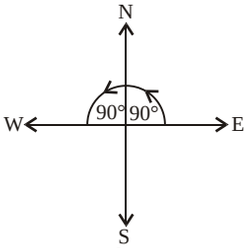
12

6. **(a)**



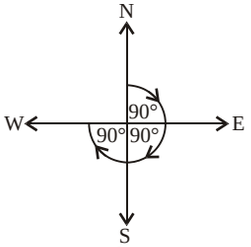
North direction

(b)



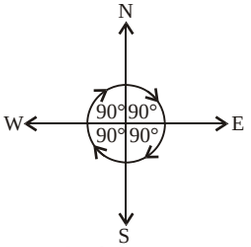
West direction

(c)



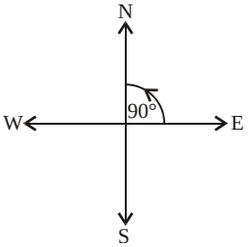
West direction

(d)



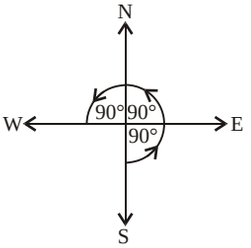
South direction

7. **(a)**



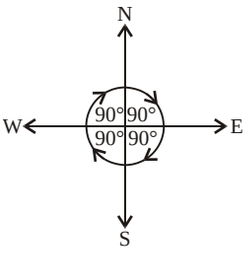
1 right angle = 90°

(b)



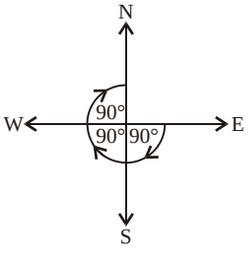
3 right angles = $3 \times 90° = 270°$

(c)



4 right angles $= 4 \times 90° = 360°$

(d)



3 right angles $= 3 \times 90° = 270°$

8.

	Column A		**Column B**
(a)	Obtuse angle	**(v)**	Between $\frac{1}{4}$ and $\frac{1}{2}$ of a revolution
(b)	Right angle	**(iv)**	One-fourth of a revolution
(c)	Acute angle	**(i)**	Less than one-fourth of a revolution
(d)	Straight angle	**(iii)**	Half of a revolution
(e)	Reflex angle	**(ii)**	More than half a revolution

MCQs

1. (b) **2.** (c) **3.** (a) **4.** (b) **5.** (a)

6. (b) **7.** (a) **8.** (c) **9.** (b) **10.** (b)

11. (c) **12.** (a) **13.** (b) **14.** (a)

CHAPTER-9 : LINEAR EQUATIONS

Exercise-9A

1. (a) $5m = 60$ if $m = 10$

LHS $= 5m = 5 \times 10 = 50 \neq 60 \neq$ RHS

(b) $n + 12 = 30$ if $n = 18$

LHS $= n + 12 = 18 + 12 = 30 =$ RHS

(c) $r - 3 = -3$ if $r = 0$

LHS $= r - 3 = 0 - 3 = -3 =$ RHS

(d) $\frac{m}{2} = 7$ if $m = 16$

LHS $= \frac{m}{2} = \frac{16}{2} = 8 \neq$ RHS

(e) $4x - 3 = 9$ if $x = 3$

LHS $= 4x - 3$

$= 4 \times 3 - 3 = 12 - 3 = 9 =$ RHS

2. $p + 6 = 14$:

P	1	2	3	4	5	6	7	**8**	9	10	11
$P+6$	7	8	9	10	11	12	13	**14**	15	16	17

Hence, $\boldsymbol{P = 8}$ satisfies $P + 8 = 14$

So, $P = 8$ is the solution of the given equation.

3. $t - 6 = 4$:

t	1	2	3	4	5	6	7	8	9	**10**	11
$t-6$	–5	–4	–3	–2	–1	0	1	2	3	**4**	5

Hence, $t = 10$ satisfies $(t - 6 = 4)$

So, $\boldsymbol{t = 10}$ is the solution of the given equation.

4. $7y = 42$:

y	1	2	3	4	5	**6**	7	8	9	10	11	12
$7y$	7	14	21	28	35	**42**	49	56	63	70	77	84

Hence, $y = 6$ satisfies $(7y = 42)$

So, $\boldsymbol{y = 6}$ is the solution of the given equation.

5. $\frac{n}{7} = 5$:

n	7	14	21	28	**35**	42	49	56
$\frac{n}{7}$	1	2	3	4	**5**	6	7	8

Hence, $n = 5$ satisfies $\left(\frac{n}{7} = 5\right)$

So, $\boldsymbol{n = 5}$ is the solution of the given equation.

6.

S.No.	Equation	Value of Variable	Equation Satisfied Yes/No
a.	$m + 10 = 20$	$m = 10$	Yes
b.	$n - 6 = 14$	$n = 22$	No

c.	$p+7=10$	$p=4$	No
d.	$4x=32$	$x=8$	Yes
e.	$\frac{l}{7}=6$	$l=42$	Yes
f.	$\frac{b}{2}-8=10$	$b=34$	No
g.	$5a=25$	$a=5$	Yes
h.	$7k+7=56$	$k=7$	Yes

7. **(a)** We try some approximate value of y and find the values of the LHS and RHS, we stop on that value of y, where LHS=RHS

y	LHS ($y+7$)	RHS (10)
1	$1+7=8$	10
2	$2+7=9$	10
3	$\mathbf{3+7=10}$	**10**

Hence, $y=3$ is the solution of given equation.

(b) We try some approximate value of x and find the values of the LHS and RHS, we stop on that value of x , LHS= RHS

x	LHS ($4x$)	RHS (24)
1	$4\times1=4$	24
2	$4\times2=8$	24
3	$4\times3=12$	24
4	$4\times4=16$	24
5	$4\times5=20$	24
6	$\mathbf{4\times6=24}$	**24**

Hence, $x=6$ is the solution of given equation.

(c) Try some appropriation values of m,

m	LHS $\left(\frac{m}{7}\right)$	RHS (9)
1	$\frac{1}{7}=\frac{1}{7}$	9
2	$\frac{2}{7}=\frac{2}{7}$	9
3	$\frac{3}{7}=\frac{3}{7}$	9
4	$\frac{4}{7}=\frac{4}{7}$	9
5	$\frac{5}{7}=\frac{5}{7}$	9
6	$\frac{6}{7}=\frac{6}{7}$	9
7	$\frac{7}{7}=1$	9
8	$\frac{8}{7}=\frac{8}{7}$	9
9	$\frac{9}{7}=\frac{9}{7}$	9
10	$\frac{10}{7}=\frac{10}{7}$	9
11	$\frac{11}{7}=\frac{11}{7}$	9
12	$\frac{12}{7}=\frac{12}{7}$	9
13	$\frac{13}{7}=\frac{13}{7}$	9
14	$\frac{14}{7}=2$	9
15	$\frac{15}{7}=\frac{15}{7}$	9
16	$\frac{16}{7}=\frac{16}{7}$	9
17	$\frac{17}{7}=\frac{17}{7}$	9
18	$\frac{18}{7}=\frac{18}{7}$	9
19	$\frac{19}{7}=\frac{19}{7}$	9
20	$\frac{20}{7}=\frac{20}{7}$	9
21	$\frac{21}{7}=3$	9

22	$\frac{22}{7}=\frac{22}{7}$	9
23	$\frac{23}{7}=\frac{23}{7}$	9
24	$\frac{24}{7}=\frac{24}{7}$	9
25	$\frac{25}{7}=\frac{25}{7}$	9
26	$\frac{26}{7}=\frac{26}{7}$	9
27	$\frac{27}{7}=\frac{27}{7}$	9
28	$\frac{28}{7}=4$	9
29	$\frac{29}{7}=\frac{29}{7}$	9
—	—	—
—	—	—
—	—	—
35	$\frac{35}{7}=5$	9
—	—	—
—	—	—
41	$\frac{41}{7}=\frac{41}{7}$	9
42	$\frac{42}{7}=6$	9
—	—	—
—	—	—
—	—	—
62	$\frac{62}{7}=\frac{62}{7}$	9
63	$\mathbf{\frac{63}{7}=9}$	**9**

(d) Try some appropriate values of P,

P	LHS $\left(\frac{P}{4}-8\right)$	RHS (4)
1	$\left(\frac{1}{4}-8\right)=\frac{-31}{4}$	4
2	$\left(\frac{2}{4}-8\right)=\frac{-30}{4}$	4
3	$\left(\frac{3}{4}-8\right)=\frac{-29}{4}$	4
4	$\left(\frac{4}{4}-8\right)=-7$	4
5	$\left(\frac{5}{4}-8\right)=\frac{-27}{4}$	4
6	$\left(\frac{6}{4}-8\right)=\frac{-26}{4}$	4
8	$\left(\frac{8}{4}-8\right)=-6$	4
16	$\left(\frac{16}{4}-8\right)=-4$	4
24	$\left(\frac{29}{4}-8\right)=-2$	4
32	$\left(\frac{32}{4}-8\right)=0$	4
40	$\left(\frac{40}{4}-8\right)=2$	4
48	$\mathbf{\left(\frac{48}{4}-8\right)=4}$	**4**

Hence, $P = 48$ is the solution of the equation.

(e) Try some appropriate values of K,

K	LHS $(12+K)$	RHS (18)
1	$12+1=13$	18
2	$12+2=14$	18
3	$12+3=15$	18
4	$12+4=16$	18
5	$12+5=17$	18
6	$\mathbf{12+6=18}$	**18**

Hence, $\boldsymbol{K = 6}$ is the solution of the equation.

(f) Try some approximate value of z,

z	LHS $(z-3)$	RHS $(2z-5)$
1	$1-3=-2$	$2\times1-5=2-5=-3$
2	$2-3=-1$	$2\times2-5=4-5=-1$

$z = 2$, LHS=RHS

Hence, $\boldsymbol{z = 2}$ is the solution of the equation.

(g) Try some approximate values of x,

x	LHS $(2x-3)$	RHS (x)
1	$2\times1-3$ $=2-3=-1$	1
2	$2\times2-3$ $=4-3=1$	2
3	$\mathbf{3\times2-3}$ $\mathbf{=6-3=3}$	**3**

$x = 3$, LHS =RHS

Hence, $\boldsymbol{x = 3}$ is the solution of the equation.

(h) Try some approximate value, of m,

m	LHS $\left(\frac{1}{3}m+8\right)$	RHS (11)
3	$\frac{1}{3}\times3+8=1+8=9$	11
6	$\frac{1}{3}\times6+8=2+8=10$	11
9	$\mathbf{\frac{1}{3}\times9+8=3+8=11}$	**11**

$m = 9$, LHS=RHS

Hence, $\boldsymbol{m = 9}$ is the solution of the equation.

(i) Try some approximate value of y,

y	LHS $(3y+4)$	RHS $(5y-4)$
1	$3\times1+4$ $=3+4=7$	$5\times1-4$ $=5-4=1$
2	$3\times2+4$ $=6+4=10$	$5\times2-4$ $=10-4=6$
3	$3\times3+4$ $=9+4=13$	$5\times3-4$ $=15-4=11$
4	$\mathbf{3\times4+4}$ $\mathbf{=12+4=16}$	$\mathbf{5\times4-4}$ $\mathbf{=20-4=16}$

$y = 4$, LHS =RHS

Hence, $\boldsymbol{y = 4}$ is the solution of the equation.

(j) Try some approximate value of m

m	LHS $(4m+9)$	RHS $(2m-3)$
1	$4\times1+9$ $=4+9=13$	$2\times1-3$ $=2-3=-1$
2	$4\times2+9$ $=8+9=17$	$2\times2-3$ $=4-3=1$
3	$4\times3+9$ $=12+9=21$	$2\times3-3$ $=6-3=3$
-1	$4\times(-1)+9$ $=-4+9=5$	$2\times(-1)-3$ $=-2-3=-5$
-3	$4\times(-3)+9$ $=-12+9=-3$	$2\times(-3)-3$ $=-6-3=-9$
-6	$\mathbf{4\times(-6)+9}$ $\mathbf{=-24+9=-15}$	$\mathbf{2\times(-6)-3}$ $\mathbf{=-12-3=-15}$

First, we tried some positive values after then we tried some negative values and get that at $m = -6$, LHS =RHS

Hence, $\boldsymbol{m = -6}$ is the solution of the equation.

Exercise–9B

1. $m-4=6$

$\Rightarrow$ $m-4+4=6+4$ (On adding 4 to both sides)

$\Rightarrow$ $m=10$

Hence, $m = 10$

Check : Substitute $m = 10$ in given equation we get,

$m-4=6$

$10-4=6$

$6=6$

Both sides are equal. So, answer is correct.

2. $n+6=10$

$\Rightarrow$ $n+6-6=10-6$ (On subtracting 6 to both sides)

$\Rightarrow$ $n=4$

Hence, $n = 4$

Check : Substitute $n = 4$ in given equation we get,

$n+6=10$

$4+6=10$

$10=10$

Both sides are equal. So, answer is correct.

3. $4x+6=18$

$\Rightarrow \quad 4x+6-6=18-6$ (On subtracting 6 to both sides)

$\Rightarrow \quad 4x=12$

$\Rightarrow \quad \frac{4x}{4}=\frac{12}{4}$ (On dividing by 4 to both sides)

$\Rightarrow \quad x=3$

Hence, $x=3$

Check : Substitute $x=3$ in given equation we get,

$\Rightarrow \quad 4x+6=18$

$\Rightarrow \quad 4\times3+6=18$

$\Rightarrow \quad 12+6=18$

$\Rightarrow \quad 18=18$

Both sides are equal. So, answer is correct.

4. $3p+4=22$

$\Rightarrow \quad 3p+4-4=22-4$

(On subtracting 4 to both sides)

$\Rightarrow \quad 3p=18$

$\Rightarrow \quad \frac{3p}{3}=\frac{18}{3}$ (On dividing by 3 to both sides)

$\Rightarrow \quad p=6$

Hence, $p=6$

Check : Substitute $p=6$ in given equation we get,

$\Rightarrow \quad 3p+4=22$

$\Rightarrow \quad 3\times6+4=22$

$\Rightarrow \quad 18+4=22$

$\Rightarrow \quad 22=22$

Both sides are equal. So, answer is correct.

5. $\frac{m}{6}=12$

$\Rightarrow \quad \frac{m}{6}\times6=12\times6$

(On multiplying by 6 to both sides)

$\Rightarrow \quad m=72$

Hence, $m=72$

Check : Substitute $m=72$ in given equation we get,

$\Rightarrow \quad \frac{m}{6}=12$

$\Rightarrow \quad \frac{72}{6}=12$

$\Rightarrow \quad 12=12$

Both sides are equal. So, answer is correct.

6. $\frac{x}{4}-8=2$

$\Rightarrow \quad \frac{x}{4}-8+8=2+8$ (On adding 8 to both sides)

$\Rightarrow \quad \frac{x}{4}=10$

$\Rightarrow \quad \frac{x}{4}\times4=10\times4$

(On multiplying by 4 to both sides)

$\Rightarrow \quad x=40$

Hence, $x=40$

Check : Substitute $x=40$ in given equation we get,

$\Rightarrow \quad \frac{x}{4}-8=2$

$\Rightarrow \quad \frac{40}{4}-8=2$

$\Rightarrow \quad 10-8=2$

$2=2$

Both sides are equal. So, answer is correct.

7. $\frac{4l}{5}=16$

$\Rightarrow \quad \frac{4l}{5}\times5=16\times5$

(On multiplying by 5 to both sides)

$\Rightarrow \quad 4l=80$

$\Rightarrow \quad \frac{4l}{4}=\frac{80}{4}$

(On dividing by 4 to both sides)

$\Rightarrow \quad l=20$

Hence, $l=20$

Check : Substitute $l=20$ in given equation we get,

$\Rightarrow \quad \frac{4l}{5}=16$

$\Rightarrow \quad \frac{4\times20}{5}=16$

$\Rightarrow \quad 4\times4=16$

$\Rightarrow \quad 16=16$

Both sides are equal. So, answer is correct.

8. $12-y=5$

$\Rightarrow \quad 12-y-12=5-12$

(On subtracting 12 to both sides)

$\Rightarrow \quad -y=-7$

$\Rightarrow \quad y=7$ (Cancel $(-)$ sign both sides)

Hence, $y=7$

Check : Substitute $y = 7$ in given equation we get,

$\Rightarrow \quad 12 - y = 5$

$\Rightarrow \quad 12 - 7 = 5$

$\Rightarrow \quad 5 = 5$

Both sides are equal. So, answer is correct.

9. $14 - 2m = 4$

$\Rightarrow \quad 14 - 2m - 14 = 4 - 14$

(On subtracting 14 to both sides)

$\Rightarrow \quad -2m = -10$

$\Rightarrow \quad \frac{-2m}{-2} = \frac{-10}{-2}$

(On dividing by (-2) to both sides)

$\Rightarrow \quad m = 5$

Hence, $m = 5$

Check : Substitute $m = 5$ in given equation we get,

$\Rightarrow \quad 14 - 2m = 4$

$\Rightarrow \quad 14 - 2 \times 5 = 4$

$\Rightarrow \quad 14 - 10 = 4$

$\Rightarrow \quad 4 = 4$

Both sides are equal. So, answer is correct.

10. $4m - 5 = 19$

$\Rightarrow \quad 4m - 5 + 5 = 19 + 5$ (On adding 5 to both sides)

$\Rightarrow \quad 4m = 24$

$\Rightarrow \quad \frac{4m}{4} = \frac{24}{4}$ (On dividing by 4 to both sides)

$\Rightarrow \quad m = 6$

Hence, $m = 6$

Check : Substitute $m = 6$ in given equation we get,

$4m - 5 = 19$

$4 \times 6 - 5 = 19$

$24 - 5 = 19$

$19 = 19$

Both sides are equal. So, answer is correct.

11. $\frac{p}{5} - 7 = 2$

$\Rightarrow \quad \frac{p}{5} - 7 + 7 = 2 + 7$ (On adding 7 to both sides)

$\Rightarrow \quad \frac{p}{5} = 9$

$\Rightarrow \quad \frac{p}{5} \times 5 = 9 \times 5$

(On multiplying by 5 to both sides)

$\Rightarrow \quad p = 45$

Hence, $p = 45$

Check : Substitute $p = 45$ in given equation we get,

$\frac{p}{5} - 7 = 2$

$\Rightarrow \quad \frac{45}{5} - 7 = 2$

$\Rightarrow \quad 9 - 7 = 2$

$\Rightarrow \quad 2 = 2$

Both sides are equal. So, answer is correct.

12. $8k + 3 = 11$

$\Rightarrow \quad 8k + 3 - 3 = 11 - 3$

(On subtracting 3 to both sides)

$\Rightarrow \quad 8k = 8$

$\Rightarrow \quad \frac{8k}{8} = \frac{8}{8}$ (On dividing by 8 to both sides)

$\Rightarrow \quad k = 1$

Hence, $k = 1$

Check : Substitute $k = 1$ in given equation we get,

$8k + 3 = 11$

$\Rightarrow \quad 8 \times 1 + 3 = 11$

$\Rightarrow \quad 8 + 3 = 11$

$\Rightarrow \quad 11 = 11$

Both sides are equal. So, answer is correct.

MCQs :

1.	(b)	**2.**	(a)	**3.**	(b)	**4.**	(b)	**5.**	(c)
6.	(a)	**7.**	(b)	**8.**	(b)	**9.**	(c)	**10.**	(a)
11.	(b)	**12.**	(a)	**13.**	(b)				

CHAPTER 10 : PERIMETER AND AREA

Exercise-10A

1. **(a)** The perimeter of triangle ABC

$= AB + BC + CA$

$= 4\,\text{cm} + 5\,\text{cm} + 7\,\text{cm}$

$= (4 + 5 + 7)\,\text{cm}$

$= 16\,\text{cm}$

(b) The perimeter of square $PQRS$

$= PQ + QR + RS + SP$

$= 5.5\,\text{cm} + 8\,\text{cm} + 7\,\text{cm} + 4\,\text{cm}$

$= (5.5 + 8 + 7 + 4)\,\text{cm}$

$= 24.5\,\text{cm}$

(c) The perimeter of trapezium $LMNO$

$= LM + MN + NO + OL$

$= 4\,\text{cm} + 6\,\text{cm} + 10\,\text{cm} + 7\,\text{cm}$

$= (4 + 6 + 10 + 7)\,\text{cm}$

$= 27\,\text{cm}$

(d) The perimeter of given figure

$= AB + BC + CD + DE + EF + FG +$
$GH + HI + IJ + JK + KL + LA$

$= 3\,\text{cm} + 1\,\text{cm} + 2\,\text{cm} + 1\,\text{cm} + 2\,\text{cm} +$
$3\,\text{cm} + 2\,\text{cm} + 1\,\text{cm} + 2\,\text{cm} + 1\,\text{cm} +$
$3\,\text{cm} + 7\,\text{cm}$

$= (3 + 1 + 2 + 1 + 2 + 3 + 2 + 1 + 2 +$
$1 + 3 + 7)\,\text{cm}$

$= 28\,\text{cm}$

(e) The perimeter of given figure

$= PQ + QR + RSST + TU + UP$

$= 4\,\text{cm} + 2\,\text{cm} + 3.5\,\text{cm} + 3.5\,\text{cm} + 3\,\text{cm} + 5\,\text{cm}$

$= (4 + 2 + 3.5 + 3.5 + 3 + 5)\,\text{cm}$

$= 21\,\text{cm}$

(f) The perimeter of given figure

$= AB + BC + CD + DA$

$= 4\,\text{cm} + 7\,\text{cm} + 6\,\text{cm} + 8\,\text{cm}$

$= (4 + 7 + 6 + 8)\,\text{cm}$

$= 25\,\text{cm}$

2. (a) The given length of the rectangle = 10 cm

Breadth of the rectangle = 8 cm

So, the perimeter of the rectangle

$= 2(l + b)$

$= 2(10 + 8)\,\text{cm}$

$= 2 \times 18\,\text{cm}$

$= 36\,\text{cm}$

(b) Length of the rectangle = 1.2 m

Breadth = 1 m

So, the perimeter of the rectangle

$= 2(l + b)$

$= 2(1.2 + 1)\,\text{m}$

$= 2 \times 2.2\,\text{m}$

$= 4.4\,\text{m}$

(c) Length of the rectangle = 1 m

Breadth = 80 cm = 0.8 m

So, the perimeter of the rectangle

$= 2(l + b)$

$= 2(1 + 0.8)\,\text{m}$

$= 2 \times 1.8\,\text{m}$

$= 3.6\,\text{m}$

(d) The length of rectangle = 6 m

Breadth = 4.8 m

So, perimeter of the rectangle

$= 2(l + b)$

$= 2(6 + 4.8)\,\text{m}$

$= 2 \times 10.8\,\text{m}$

$= 21.6\,\text{m}$

3. Since perimeter of the square = 4 side

(a) The given,

side = 18 cm

So, perimeter of the square = $4 \times 18\,\text{cm}$

$= 72\,\text{cm}$

(b) The given,

side = 22.5 cm

So, perimeter of the square = $4 \times 22.5\,\text{m}$

$= 90\,\text{m}$

(c) The given,

side = 25 m

So, perimeter of the square = $4 \times 25\,\text{m}$

$= 100\,\text{m}$

(d) The given,

side = 36 cm

So, perimeter of the square = $4 \times 36\,\text{cm}$

$= 144\,\text{cm}$

4. (a) The given,

perimeter = 180 cm, breadth = 40 cm

We know that,

$$\text{Length} = \frac{\text{Perimeter} - 2\,\text{breadth}}{2}$$

$$= \frac{180\,\text{cm} - 2 \times 40\,\text{cm}}{2}$$

$= 90\,\text{cm} - 40\,\text{cm} = 50\,\text{cm}$

(b) The given,

perimeter = 330 cm, breadth = 45 cm

We know that,

$$\text{Length} = \frac{\text{Perimeter} - 2\,\text{breadth}}{2}$$

$$= \frac{330\,\text{cm} - 2\times 45\,\text{cm}}{2}$$

$$= 165\,\text{cm} - 45\,\text{cm}$$

$$= 120\,\text{cm}$$

5. **(a)** The given,

perimeter = 250 cm, length = 85 cm

We know that,

$$\text{Breadth} = \frac{\text{Perimeter} - 2\,\text{length}}{2}$$

$$= \frac{250\,\text{cm} - 2\times 85\,\text{cm}}{2}$$

$$= 125\,\text{cm} - 85\,\text{cm}$$

$$= 40\,\text{cm}$$

(b) The given,

perimeter = 480 cm, length = 124 cm

We know that,

$$\text{Breadth} = \frac{\text{Perimeter} - 2\,\text{length}}{2}$$

$$= \frac{480\,\text{cm} - 2\times 124\,\text{cm}}{2}$$

$$= 240\,\text{cm} - 124\,\text{cm}$$

$$= 116\,\text{cm}$$

6. The length of a table-top = 1 m 75 cm

$$= 1.75\,\text{m}$$

And the breadth of a table-top = 1 m 25 cm

$$= 1.25\,\text{m}$$

So, perimeter of the table-top = 2 (length + breadth)

$$= 2(1.75\,\text{m} + 1.25\,\text{m})$$

$$= 2\times 3\,\text{m}$$

$$= 6\,\text{m}$$

7. The each side of an equilateral triangle = 5.6 cm

So, perimeter of an equilateral triangle = Sum of its three sides

$$= (5.6 + 5.6 + 5.6)\,\text{cm}$$

$$= 16.8\,\text{cm}$$

Hence, the perimeter of an equilateral triangle is 16.8 cm.

8. Perimeter of the square = 56 cm

Let the each side of square be x cm.

Then, perimeter of the square = 4 side

$$56\,\text{cm} = 4x$$

or $$4x = 56\,\text{cm}$$

or $$x = (56 \div 4)\,\text{cm}$$

or $$x = 14\,\text{cm}$$

Hence, the each side of the square is 14 cm.

9. The given,

Each side of a regular hexagon = 6 cm

So, perimeter of the regular hexagon

$$= (6 + 6 + 6 + 6 + 6 + 6)\,\text{cm}$$

$$= 36\,\text{cm}$$

Hence, the perimeter of the regular hexagon is 36. cm.

10. Perimeter of the pentagon = 35 cm

So, perimeter of a pentagon = 5 × side

or $$35\ \text{cm} = 5\times \text{side}$$

or $$\text{side} = (35 \div 5)\,\text{cm}$$

$$\text{side} = 7\,\text{cm}$$

Hence, the each side of a regular pentagon is 7 cm.

11. Length of the park = 80 m

Breadth of the park = 68 m

So, perimeter of a rectangular park

$$= 2\,(\text{length} + \text{breadth})$$

$$= 2(80 + 68)\,\text{m}$$

$$= 2\times 148\,\text{m}$$

$$= 296\,\text{m}$$

Since cost of fencing per meter = ₹ 8.80

So, cost of fencing 296 m = ₹ (8.80 × 296)

$$= ₹\ 2604.80$$

Hence, the cost of fencing a rectangular park is ₹ 2604.80.

12. Side of a square park = 320 m

So, perimeter of a squar park = 4 × side

$$= 4\times 320\,\text{m}$$

$$= 1280\,\text{m}$$

Since cost of fencing per meter = ₹ 12

So, cost of fencing 1280 m = ₹ 12 × 1280

$$= ₹\ 15360$$

Hence, the cost of fencing a square park is ₹ 15360.

13. Length of the rectangular garden = 120 m

Breadth of the rectangular garden

$= 2(\text{length} + \text{breadth})$

$= 2(120 + 90)\ \text{m}$

$= 2 \times 210\ \text{m}$

$= 420\ \text{m}$

Therefore, distance covered by him in 1 rounds

$= 10 \times 420\ \text{m}$

$= 4200\ \text{m}$

Hence, the total distance covered by athlete is 4200 m.

14. Length of the rectangular field = 90 cm

Breadth of the rectangular field = 78 m

So, perimeter of the rectangular field

$= 2(\text{length} + \text{breadth})$

$= 2(90 + 78)\ \text{m}$

$= 2 \times 168\ \text{m}$

$= 336\ \text{m}$

So, length of wire required in six time $= 6 \times 336\ \text{m}$

$= 2016\ \text{m}$

Cost of wire per meter = ₹ 11.80

So, cost of 2016 m wire = ₹ 11.80×2016

= ₹ 23788.80

Hence, the length of wire required is 2016 m and cost of wire is ₹ 23788.80.

15. Distance covered by Harpreet is one round

= perimeter of rectangular park

$= 2(\text{length} + \text{breadth})$

$= 2(70 + 58)\ \text{m}$

$= 2 \times 128\ \text{m}$

$= 256\ \text{m}$

Distance covered by Karan in one round

= perimeter of squar park

$= 4 \times$ length of side

$= 4 \times 80\ \text{m}$

$= 320\ \text{m}$

Since, $320 > 256\ \text{m}$

So, Karan covers 64 m more distance.

Hence, Karan covers more distance by Harpreet.

16. Let the length and breadth of a room be $3x$ and $2x$ respectively.

So, perimeter of a room = 2 (length + breadth)

$60\ \text{m} = 2(3x + 2x)$ $(\because$ perimeter = 60 m)

or $2 \times 5x = 60\ \text{m}$

or $5x = 30\ \text{m}$

or $x = 6\ \text{m}$

Therefore, the length of a room are :

$3x = 3 \times 6\ \text{m} = 18\ \text{m}$

The breadth of a room are :

$2x = 2 \times 6\ \text{m} = 12\ \text{m}$

Hence, the dimensions of the room are 18 m and 12 m.

17. Total cost of fencing = ₹ 1560

Per meter cost = ₹ 6.50

So, perimeter of the rectangular field

$$= \frac{\text{total cost of fencing}}{\text{per meter cost}}$$

$$= \frac{1560}{6.50} = 240\ \text{m}$$

Breadth of the rectangular field = 50 m

Perimeter of the rectangular field

$= 2(\text{length} + \text{breadth})$

$240\ \text{m} = 2(\text{length} + 50\ \text{m})$

$120\ \text{m} = \text{length} + 50\ \text{m}$

$\text{length} = 120\ \text{m} - 50\ \text{m}$

$= 70\ \text{m}$

Hence, the length of the rectangular field is 70 m.

18. Total cost of fencing = ₹ 1872

per meter cost = ₹ 12

So, perimeter of the square park

$$= \frac{\text{total cost of fencing}}{\text{per meter cost}}$$

$$= \frac{1872}{12} = 156\ \text{m}$$

Let length of the square park be x m.

So, perimeter of the square park $= 4x$

$156\ \text{m} = 4x$

or $4x = 156\ \text{m}$

or $x = (156 \div 4)\ \text{m}$

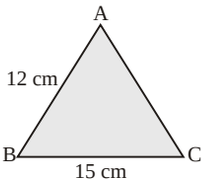
$x = 39\ \text{m}$

Hence, the length of each side of park is 39 m.

19. Two sides of a triangle = 12 cm, 15 cm

The perimeter of the triangle = 40 cm

The third side = ?



The perimeter of the triangle

$= AB + BC + AC$

$40\,\text{cm} = 12\,\text{cm} + 15\,\text{cm} + AC$

or $40\,\text{cm} - 27\,\text{cm} = AC$

or $AC = 13\,\text{cm}$

Hence, the third side of a triangle is 13 cm.

Exercise-10B

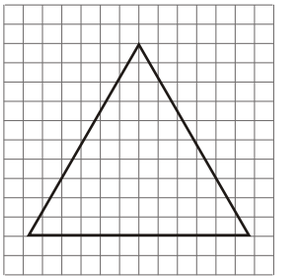
1. **(a)** Number of complete squares = 26

Number of more than half squares = 9

Number of half squares = 0

So, area of given figure = $(26 + 9 + 0)$ sq.m

$= 35$ sq.m



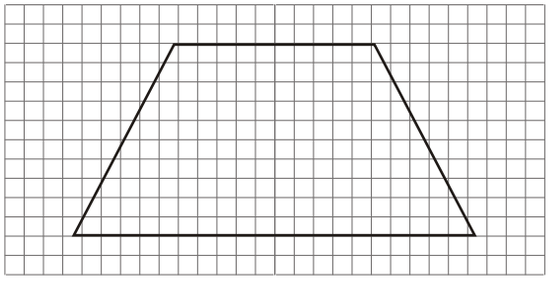
(b) Number of complete squares = 91

Number of more than half squares = 9

Number of half squares = 0

So, area of given figure = $(91 + 9 + 0)$ sq.m

$= 100$ sq.m



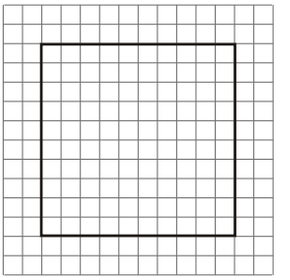
(c) Number of complete squares = 70

Number of more than half squares = 0

Number of half squares = 0

So, area of given figure = $(70 + 0 + 0)$ sq.m

$= 70$ sq.m



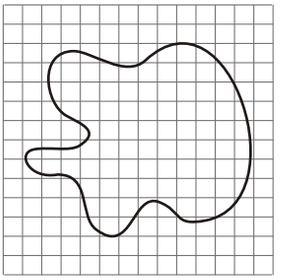
(d) Number of complete squares = 54

Number of more than half squares = 10

Number of half squares = 2

So, area of given figure = $(54 + 10 + 2)$ sq.m

$= 66$ sq.m



Exercise-10C

1. Since, area of the rectangle = length $\times$ breadth

(a) The given,

length = 10 m, breadth = 8 m

So, area of the rectangle = $(10 \times 8)\ \text{m}^2$

$= 80\ \text{m}^2$

(b) The given,

length = 10.4 m, breadth = 9.6 m

So, area of the rectangle = $(10.4 \times 9.6)\ \text{m}^2$

$= 99.84\ \text{m}^2$

(c) The given,

length = 15 m, breadth = 18.5 dm = 185 m

So, area of the rectangle = $(15 \times 185)\ \text{m}^2$

$= 2775\ \text{m}^2$

(d) The given,

length = 1.5 m, breadth = 85 cm = 0.85 m

So, area of the rectangle = $(1.5 \times 0.85)\ \text{m}^2$

$= 1.275\ \text{m}^2$

2. Since area of the square = $(\text{side})^2$

(a) Side = 12 m

So, area of the square = $(12\ \text{m})^2$

$= 144\ \text{m}^2$

(b) Side = 14 m

So, area of the square = $(14\text{ m})^2$

$= 196\text{ m}^2$

(c) Side = 18.5 m

So, area of the square = $(18.5\text{ m})^2$

$= 342.25\text{ m}^2$

(d) Side = 20 dm

So, area of the square = $(20\text{ dm})^2$

$= 400\text{ dm}^2$

3. The area of a rectangular garden = 7800 m^2

Breadth of the garden = 78 m

So, length of a rectangular garden = $\frac{\text{Area}}{\text{Breadth}}$

$= \frac{7800}{78}\text{ m} = 100\text{ m}$

Hence, length of a rectangular garden is 100 m.

4. Length of the rectangular ground = 110 m

Breadth of the rectangular ground = 85 m

So, area of the rectangular ground = length × breadth

$= (110 \times 85)\text{ m}^2$

$= 9350\text{ m}^2$

Cost of levelling per m^2 = ₹ 1.75

So, cost of levelling 9350 m^2 = ₹ 1.75×9350

= ₹ 16362.50

Hence, the cost of levelling the garden is ₹ 16362.50.

5. Length of the room = 14 m

Breadth of the room = 12 m

Area of the room = $(14 \times 12)\text{ m}^2 = 168\text{ m}^2$

Area of the carpet = Area of the room = 168 m^2

Cost of carpet per m^2 = ₹ 25

So, cost of 168 m^2 carpet = ₹ (25×168)

= ₹ 4200

Hence, the cost of carpet is ₹ 4200.

6. Length of a room = 6 m, breadth of a room = 4 m

So, area of a room = $(6 \times 4)\text{ m}^2 = 24\text{ m}^2$

Since side of a carpet = 3 m

So, area of a square carpet = $(3\text{ m})^2 = 9\text{ m}^2$

The area of the floor that is not carpeted

= area of a room – area of a square carpet

$= 24\text{ m}^2 - 9\text{ m}^2$

$= 15\text{ m}^2$

Hence, the area of the floor that is not carpeted is 15 m^2.

7. Total cost of the cultivating = ₹ 9450

Cost of cultivating per sq. m = ₹ 6.75

So, area of a rectangular field = $\frac{\text{total cost}}{\text{per meter cost}}$

$= \left(\frac{9450}{6.75}\right)\text{m}^2 = 1400\text{ m}^2$

Length of the field = 40 m

So, breadth of the field = $\frac{\text{Area}}{\text{Length}}$

$= \frac{1400\text{ m}^2}{40\text{ m}} = 35\text{ m}$

Hence, the breadth of the field is 35 m.

8. Length of a hall room = 18.5 m

Breadth of a hall room = 16 m

So, area of a hall room = length × breadth

$= (18.5 \times 16)\text{ m}^2$

$= 296\text{ m}^2$

Since side a tile = 25 cm = 0.25 m

So, area of a tile = $(0.25 \times 0.25)\text{ m}^2$

$= 0.0625\text{ m}^2$

So, number of tiles required = $\frac{\text{Area of a hall room}}{\text{Area of one tile}}$

$= \frac{296}{0.0625} = 4736$

Cost of per tile = ₹ 24

So, cost of 4736 tiles = ₹ 24×4736

= ₹ 113664

Hence, the number of tiles is 4736 and the cost of tiles is ₹ 113664 to be paved.

9. Length of a room = 9.68 m

Breadth of a room = 6.2 m

So, area of a room = $(9.68 \times 6.2)\text{ m}^2$

$= 60.016\text{ m}^2$

Length of a tile = 20 cm = 0.20 m

Breadth of a tile = 11 cm = 0.11 m

So, area of a tile = $(0.20 \times 0.11)\text{ m}^2$

$= 0.022\text{ m}^2$

Number of tiles $= \dfrac{\text{Area of a room}}{\text{Area of a tile}}$

$= \dfrac{60.016}{0.022} = 2728$

Cost of per tile $= ₹\,18$

So, cost of 2728 tiles $= ₹\,18 \times 2728$

$= ₹\,49104$

Hence, the total cost required is ₹ 49104.

10. Length of a rectangular field = 90 m

Breadth of a rectangular field = 60 m

So, area of a rectangular field $= (90 \times 60)\,m^2$

$= 5400\,m^2$

Perimeter of a rectangular field = 2 (length + breadth)

$= 2(90 + 60)\,m$

$= 300\,m$

Since perimeter of a rectangular field

= perimeter of a square field

$\therefore$ Side of a square field $= \dfrac{300}{4}\,m = 75\,m$

So, area of a square field $= (75 \times 75)\,m^2 = 5625\,m^2$

Since $5400 < 5625$

So, difference $= (5625 - 5400)\,m^2 = 225\,m^2$

Hence, a square field has greater area and by 225 m^2.

11. Length of cloth = 4 m

Breadth of cloth = 2 m 25 cm = 2.25 m

So, area of the cloth $= (4 \times 2.25)\,m^2 = 9\,m^2$

Cost of cloth per $m^2 = ₹\,25$

So, cost of 9 m^2 cloth $= ₹\,25 \times 9 = ₹\,225$

Hence, the area of the cloth is 9 m^2 and its cost is ₹ 225.

12. **(a)** The area of given figure

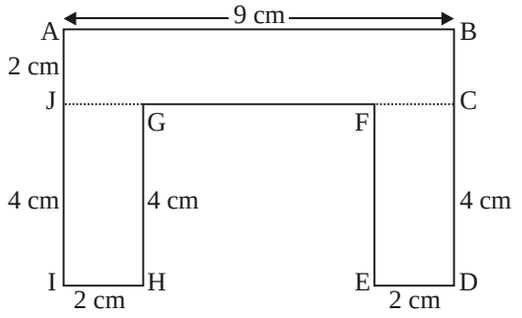
$= [(AB \times BC) + (CD \times DE) + (GH \times HI)]$

$= [(9 \times 2)\,cm^2 + (4 \times 2)\,cm^2 + (4 \times 2)\,cm^2]$

$= 18\,cm^2 + 8\,cm^2 + 8\,cm^2$

$= 18\,cm^2 + 16\,cm^2$

$= 34\,cm^2$



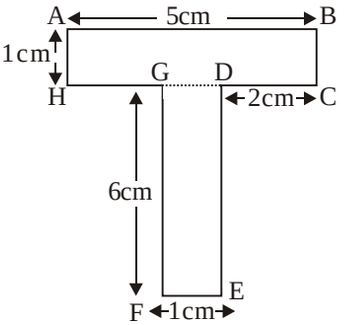
(b) The area of given figure

$= [(AB \times BC) + (DE \times EF)]$

$= [(5 \times 1)\,cm^2 + (6 \times 1)\,cm^2]$

$= 5\,cm^2 + 6\,cm^2$

$= 11\,cm^2$



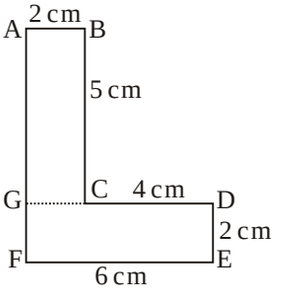
(c) The area of figure

$= [(AB \times (BC) + (GD \times DE)]$

$= [(2 \times 5)\,cm^2 + (6 \times 2)\,cm^2]$

$= 10\,cm^2 + 12\,cm^2$

$= 22\,cm^2$



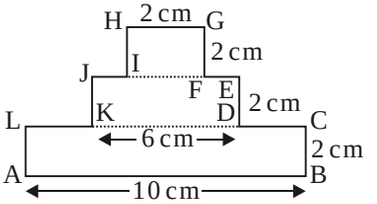
(D) The area of given figure

$= [(AB \times BC) + (GE \times DE) + (HG \times GF)]$

$= [(10 \times 2)\,cm^2 + (6 \times 2)\,cm^2 + (2 \times 2)\,cm^2]$

$= (20 + 12 + 4)\,cm^2$

$= 36\,cm^2$



MCQs

1. (a) **2.** (c) **3.** (b) **4.** (b) **5.** (c)

6. (a) **7.** (b) **8.** (c) **9.** (c) **10.** (a)

CHAPTER 11 : DATA HANDLING

Exercise-11

1. (a) Raw Data : When the observation are initially collected, the collection is called raw data.

For example : The marks obtained by 12 students of a class in a test are given below : 49, 37, 45, 47, 48, 50, 41, 38, 25, 15, 39, 41.

Data given in the above example is raw data.

(b) Array : Arranging the numerical data in an ascending or a descending order is called an array.

(c) Tabulation of Data : Arranging the data in the form of a table is called tabulation of data.

(d) Frequency : Any observation occurs as many times as in data is called its frequency. Such as in above example 20 is repeating 3 times so, frequency of 20 is 3, 24 is repeating 2 times so, frequency of 24 is 2.

(e) Tally mark : It is easy method to count the number one by one. It is shown as,

one number as |

two number as ||

three numbers as |||

four number as 𝍸

five number as 𝍸| or 𝍸||

six number as 𝍸|

Seven number as |||| ||

ans so on.

(f) Statistics : It is the branch of mathematics which deals collection, presentation, analysis and interpretation of the numerical data.

2. Frequency distribution of the given data is :

Score	Tally Marks	Frequency
1	|	1
15	|	1
20	||	2
22	|	1
24	|	1
31	|	1
40	|	1
50	𝍸	5
60	|||	3
80	|	1
90	||	2
100	|	1

3. Frequency distribution of the given data is :

Marks	Tally Marks	Frequency
2	||	2
10	|||	3
13	|	1
15	||	2
16	|	1
18	||	2
20	||	2
24	|	1
29	|	1
30	|||	3
32	|	1
35	|	1
40	|	1
42	||	2
45	𝍸	5
46	|||	3
48	|||	3
49	||	2
50	𝍸	5

4. Frequency distribution of heights of 30 students :

Height (in cm)	Tally Marks	Frequency
138	|	1
140	|	1

145	|	1
146	|	1
148	𝍸	5
150	𝍸 |	4
152	|||	3
155	||	2
156	||	2
158	|	1
159	|	1
160	𝍸 |	6
165	||	2

5. Frequency distribution of the given data is :

Outcomes	Tally Marks	Frequency
1	𝍸 |	6
2	𝍸	4
3	𝍸	5
4	𝍸 |	6
5	|||	3
6	𝍸 |||	8

6. Frequency distribution of ages of 24 children :

Age	Tally Marks	Frequency
12	|||	3
13	|	1
14	|||	4
15	𝍸	5
16	𝍸	5
17	|||	3
18	||	2
20	|	1

7. Frequency distribution of the given data is :

Number of Children	Tally Marks	Frequency
0	||	2
1	𝍸 |	6
2	𝍸 |||	8
3	𝍸 ||	7
4	|||	4
5	|||	3

8. Frequency distribution of the given data is :

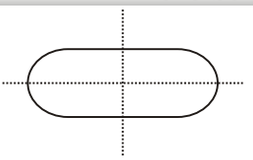
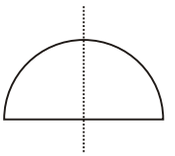
Number of family members	Tally Marks	Frequency
2	|	1
3	||	2
4	𝍸 |	6
5	|	1
6	𝍸	5
7	|	1
8	|||	4

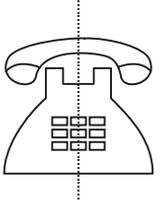
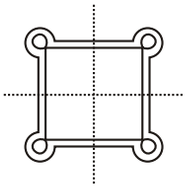
MCQs :

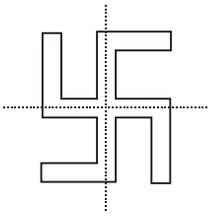
1. (a) **2.** (b) **3.** (b) **4.** (a) **5.** (c)
6. (b) **7.** (a) **8.** (b) **9.** (c) **10.** (a)
11. (a) **12.** (b)

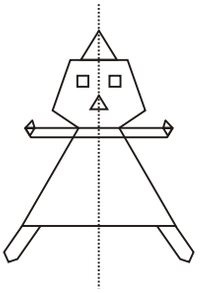
CHAPTER12 : LINEAR SYMMETRY

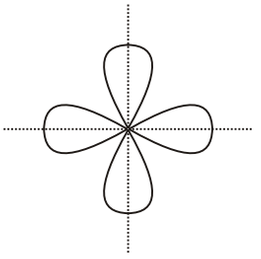
Exercise-12A

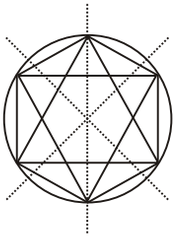
1. **(a)**  **(b)** 

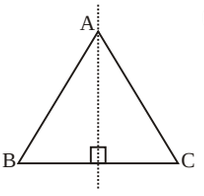
(c)  **(d)** 

(e) 

(f) 

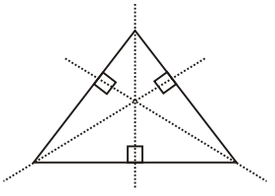
(g) 

(h) 

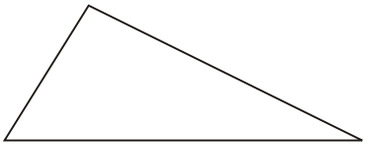
2. **(a)** Yes, 

(b) No;

(c) Yes, equilateral triangle



(c) Yes, scalene triangle



3. **(a)** The letter H has only one line of symmetry. (F)

(b) A parallelogram has no line of symmetry. (T)

(c) A rhombus has two lines of symmetry. (T)

(d) A square has two lines of symmetry. (F)

(e) A circle has infinite number of lines of symmetry. (T)

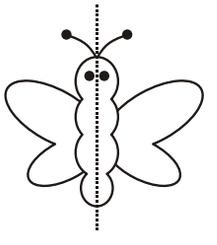
(f) An isosceles trapezium has only line of symmetry. (T)

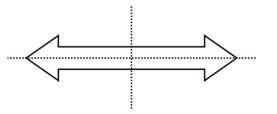
(g) A rectangle has two lines of symmetry. (T)

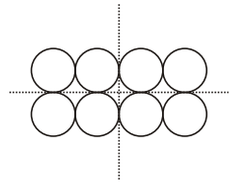
(h) A kite shaped figure has two lines of symmetry. (F)

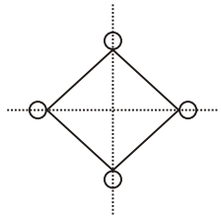
Exercise-12B

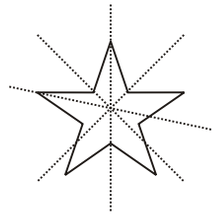
1. **(a)** 

(b) 

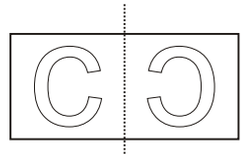
(c) 

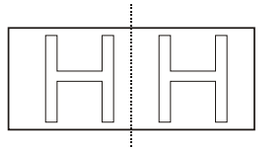
(d) 

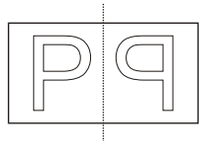
(e) 

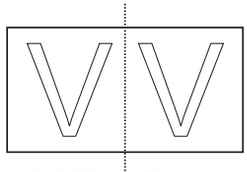
(f) 

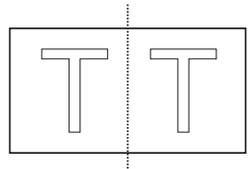
2. **(a)** 

(b) 

(c) 

(d) 

(e) 

(f) 

Letters W, H, V, T looks the same and letters C and P do not look the same. It is because the image is laterally inverted.

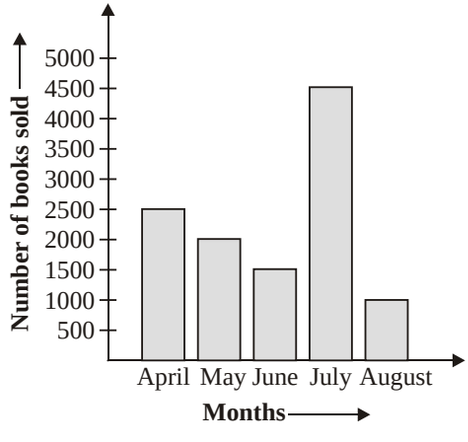
MCQs

1. (a) **2.** (a) **3.** (c) **4.** (b) **5.** (a)
6. (b) **7.** (c) **8.** (c)

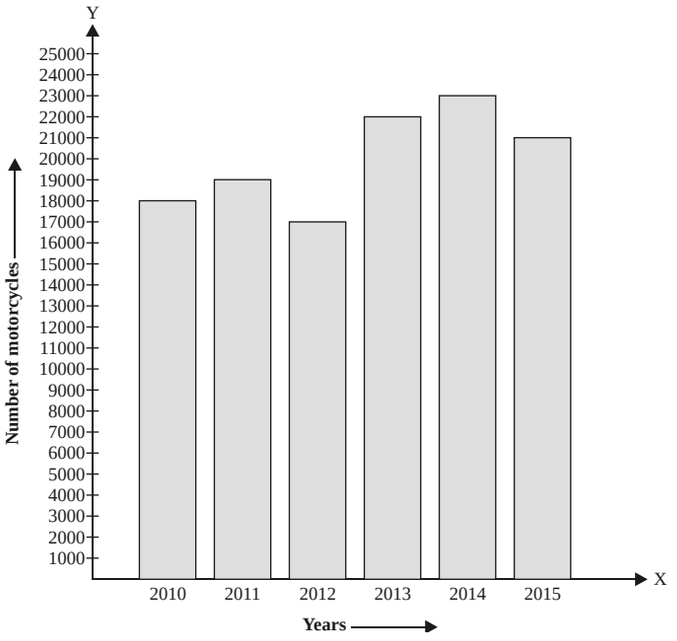
CHAPTER13 : BAR GRAPH

Exercise-13

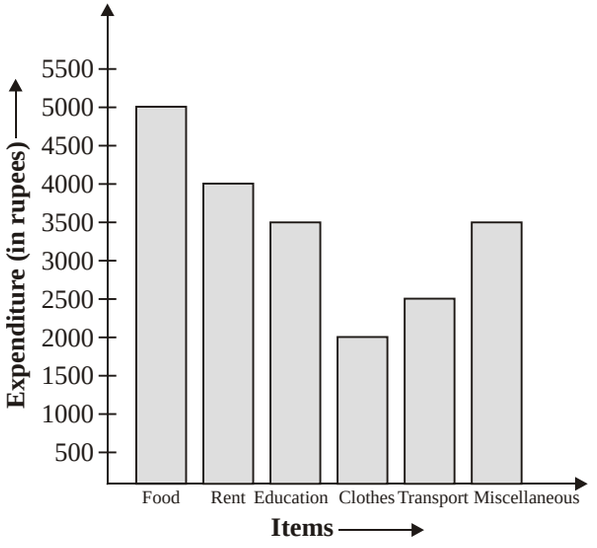
1. Scale : 1 unit length = 500 books



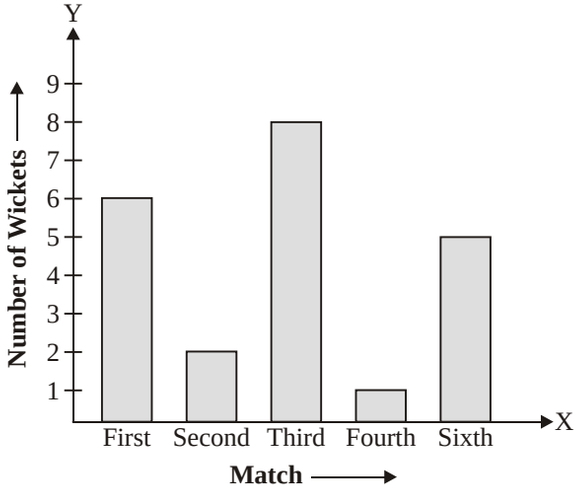
2. Scale : 1 unit length = 1000 motorcycles



3. Scale : 1 unit length = ₹ 500



4. Scale : 1 unit length = 1 wicket



5. **(a)** In Maths, he get maximum marks.

(b) In Hindi and Science, he get equal marks.

(c) He get 10 marks more in maths as compare to Science.

(d) 395 is the total marks in all five subjects.

6. **(a)** 4500 cars are produced in year 2011.

(b) In 2015, the production of cars was maximum.

(c) In 2014, the production of cars was minimum and 3000 cars.

(d) 13500 Cars were produced in 2009, 2001 and 2012.

7. **(a)** 110 was the highest score in fourth inning.

(b) In fifth inning, he score minimum runs.

(c) 90 was the score of third inning.

(d) $\text{Average} = \frac{80+60+90+110+40+80}{6}$

$= \frac{460}{6} = 76.66$

Hence, 76.66 the average of all six innings.

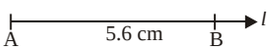
MCQs :

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(c)	**5.**	(b)
6.	(c)	**7.**	(a)	**8.**	(a)	**9.**	(b)	**10.**	(c)
11.	(b)	**12.**	(b)						

CHAPTER-14 : PRACTICAL GEOMETRY

Exercise-14A

1.



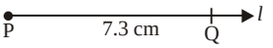
Steps of Construction :

Step 1 : Draw a line l and mark at point A on it.

Step 2 : Place the compasses pointer on the zero mark of the ruler and open it to, place the pencil point upto 5.6 cm mark.

Step 3 : Now, carefully lift the compasses from the ruler without disturbing its arms and place the pointer on A and cut arc on line l at point A.
Thus, AB line-segment of required length 5.6 cm.

2.



Steps of Construction :

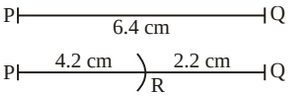
Step 1 : Draw a line l and mark at point P on it.

Step 2 : Place the compasses pointer on the zero mark point upto 7.3 mark.

Step 3 : Now, carefully lift the compasses from the ruler without disturbing its arms place the pointer on P and cut an arc on line l at point Q.
Thus, $\overline{PQ}$ is line-segment of required length 7.3.

3. Steps of Construction :

Step 1 : Draw line segment $\overline{PQ}$ of length 6.4 cm.



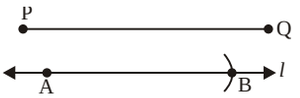
Step 2 : Place the pointer of the compass on the zero mark of the ruler. Open it to place the pencil point upto 4.2 cm marks.

Step 3 : Without changing the opening of the compass, place the pointer on P by measuring, we find that $RQ = 2.2$ cm.

4. We have a line-segment $\overline{PQ}$.

Steps of Construction :

Step 1 : Draw a line l. Mark a point A on the line l.



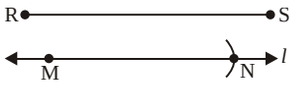
Step 2 : Fix the pointer of the compass on P and the pencil point on Q.

Step 3 : Without changing the opening of the compass, place the pointer on A and draw an arc to cut l at B.
Now, $\overline{AB}$ is the copy of $\overline{PQ}$.

5. We have a line-segment $\overline{RS}$.

Steps of Construction :

Step 1 : Draw a line l. Mark point M on line l.

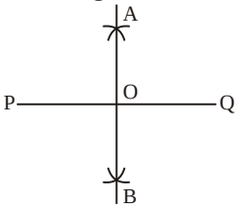


Step 2 : Fix the pointer of the compass on R and the pencil point on S.

Step 3 : Without changing the opening of the compass, place the pointer on M and draw an arc to cut l at N.
Now, $\overline{MN}$ is the copy of $\overline{PQ}$.

6. Steps of Construction :

Step 1 : Draw a line-segment $PQ = 5.8$ cm.



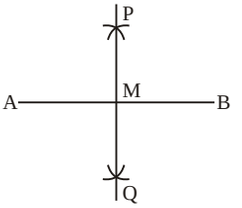
Step 2 : With P as centre and radius more than half PQ, draw arcs, one on each side of PQ.

Step 3 : With Q as centre and the same radius as before, draw arcs, cutting the previously drawn arcs at A and B respectively.

Step 4 : Join AB, meeting PQ at O. Then AO is the perpendicular bisector of PQ.

7. Steps of Construction :

Step 1 : Draw a line-segment $AB = 8.4$ cm.



Step 2 : With A as centre and radius more than half AB, dra w arcs, one on each side of AB.

Step 3 : With B as centre and the same radius as before, draw arcs, cutting the previously drawn arcs at P and Q respectively.

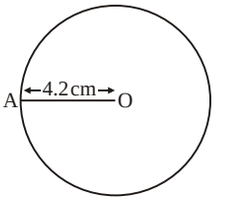
Step 4 : Join PQ, meeting AB at M. Then PM is the perpendicular bisector of AB.

Step 5 : Measure $AB = MB = 4.2$ cm.

Exercise-14B

1. Steps of Construction :

Step 1 : Open the compasses and measure 4.2 cm on the ruler.

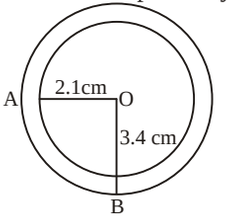


Step 2 : Mark a point O on the paper and place pointer end of compasses on it.

Step 3 : Now, turn the compasses slowly-slowly on the paper, without disturbing its arms and complete one round.
Thus, the circle of required radius is obtained.

2. Steps of Construction :

Step 1 : Open the compasses for the required radius of 2.1 cm and 3.4 cm respectively.



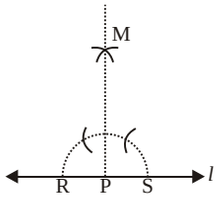
Step 2 : Mark a point *O*.

Step 3 : Plays the pointer of the compasses on *O* with radius 2.1 cm and 3.4 cm respectively.

Step 4 : Turn the compasses slowly to draw the circles.

3. Steps of Construction :

Step 1 : Draw a line *l* and mark at point *P* on it.



Step 2 : Place the pointer edge of compasses at point *P* and cut an arc, which cut line *l* at *R* and *S*.

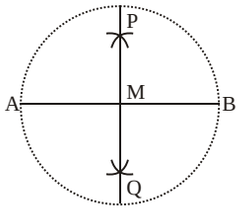
Step 3 : With *R* as centre, draw an arc of radius more than *RS* and with same radius draw another arc, which cuts the previous arc at point *M*.

Step 4 : Join *MP*.

Thus, $MP \perp l$.

4. Steps of Construction :

Step 1 : Draw a line-segment $AB = 3.2$ cm.



Step 2 : With *A* as centre and radius more than half *AB*, draw arcs, one on each side of *AB*.

Step 3 : With *B* as centre and the same radius as before, draw arcs, cutting the previously drawn arcs at *P* and *Q* respectively.

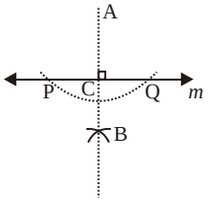
Step 4 : Join *PQ*, meeting *AB* at *M*. Then *PM* is the perpendicular bisector of *AB*.

Step 5 : Open the compasses for the require radius of 1.6 cm.

Step 6 : Plays the pointer of the compasses on *M*.

Step 7 : Turn the compasses slowly to draw the circle.

5. Steps of Construction :



Step 1 : Draw a line *m* and take a point *A* outside it.

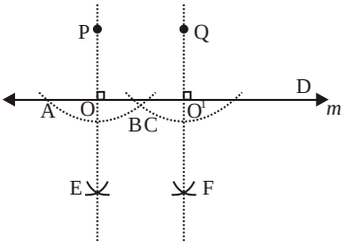
Step 2 : With *A* as a centre draw an arc which cuts *m* at *P* and *Q*.

Step 3 : With *P* as centre draw an arc of radius more than half of *PQ*, with *Q* as centre draw another arc, which cuts the previous arc at *B*.

Step 4 : Join *AB*, which cuts line *m* at *C*.

Thus, $AC \perp m$.

6. Steps of Construction :



Step 1 : Draw a line *m* and take two point *P* and *Q* outside it.

Step 2 : With *P* and *Q* as the centres draw two arc which are cuts *m* at *A*, *B* and *C*, *D* respectively.

Step 3 : With *A* as centre draw an arc of radius more than half of *AB*, with *B* as centre draw another arc, which cuts the previous arc at *E*.

Step 4 : Join *PE*, which cuts line *m* at *O*.

Thus, $PE \perp m$.

Step 5 : With *C* as centre draw an arc of radius more than half of *CD*, with *D* as centre draw another arc, which cuts the previous arc at *F*.

Step 6 : Join *QF*, which cuts line *m* at O^1.

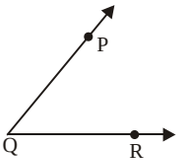
Thus, $QF \perp m$.

Yes, two line-segment *PE* and *QF* are parallel to each other.

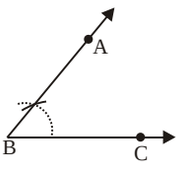
Exercise-14C

1. Steps of Construction :

Step 1 : Draw a ray *QR*.



Step 2 : Place the pointer edge of compasses at *B* and cut an arc on it which cuts *BC* at *D* with same arc and taking *Q* as a centre draw an arc, which cuts *QR* at *M*.



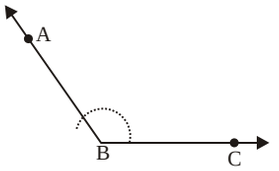
Step 3 : Place pointer edge at point *D* and open the arm of compasses such that it cuts at point *E*. With same radius draw an arc with *M* as centre, which cuts previous arc at *N*.

Step 4 : Join QN and product to P.

Thus, $\angle PQR = \angle ABC$

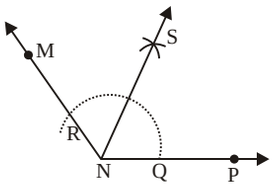
2. Steps of Construction :

Step 1 : Draw $\angle MNP$.



Step 2 : With N as centre draw an arc which cuts NP at Q and MN at R.

Step 3 : With Q as centre and taking radius more than half on RQ, draw an arc.



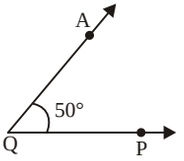
Step 4 : With same radius and taking R as centre, draw an arc which cuts the previous arc at S.

Step 5 : Jon NS.

Thus, NS is the angle bisector of $\angle MNP$ i.e. $\angle MNS = \angle SNP$

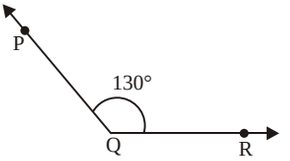
3. Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{BC}$.



Step 2 : Place the centre of the protractor at B and the zero edge along the $\overrightarrow{AB}$.

Step 3 : Mark the point at 50°, i.e., A.

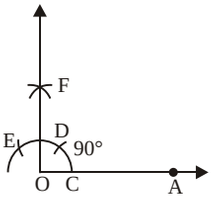


Step 4 : Join AB.

Thus, $\angle ADC = 50°$. Similarly, $\angle PQR = 130°$

4. Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{QA}$.



Step 2 : With O as centre, draw an arc of any radius, which cuts OA at C.

Step 3 : Draw arc of same radius with centre C, which cuts the previous arc at D, from D draw another arc which cuts it at E.

Step 4 : Draw two arcs, taking D and E as centres which cuts at F join OF.

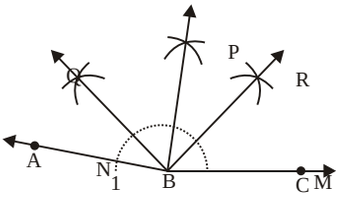
Thus, $\angle FOA = 90°$.

5. Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{BC}$.

Step 2 : Place the centre of the protractor at B and the zero edge along the $\overrightarrow{BC}$.

Step 3 : Mark the point at 160° i.e., A. Join $\angle ABC = 160°$.



Step 4 : With B as a centre and any convenient radius, draw an arc which cuts BC at M.

Step 5 : With M as a centre and same radius, cut the arc. And again with N as a centre, cut another cut the arc at P.

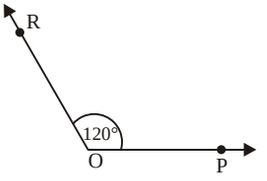
Step 6 : Joint PB.

Step 7 : Similarly, make QB and RB.

Thus, an angle of 160° is divide into four equal parts.

6. (a) Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{OP}$.



Step 2 : Place the centre of the protractor at O and the zero edge along the $\overrightarrow{OP}$.

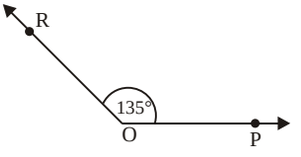
Step 3 : Mark the point at 120°, i.e., R.

Step 4 : Join OR.

Thus, $\angle ROP = 120°$.

(b) Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{OP}$.



Step 2 : Place the centre of the protractor at O and the zero edge along the $\overrightarrow{OP}$.

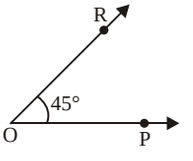
Step 3 : Mark the point at 135°, i.e., R.

Step 4 : Join OR.

Thus, $\angle ROP = 135°$.

(c) Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{OP}$.



Step 2 : Place the centre of the protractor at O and the zero edge along the $\overrightarrow{OP}$.

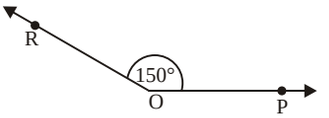
Step 3 : Mark the point at 45°, i.e., R.

Step 4 : Join OR.

Thus, $\angle ROP = 45°$

(d) Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{OP}$.



Step 2 : Place the centre of the protractor at O and the zero edge along the $\overrightarrow{OP}$.

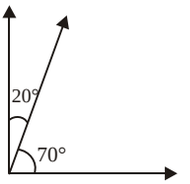
Step 3 : Mark the point at 150°, i.e., R.

Step 4 : Join OR.

Thus, $\angle ROP = 150°$.

7. Steps of Construction :

Step 1 : Draw a ray $\overrightarrow{OP}$.



Step 2 : Place the centre of the protractor at O and the zero edge along the $\overrightarrow{OP}$.

Step 3 : Mark the point at 70°, i.e., R.

Step 4 : Join OR.

Thus, $\angle ROP = 70°$.

Step 5 : Again make 20° without any disturbing. Thus required angle is supplement.

MCQs :

1. (a) **2.** (c) **3.** (a) **4.** (b) **5.** (a)

6. (b) **7.** (c) **8.** (a) **9.** (b) **10.** (c)

11. (b) **12.** (a)

CHAPTER 15 : THE DIMENSIONS SHAPES

Exercise-15

1. (a) An object which occupy space is called three dimensional shapes.

(b) A cuboid has 12 edges.

(c) A cube has all edges equal.

(d) A opposite faces of a cuboid are identical.

(e) A sphere has no vertex and no edges.

(f) A sphere has only face surface.

(g) A dice is in shapes of cube.

(h) A cuboid has 6 face.

(i) A triangular pyramid has 3 triangular faces and 6 edges.

(j) A cone has one circular end and a curved surface.

(k) A triangular pyramid is also known as tetrahedron.

(l) A triangular pyramid has 3 triangular lateral faces.

2. (a) March box, set top box.

(b) Gas cylinder, a circular pipe.

(c) Ice-cram, cone, joker's cap.

(d) A football, a cricket ball.

MCQs :

1. (c) **2.** (b) **3.** (c) **4.** (b) **5.** (a)

6. (c) **7.** (b) **8.** (a) **9.** (b) **10.** (b)

11. (c) **12.** (c) **13.** (a) **14.** (b)

MIXED PRACTICE

Exercise-1

1. (a) perimeter of given figure

$= PQ + QR + RP$

$= (5 + 6 + 7)\,\text{cm}$

$= 18\,\text{cm}$

(b) perimeter of given figure

$= AB + BC + CD + DA$

$= (4 + 7.2 + 6.5 + 3)\,\text{cm}$

$= 20.7\,\text{cm}$

(c) perimeter of given figure

$= AB + BC + CD + DE + EF +$

$FG + GH + HA$

$= (7 + 2 + 3 + 5 + 1 + 5 + 3 + 2)\,\text{cm}$

$= 28\,\text{cm}$

2. Length of the rectangular garden = 200 m

Perimeter = 680 m

So, breadth of the rectangular garden

$$= \frac{\text{perimeter} - 2\ \text{length}}{2}$$

$$= \frac{680\,\text{m} - 2 \times 200\,\text{m}}{2}$$

$= 140\,\text{m}$

3. Perimeter of a regular hexagon = 72 cm

Since the perimeter of a regular hexagon

$= 6 \times \text{side}$

so, $72\,\text{cm} = 6 \times \text{side}$

or $\text{side} = (72 \div 6)\,\text{cm}$

$\text{side} = 12\,\text{cm}$

Hence, the each side of a regular hexagon is 12 cm.

4. Side of square field = 65 m

So, perimeter of a square field = 4 side

$= 4 \times 65\,\text{m} = 260\,\text{m}$

Therefore, the cost of fencing a square field

$= ₹\ 4 \times 260$

$= ₹\ 1040$

5. Side of the square park = 60 cm

So, area of the square park = $(60 \times 60)\,\text{m}^2$

$= 3600\,\text{m}^2$

The given,

length of the rectangular park = 90 m

So, area of the rectangle park = area of the square park

$\text{length} \times \text{breadth} = 3600\,\text{m}^2$

$90 \times \text{breadth} = 3600\,\text{m}^2$

$\text{breadth} = (3600 \div 90)\,\text{m}$

$= 40\,\text{m}$

Hence, the breadth of the rectangular park is 40 m.

6. Length of a rectangle = 40 cm

Breadth of a rectangle = 22 cm

So, area of a rectangle = length × breadth

$= (40 \times 22)\,\text{cm}^2$

$= 880\,\text{cm}^2$

Since the perimeter of a rectangle = the perimeter of a square

So, $2(\text{length} + \text{breadth}) = 4\,\text{side}$

or $4\,\text{side} = 2(40 + 22)\,\text{cm}$

$\text{side} = \frac{2 \times 62}{4}\,\text{cm} = 31\,\text{cm}$

So, the area of a square = $(\text{side})^2$

$= (31 \times 31)\,\text{cm}^2$

$= 961\,\text{cm}^2$

Since, $961\,\text{cm}^2 > 880\,\text{cm}^2$

So, area of a square is more than area of a rectangle.

Hence, 31 cm will be measure of each side and a square shape has more area.

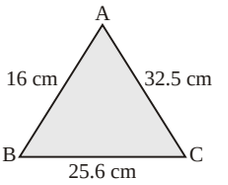
7. Let $AB = 16\,\text{cm}$, $BC = 25.6\,\text{cm}$ and $CA = 32.5\,\text{cm}$

So, the perimeter of a triangle

$= AB + BC + CA$

$= 16\,\text{cm} + 25.6\,\text{cm} + 32.5\,\text{cm}$

$= 74.1\,\text{cm}$



Hence, the perimeter of a triangle is 74.1 cm.

8. Length of a room = 15 m

Breadth of a room = 12 m

So, area of a room = $15\,\text{m} \times 12\,\text{m} = 180\,\text{m}^2$

Length of a tile = 25 cm = 0.25 m

Breadth of a tile = 20 cm = 0.20 m

So, area of a tile = $(0.25 \times 0.20)\,\text{m}^2$

$= 0.05\,\text{m}^2$

So, number of tiles = $\frac{\text{Area of a room}}{\text{Area of a tile}}$

$= \frac{180}{0.50} = 3600$

Hence, 3600 tiles are required to paved floor.

9. Let the length and breadth of a rectangular field be $7x$ and $4x$ respectively.

So, perimeter of a rectangular field = 330 m

$2(7x + 4x) = 330\,\text{m}$

$2 \times 11x = 330\,\text{m}$

$x = \frac{330}{22}\,\text{m}$

$x = 15\,\text{m}$

So, length = $7x = 7 \times 15\,\text{m} = 105\,\text{m}$

breadth = $4x = 4 \times 15\,\text{m} = 60\,\text{m}$

So, area of a rectangular field = length × breadth

$= 105\,\text{m} \times 60\,\text{m}$

$= 6300\,\text{m}^2$

The cost of levelling rectangular field = ₹ 5.50×6300

= ₹ 34650

10. **(a)** A cube has 6 faces and 12 edges.

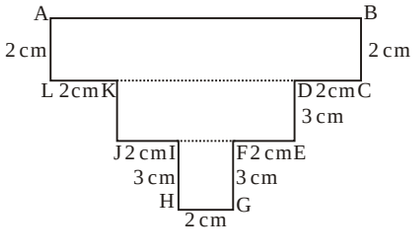
(b) Base of square pyramid is square.

(c) A dice is in the shape of cube.

(d) A cylinder has no vertex.

Exercise-2

1. **(a)** Area of the given figure



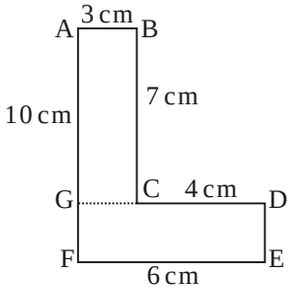
$$= [(AB \times BC) + (KD \times DE) + (FG \times HG)]$$

$$= [(10 \times 2)\,\text{cm}^2 + (6 \times 3)\,\text{cm}^2 + (3 \times 2)\,\text{cm}^2]$$

$$= 20\,\text{cm}^2 + 18\,\text{cm}^2 + 6\,\text{cm}^2$$

$$= 44\,\text{cm}^2$$

(b) Area of the given figure



$$= [(AB \times BC) + (GD \times DE)]$$

$$= [(3 \times 7)\,\text{cm}^2 + (6 \times 3)\,\text{cm}^2]$$

$$= 21\,\text{cm}^2 + 18\,\text{cm}^2$$

$$= 39\,\text{cm}^2$$

2. Side of a square = 80.4 m

So, the area of a square park = $(80.4 \times 80.4)\,\text{m}^2$

$$= 6464.16\,\text{m}^2$$

The cost of grassing of a square park = ₹ 0.80×6464.16

= ₹ 5171.32

3. The area of a rectangle = $234\,\text{m}^2$

Breadth = 13 m

$$\text{Length of a rectangle} = \frac{\text{Area of a rectangle}}{\text{Breadth}}$$

$$= \frac{234}{13}\,\text{m} = 18\,\text{m}$$

So, perimeter of a rectangle = 2(length + breadth)

$$= 2(18 + 13)\,\text{m}$$

$$= 2 \times 31\,\text{m}$$

$$= 62\,\text{m}$$

Cost of fencing per meter = ₹ 3.55

So, the total cost of 62 m fencing = ₹ 3.55×62

= ₹ 220.10

Hence, the cost of fencing is ₹ 220.10.

4. Total cost of the cultivating = ₹ 8050.70

Cost of cultivating per m^2 = ₹ 2.45

$$\text{So, area of the field} = \frac{\text{Total cost}}{\text{per meter cost}}$$

$$= \left(\frac{8050.70}{2.45}\right)\text{m}^2 = 3286\,\text{m}^2$$

Length of the field = 62 m

$$\text{Breadth of the field} = \frac{\text{Area}}{\text{Length}}$$

$$= \frac{3286}{62}\text{m} = 53\,\text{m}$$

Hence, the breadth of the field is 53 m.

5. Length of a room = 12 m

Breadth of a room = 9 m

So, area of a room = $(12 \times 9)\,\text{m}^2 = 108\,\text{m}^2$

Side of a square tile = 25 cm = 0.25 m

So, area of square tile = $(0.25 \times 0.25)\,\text{m}^2$

$$= 0.625\,\text{m}^2$$

$$\text{Number of tiles} = \frac{\text{Area of a room}}{\text{Area of a tile}}$$

$$= \frac{108}{0.0625} = 1728$$

Cost of per tile = ₹ 4.80

= ₹ 8294.40

Hence, the total cost of the tiles is = ₹ 8294.40.

6. Let the length and breadth of a rectangular park be $7x$ and $5x$ respectively.

So, perimeter of a rectangular park

= 2(length + breadth)

$$360\,\text{m} = 2(7x + 5x)$$

$$2 \times 12x = 360\,\text{m}$$

$$24x = 360\,\text{m}$$

$$x = (360 \div 24)\,\text{m}$$

$$x = 15\,\text{m}$$

So, length = $7x = 7 \times 15\,m = 105\,m$

breadth = $5x = 5 \times 15\,m = 75\,m$

So, area of the park = $(105 \times 75)\,m^2$

$= 7875\,m^2$

Cost of levelling per m^2 = ₹ 2.75

So, cost of 7875 m^2 levelling = ₹ 2.75×7875

= ₹ 21656.25

Hence, the cost of levelling a rectangular park is ₹ 21656.25.

7. Side of a square shape of wire = 20 cm

So, perimeter of a wire = $4 \times 20\,cm = 80\,cm$

Since perimeter of a triangle = perimeter of a wire

So, First side + Second side + Third side = 80 cm

30 cm + 25 cm + Third side = 80 cm

Third side = 80 cm – 55 cm

Third side = 25 cm

Hence, the length of third side is 25 cm.

8. Length = 100 m, breadth = 72 m

So, perimeter of a rectangular field = 2 (length + breadth)

$= 2(100 + 72)\,m$

$= 2 \times 172\,m$

$= 344\,m$

Distance covered by athlete in one round = perimeter of the rectangular field.

$= 344\,m$

Therefore, distance covered by him in 10 rounds

$= 10 \times 344\,m$

$= 3440\,m$

Hence, the total distance covered by athlete is 3440 m.

9. Total cost of cultivating = ₹ 118125

Cost of cultivating = ₹ 5.25

So, area of a square field = $\frac{\text{Total cost}}{\text{per meter cost}}$

$= \left(\frac{118125}{5.25}\right) m^2$

$= 22500\,m^2$

So, the side of square field = $(\text{side})^2$

$(\text{side})^2 = 22500\,m^2$

$\text{side} = \sqrt{22500}$

$\text{side} = 150\,m$

perimeter of the square field = $4 \times$ side

$= 4 \times 150\,m$

$= 600\,m$

Hence, the side of square field is 150 m and length of wire is 600 m.

10. **(a)** A cylinder has a curved surface.

(b) A cone has only one vertex.

(c) The side faces of a pyramid are called its lateral faces.

(d) A triangular pyramid has 3 triangular lateral faces.

(e) A opposite faces of a cuboid are identical.

CHAPTER 16 : PICTOGRAPH

Exercise-16

1. Scale :  = 5 students

The above data can be represented by a pictograph as given below :

Class	Number of Students
I	
II	
III	
IV	
V	

2. Scale :  = 5 CFL

The above data can be represented by a pictograph as given below :

Months	Number of Students
January	
February	
March	
April	
May	

3. Scale :  = 5 students

The above data can be represented by a pictograph as given below :

Subject	Number of Students
English	
Hindi	
Science	
Social Science	
Mathematics	

4. Scale :  = 5 bicycle

The above data can be represented by a pictograph as given below :

Day	Number of bicycle
Sunday	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

5. Scale :  = 500 motorbike

 = 500 scooter

 = 500 scooty

The above data can be represented by a pictograph as given below :

Vehicle	Number of users
Motorbike	
Scooter	
Scooty	

6. **(a)** One picture of a car shows 10 cars March is showing 4 pictures of cars.

So, 40 cars were sold in March.

(b) In April, number of cars were sold maximum.

(c) In February, number of cars were sold minimum .

(d) Total number of pictures of cars is 17 in March, April and May. So, total number of cars $= 17 \times 10 = 170$

7. **(a)** One picture of girl 6 girls. So, class III has the minimum number of girls students.

(b) Class II^{nd} and IV^{th} has same number of girls students.

(c) VI class has the maximum number of girls students.

(d) Total number of picture of girls is 33. So, the total number of girls students $= 33 \times 6 = 198$

Hence, 198 is the total number of girls students in the school.

8. **(a)** Sheikh fruit seller sold the maximum number of baskets i.e., $8 \times 50 = 400$ fruit baskets.

(c) $7 \times 50 = 350$ fruit baskets were sold by Ramdeen.

(d) Since total number of pictures of baskets is 30. So, total number of baskets $= 30 \times 50 = 1500$

Hence, 1500 fruit baskets were sold in October.

MCQs

1. (b) **2.** (a) **3.** (c) **4.** (a) **5.** (a)

CHAPTER 1 : INTEGERS

Exercise-1A

1. **(a)** Srinagar is the coldest place among the above places.

(b) Jaipur is the hottest place among the above places.

(c) Difference between temperatures of Jammu and Jaipur = 11° C – (–8° C)

= 11° C + 8° C

= 19° C

(d) 4°C is the temperature of Meerut.

2. The vertical distance between a plane and a submarine

= 500 m + 800 m

= 5800 m

3. Temperature on Monday = –10° C

Temperature of Tuesday –10° C – 3° C = –13° C

Temperature of Wednesday = –13° C + 5° C

= –8° C

4. **(a)** **72 + (–64)**

= 72 – 64

= 8

(b) **–13 + (–41)**

= –13 – 41

= –54

(c) **–68 + 76**

= 76 – 68

= 8

(d) **–81 + 103**

= 103 – 81

= 22

(e) **174 + 82**

= 256

(f) **92 + (–42)**

= 92 – 42

= 50

(g) **–416 + (–216)**

= –416 – 216

= –632

(h) **–176 + 418**

= 418 – 176

= 242

(i) **–56 + (–93)**

= –56 – 93

= –149

5. **(a)** **23 – 16**

= 7

(b) **0 – 78**

= –78

(c) **42 – (–96)**

= 42 + 96

= 138

(d) **– 42 – (–68)**

= – 42 + 68

= 26

(e) **–32 – 176**

= – (32 + 176)

= –208

(f) **–516 – (–412)**

= –516 + 412

= –104

(g) **–46 – (–46)**

= –46 + 46

= 0

(h) **302 – (–68)**

= 302 + 68

= 370

(i) **–68 – 42**

= –110

6. **(a)** The additive inverse of (–42) is 42.

(b) The additive inverse of 66 is –66.

(c) The additive inverse of (–98) is 98.

(d) The additive inverse of (–200) is 200.

(e) The additive inverse of 198 is –198.

7. The sum of two integers = –68

One of them = –62

Other integer = ?

Other integer = The sum of two integers – One integer

= –68 – (–62)

= –68 + 62

= –6

8. The sum of two integers = 169

One of them = –48

Other integer = ?

Other integer = Sum of two integer – One of them

= 169 – (–48)

= 217

9. **[102 + (–32)] – [64 + (–78)]**

= (102 – 32) – (64 – 78)

= 70 – (–14)

= 70 + 14

= 84

10. **102 – [–48 + (–58)]**

= 102 – [–48 – 58]

= 102 – (–106)

= 102 + 106

= 208

11. **(a)** T **(b)** F **(c)** T **(d)** F **(e)** T **(f)** F

Exercise-1B

1. **(a)** $(-14)\times 26 = \underline{\mathbf{26}}\times(-14)$

[By commutative property]

(b) $13\times(26+18) = (13\times 26)+\mathbf{(\underline{13}\times\underline{18})}$

[By distribution property of multiplication over addition]

(c) $25\times\frac{1}{25} = \underline{\mathbf{1}}$ [By multiplicative inverse]

(d) $306\times\underline{\mathbf{0}} = 0$ [Property of zero]

(e) $(-79)\times\underline{\left(-\frac{\mathbf{1}}{\mathbf{79}}\right)} = 1$ [By multiplicative inverse]

(f) $28\times(36-10) = (28\times 36)-(28\times\underline{\mathbf{10}})$

[By distribution property of multiplication over subtraction]

2. **(a)** $\mathbf{225\times(-16)}$

$= -(225\times 16)$

$= -3600$

(b) $\mathbf{56\times 15}$

$= 840$

(c) $\mathbf{-76\times 40}$

$= -(76\times 40)$

$= -3040$

(d) $\mathbf{(-105)\times(-7)}$

$= +(105\times 7)$

$= 735$

(e) $\mathbf{(-18\times 16\times 4)}$

$= (-18)\times 64$

$= -(18\times 64)$

$= -1152$

(f) $\mathbf{42\times(-16)\times 0}$

$= 42\times 0$

$= 0$

(g) $\mathbf{(-307)\times 0}$

$= 0$

(h) $\mathbf{(-49)\times(-14)}$

$= 686$

(i) $\mathbf{37\times(-48)}$

$= -37\times 48$

$= -1776$

3. **(a)** $\mathbf{17\times(-8)\times 5}$

$= 17\times[-8\times 5]$

$= 17\times(-40)$

$= -[17\times 40]$

$= -680$

(b) $\mathbf{9\times(-3)\times 80}$

$= -[9\times 3]\times 80$

$= -[27\times 80]$

$= -2160$

(c) $\mathbf{(-14)\times 5\times(-12)}$

$= +[14\times 12]\times 5$

$= 168\times 5$

$= 840$

(d) $\mathbf{(-18)\times 10\times(-6)}$

$= +[18\times 6]\times 10$

$= 108\times 10$

$= 1080$

(e) $\mathbf{(-25)\times 4\times 16}$

$= (-25)\times 64$

$= -[25\times 64]$

$= -1600$

(f) $\mathbf{(-19)\times 5\times(-20)}$

$= (-19)\times[5\times(-20)]$

$= (-19)\times(-100)$

$= 1900$

(g) $\mathbf{(-63)\times 15\times 20}$

$= (-63)\times 300$

$= -18900$

(h) $\mathbf{(-8)\times 18\times 30}$

$= (-8)\times 540$

$= -[8\times 540]$

$= -4320$

(i) $\mathbf{(-30)\times 4\times(-50)}$

$= (-30)\times[4\times(-50)]$

$= (-30)\times(-200)$

$= 6000$

4. **(a)** $\mathbf{15\times(-25)+15\times(-15)}$

$= 15\times[(-25)+(-15)]$

$= 15\times[-25-15]$

$= 15\times(-40)$

$= -600$

(b) $\mathbf{(-15)\times 4+15\times(-6)}$

$= 15\times[(-4)+(-6)]$

$= 15\times[-4-6]$

$= 15\times(-10)$

$= -150$

(c) $\mathbf{625\times(-35)+(-625)\times 65}$

$= 625\times[(-35+(-65)]$

$= 625\times[-35-65]$

$= 625\times(-100)$

$= -62500$

(d) $\mathbf{18\times 20-18\times 100}$

$= 18\times(20-10)$

$= 18\times 10$

$= 180$

(e) $\mathbf{20\times(-16)+20\times6}$

$= 20\times[(-16)+6]$

$= 20\times[-16+6]$

$= 20\times(-10)$

$= -200$

(f) $\mathbf{(-56)\times19-56}$

$= 56\times[-19-1]$

$= 56\times(-20)$

$= -1120$

5. The temperature of a room = 45° C

Rate of temperature every hour = 6° C

So, the room temperature after a hours

$= 45°\text{ C} - 6\times 9°\text{ C}$

$= 45°\text{ C} - 54°\text{ C}$

$= -9°\text{ C}$

6. (a) Marks are given for one correct answers = 4

So, marks are given for 4 correct answers

$= 4\times4 = 16$

Marks are given for one wrong answers = −2

So, marks are given for 12 wrong answers

$= -2\times12 = -24$

Therefore, Manpreet's score = 16 − 24 = −8

Hence, Manpreet's score is (−8).

(b) Marks are given for one correct answers = 4

So, marks are given for 12 correct answers

$= 4\times12 = 48$

Marks are given for one wrong answers = −2

So, marks are given for 2 wrong answers

$= -2\times2 = -4$

Therefore, Kartik's score = 48 − 4 − 44

Hence, Kartik's score is 44.

(c) Total number of blankets = 12000

Number of defective blankets = 4000

So, number of fresh blankets = 12000 − 4000 = 8000

Company earns a profit on one fresh blanket = ₹ 100

Company earns a profit on 8000 such blankets

$= ₹\ (8000\times100)$

$= ₹\ 800000$

Company suffers a loss on one defective blanket = ₹ 180

So, company suffers loss on 4000 defective blankets

$= ₹\ (4000\times180)$

$= ₹\ 720000$

Here, profit is more than loss, so company earns a profit

$= ₹\ (800000 - 720000)$

$= ₹\ 80000$

Hence, company earns a profit of ₹ 80000.

8. (a) T **(b)** T **(c)** F **(d)** T **(e)** T **(f)** T

Exercise-1C

1. (a) $72\div\underline{\mathbf{12}} = 6$ **(b)** $\underline{\mathbf{100}}\div(-25) = (-4)$

(c) $50\div\underline{\mathbf{25}} = 2$ **(d)** $\underline{\mathbf{126}}\div63 = 2$

(e) $-42\div42 = \underline{-\mathbf{1}}$ **(f)** $144\div\underline{\mathbf{12}} = -12$

2. (a) **75 by −15**

$= 75\div(-15)$

$= 75\times\dfrac{1}{(-15)} = -5$

(b) **−169 by 13**

$= -169\div13$

$= -169\times\dfrac{1}{13} = -13$

(c) **625 by −25**

$= 625\div(-25)$

$= 625\times\dfrac{1}{-25} = -25$

(d) **−132 by 12**

$= -132\div12$

$= \dfrac{-132}{12} = -11$

(e) **(−164) by (−4)**

$= (-164)\div(-4)$

$= \dfrac{-164}{-4} = 41$

(f) **81 by (−9)**

$= 81\div(-9)$

$= \dfrac{81}{-9} = -9$

(g) **−144 by −24**

$= (-144)\div(-24)$

$= \dfrac{-144}{-26} = 6$

(h) (−36) by 36

$$= -36 \div 36$$
$$= \frac{-36}{36} = -1$$

(i) −63 by −21

$$= -63 \div (-21)$$
$$= \frac{-63}{-21} = 3$$

3. (a) $\mathbf{-31 \div [(-30) + (-1)]}$

$$= -31 \div [-30 - 1]$$
$$= -31 \div (-31)$$
$$= \frac{-31}{-31} = 1$$

(b) $\mathbf{[(-18) + 18] \div [12 \div 6]}$

$$= [-18 + 18] \div \left[\frac{12}{6}\right]$$
$$= 0 \div 2 = \frac{0}{2} = 0$$

(c) $\mathbf{[(-48) \div 4] \div 3}$

$$= \left[\frac{-48}{4}\right] \div 3$$
$$= (-12) \div 3$$
$$= \frac{-12}{3} = -4$$

(d) $\mathbf{[(-72) \div (-12)] \div [36 \div 18]}$

$$= \left[\frac{-72}{-12}\right] \div \left[\frac{36}{18}\right]$$
$$= 6 \div 2 = \frac{6}{2} = 3$$

(e) $\mathbf{[(-6) + 8] \div 2}$

$$= [-6 + 8] \div 2$$
$$= 2 \div 2 = \frac{2}{2} = 1$$

(f) $\mathbf{[(-6) + 5] \div [(-2) + 1]}$

$$= [-6 + 5] \div [-2 + 1]$$
$$= -1 \div (-1)$$
$$= \frac{-1}{-1} = 1$$

4. Marks given for one correct answer = + 3

So, marks given for 10 correct answers = $+3 \times 10 = +30$

Rahul's score = 20 marks

So, marks for wrong answers = $20 - 30 = -10$

Marks given for one wrong answer = −2

Therefore, number of wrong answers = $(-10) \div (-2) = 5$

Hence, number of wrong answers given by Rahul are 5.

5. Speed of an elevator = 5 m/min

Distance of a coal mine = $[20 - (-250)]$ m

$$= 270 \text{ m}$$

So, taken time by an elevator = $\frac{\text{Distance}}{\text{Speed}}$

$$= \frac{270}{5} = 54 \text{ min}$$

Hence, it will take 54 minutes to reach −250 m.

6. Profit earned by selling one new register = ₹ 2

Profit earned by selling 10 new register = ₹ 2×10 = ₹ 20, which we denote by + ₹ 20.

Total loss given = ₹ 4, which we denote = ₹ 5

Profit earned + Loss incurred = Total loss

There, loss incurred = Total loss – Profit earned

$$= ₹ (-4 - 20)$$
$$= ₹ (-24) = -₹ 24$$

Loss incurred by selling one old register = ₹ 1.20, which we write as – ₹ 1.20.

So, the number of old register sold

$$= -₹ 24 \div (-₹ 1.20)$$
$$= \frac{24}{1.20} = \frac{2400}{120}$$
$$= 20$$

Hence, he sell 20 old register on that particular day.

7. Temperature decreases at the rate of 3° C per hour or −2° C per hour

Temperature at 10 am was = 12° C above zero or represented as +12° C

Required temperature was = 15° C below zero = −15° C

So, the difference between two temperature

$$= -15° \text{ C} - (12° \text{ C})$$
$$= -27° \text{ C}$$

Therefore, number of hours are required to being this temperature = $(-27° \text{ C}) \div (-3° \text{ C}) = 9$ hours.

Hence, at 7 : 00 pm temperature was 15°C below zero.

Now, the difference between midnight and 10 : 00 am

= 14 hours

So, temperature would decrease by $14 \times (3° \text{ C}) = 42° \text{ C}$

but temperature at 10 : 00 am was 12°C.

So, temperature would be at mid night

$$= 12° \text{ C} - 42° \text{ C}$$
$$= -30° \text{ C or } 30°\text{C below zero}$$

Hence, temperature at mid night was 30°C below zero.

MCQs

1. (a) **2.** (a) **3.** (b) **4.** (c) **5.** (b)
6. (a) **7.** (b) **8.** (c) **9.** (b) **10.** (b)
11. (a) **12.** (a)

CHAPTER 2 : RATIONAL NUMBERS

Exercise-2A

1. Since when numerator and denominator, eighter both are positive or both negative of a rational number then it is said to be a positive rational number.

So, option (b), (c), (f), (g), (i) and (j) are positive rational numbers.

2. Since when numerator and denominator are of different signs i.e., one positive and other negative then it is said to be a negative rational number.

So, option (b), (c), (d), (f) and (h) are negative rational number.

3. **(a)** $\frac{7}{-10}$ **(b)** $\frac{2^3}{5^2}=\frac{8}{25}$

(c) $\frac{6-32}{5-48}=\frac{-26}{-43}=\frac{26}{43}$ **(d)** $\frac{30-8}{50-2}=\frac{22}{48}=\frac{11}{24}$

(e) $\frac{4\times3}{36\div2}=\frac{6}{9}=\frac{2}{3}$ **(f)** $\frac{-8\div2}{25\div5}=\frac{-4}{5}$

4. **(a)** In $\frac{-4}{15}$, numerator is -4.

To what number must we multiply to (-4), to get 8.

i.e., (-2) since, $\{8\div(-2)=(-4)\}$, so on multiplying by -2.

we get, $\frac{-4}{15}\times\frac{(-2)}{(-2)}=\frac{8}{-30}$

(b) In $\frac{-4}{15}$, numerator is -4.

To what number must we multiply to (-4), to get (16).

i.e., (-4) since, $\{16\div(-4)=(-4)\}$, so on multiplying by (-4).

we get, $\frac{-4}{15}\times\frac{(-4)}{(-4)}=\frac{16}{-60}$

(c) In $\frac{-4}{15}$, numerator is -4.

To what number must we multiply to (-4), to get (-40).

i.e., 10 since, $\{40\div10=(-4)\}$, so on multiplying by 10.

we get, $\frac{-4}{15}\times\frac{10}{10}=\frac{-40}{150}$

(d) In $\frac{-4}{15}$, numerator is -4.

To what number must we multiply to (-4), to get 48.

i.e., (-12) since, $\{48\div(-4)=-12\}$, so on multiplying by (-12).

we get, $\frac{-4}{15}\times\frac{(-12)}{(-12)}=\frac{48}{-180}$

(e) In $\frac{-4}{15}$, numerator is -4.

To what number must we multiply to (-4), to get (-60).

i.e., 15 since, $\{(-60)\div15=(-4)\}$, so on multiplying by 15.

we get, $\frac{-4}{15}\times\frac{15}{15}=\frac{-60}{225}$

5. **(a)** In $\frac{7}{-11}$, denominator is -11.

To what number must we multiply to (-11), to get (-33).

i.e., 3 since, $\{(-33)\div3=(-11)\}$, so on multiplying by 3.

we get, $\frac{7}{-11}\times\frac{3}{3}=\frac{21}{-33}$

(b) In $\frac{7}{-11}$, denominator is -11.

To what number must we multiply to (-11), to get 44.

i.e., (-4) since, $\{44\div(-4)=(-11)\}$, so on multiplying by (-4).

we get, $\frac{7}{-11}\times\frac{(-4)}{(-4)}=\frac{-28}{44}$

(c) In $\frac{7}{-11}$, denominator is -11.

To what number must we multiply to (-11), to get -66.

i.e., 6 since, $\{(-66)\div6=(-11)\}$, so on multiplying by 6.

we get, $\frac{7}{-11}\times\frac{6}{6}=\frac{42}{-66}$

(d) In $\frac{7}{-11}$, denominator is -11.

To what number must we multiply to (-11), to get 99.

i.e., (-9) since, $\{99 \div (-9) = (-11)\}$, so on multiplying by (-9).

we get, $\frac{7}{-11} \times \frac{(-9)}{(-9)} = \frac{-63}{99}$

(e) In $\frac{7}{-11}$, denominator is -11.

To what number must we multiply to (-11), to get (-132).

i.e., (12) since, $[(-132) \div 12 = (-11)]$, so on multiplying by 12.

we get, $\frac{7}{-11} \times \frac{12}{12} = \frac{84}{-132}$

6. (a) $\mathbf{\frac{-5}{11}}$ $= \frac{-5\times2}{11\times2} = \frac{-5\times3}{11\times3} = \frac{-5\times4}{11\times4}$

$= \frac{-5\times5}{11\times5} = \frac{-5\times6}{11\times6}$

$= \frac{-10}{22} = \frac{-15}{33} = \frac{-20}{44} = \frac{-25}{55} = \frac{-30}{66}$

Hence, $\frac{-10}{22}, \frac{-15}{33}, \frac{-20}{44}, \frac{-25}{55}$ and $\frac{-30}{66}$ are first five equivalent rational numbers.

(b) $\mathbf{\frac{3}{13}}$ $= \frac{3\times2}{13\times2} = \frac{3\times3}{13\times3} = \frac{3\times4}{13\times4}$

$= \frac{3\times5}{13\times5} = \frac{3\times6}{13\times6}$

$= \frac{6}{26} = \frac{9}{39} = \frac{12}{52} = \frac{15}{65} = \frac{18}{78}$

Hence, $\frac{6}{26}, \frac{9}{39}, \frac{12}{52}, \frac{15}{65}$ and $\frac{18}{78}$ are first five equivalent rational numbers.

(c) $\mathbf{\frac{-7}{-17}}$ $= \frac{-7\times2}{-17\times2} = \frac{-7\times3}{-17\times3} = \frac{-7\times4}{-17\times4}$

$= \frac{-7\times5}{-17\times5} = \frac{-7\times6}{-17\times6}$

$= \frac{-14}{-34} = \frac{-21}{-51} = \frac{-28}{-68} = \frac{-35}{-85} = \frac{-42}{-102}$

Hence, $\frac{-14}{-34}, \frac{-21}{-51}, \frac{-28}{-68}, \frac{-35}{-85}$ and $\frac{-42}{-102}$ are first five equivalent rational numbers.

(d) $\mathbf{\frac{11}{5}}$ $= \frac{11\times2}{15\times2} = \frac{11\times3}{15\times3} = \frac{11\times4}{15\times4}$

$= \frac{11\times5}{15\times5} = \frac{11\times6}{15\times6}$

$= \frac{22}{30} = \frac{33}{45} = \frac{44}{60} = \frac{55}{75} = \frac{66}{90}$

Hence, $\frac{22}{30}, \frac{33}{45}, \frac{44}{60}, \frac{55}{75}$ and $\frac{66}{90}$ are first five equivalent rational numbers.

(e) $\mathbf{\frac{8}{-15}}$ $= \frac{8\times2}{-15\times2} = \frac{8\times3}{-15\times3} = \frac{8\times4}{-15\times4}$

$= \frac{8\times5}{-15\times5} = \frac{8\times6}{-15\times6}$

$= \frac{16}{-30} = \frac{24}{-45} = \frac{32}{-60} = \frac{40}{-75} = \frac{48}{-90}$

Hence, $\frac{16}{-30}, \frac{24}{-45}, \frac{32}{-60}, \frac{40}{-75}$ and $\frac{48}{-90}$ are first five equivalent rational numbers.

7. (a) $\mathbf{\frac{-27}{108}}$

Since HCF of 27 and 108 is 27, so divide numerator and denominator by 27, we get

$$\frac{-27 \div 27}{108 \div 27} = \frac{-1}{4}$$

Hence, $\frac{-1}{4}$ is the standard form.

(b) $\mathbf{\frac{44}{-428}}$

Since HCF of 44 and 428 is 4, so divide numerator and denominator by 4, we get

$$\frac{44 \div 4}{-428 \div 4} = \frac{11}{-109}$$

Hence, $\frac{11}{-107}$ is the standard form.

(c) $\mathbf{\frac{185}{200}}$

Since HCF of 185 and 200 is 5, so divide numerator and denominator by 5, we get

$$\frac{185 \div 5}{200 \div 5} = \frac{37}{40}$$

Hence, $\frac{37}{40}$ is the standard form.

(d) $\mathbf{\frac{-78}{208}}$

Since HCF of 78 and 208 is 26, so divide numerator and denominator by 26, we get

$$\frac{-78 \div 26}{208 \div 26} = \frac{3}{8}$$

Hence, $\frac{3}{8}$ is the standard form.

(e) $\frac{\mathbf{76}}{\mathbf{-245}}$

Since HCF of 76 and 245 is 1, so divide numerator and denominator by 1, we get

$$\frac{76\div(1)}{-245\div(1)}=\frac{-76}{245}$$

Hence, $\frac{-76}{245}$ is the standard form.

(f) $\frac{\mathbf{129}}{\mathbf{-729}}$

Since HCF of 129 and 729 is 3, so divide numerator and denominator by (-3), we get

$$\frac{129\div(-3)}{-72\div(-3)}=\frac{-43}{243}$$

Hence, $\frac{43}{243}$ is the standard form.

(g) $\frac{\mathbf{252}}{\mathbf{1827}}$

Since HCF of 252 and 1827 is 63, so divide numerator and denominator by 63, we get

$$\frac{252\div63}{1827\div63}=\frac{4}{29}$$

Hence, $\frac{4}{29}$ is the standard form.

(h) $\frac{\mathbf{-240}}{\mathbf{840}}$

Since HCF of 240 and 840 is 120, so divide numerator and denominator by 120, we get

$$\frac{(-240)\div120}{840\div120}=\frac{-2}{7}$$

Hence, $\frac{-2}{7}$ is the standard form.

(i) $\frac{\mathbf{-85}}{\mathbf{119}}$

Since HCF of 85 and 119 is 17, so divide numerator and denominator by 17, we get

$$\frac{(-85)\div17}{119\div17}=\frac{-5}{7}$$

Hence, $\frac{-5}{7}$ is the standard form.

(j) $\frac{\mathbf{56}}{\mathbf{-1288}}$

Since HCF of 56 and 1288 is 56, so divide numerator and denominator by 56, we get

$$\frac{56\div56}{-1288\div56}=\frac{1}{23}$$

Hence, $\frac{1}{23}$ is the standard form.

8. (a) $\frac{\mathbf{14}}{\mathbf{-25}}$ **and** $\frac{\mathbf{42}}{\mathbf{-75}}$

On cross-multiplication, we get

$$(14)\times(-75)\text{ and }(42)\times(-25)$$

$$-1050=-1050$$

Hence, $\frac{14}{-25}$ and $\frac{42}{-75}$ are pair of equivalent rational numbers.

(b) $\frac{\mathbf{-6}}{\mathbf{15}}$ **and** $\frac{\mathbf{5}}{\mathbf{-18}}$

On cross-multiplication, we get

$$(-6)\times(-18)\text{ and }5\times15$$

$$108\neq75$$

Hence, $\frac{-6}{15}$ and $\frac{5}{-18}$ are not pair of equivalent rational numbers.

(c) $\frac{\mathbf{16}}{\mathbf{-25}}$ **and** $\frac{\mathbf{64}}{\mathbf{-100}}$

On cross-multiplication, we get

$$16\times(-100)\text{ and }64\times(-25)$$

$$-1600=-1600$$

Hence, $\frac{16}{-25}$ and $\frac{64}{-100}$ are pair of equivalent rational numbers.

(d) $\frac{\mathbf{-18}}{\mathbf{49}}$ **and** $\frac{\mathbf{15}}{\mathbf{-75}}$

On cross-multiplication, we get

$$(-18)\times(-75)\text{ and }15\times49$$

$$1350=735$$

Hence, $\frac{-18}{49}$ and $\frac{15}{-75}$ are not pair of equivalent rational numbers.

(e) $\frac{\mathbf{4}}{\mathbf{18}}$ **and** $\frac{\mathbf{20}}{\mathbf{90}}$

On cross-multiplication, we get

$$4\times90\text{ and }20\times18$$

$$360=360$$

Hence, $\frac{4}{18}$ and $\frac{20}{90}$ are pair of equivalent rational numbers.

(f) $\frac{17}{-25}$ **and** $\frac{68}{-100}$

On cross-multiplication, we get

$17\times(-100)$ and $68\times(-25)$

$-1700 = 1700$

Hence, $\frac{17}{-25}$ and $\frac{68}{-100}$ are pair of equivalent rational numbers.

9. (a) $\frac{\mathbf{16}}{\mathbf{-20}} = \frac{\square}{\mathbf{5}}$

$\Rightarrow \quad \frac{16}{-20} = \frac{x}{5}$

$\Rightarrow \quad 16\times 5 = (-20)x$ (On cross-multiplication)

$\Rightarrow \quad x = \frac{-16\times 5}{20}$

$\Rightarrow \quad x = \frac{-16}{4} = -4$

Hence, $\frac{16}{-20} = \frac{\boxed{\mathbf{-4}}}{5}$

(b) $\frac{\square}{\mathbf{4}} = \frac{\mathbf{90}}{\mathbf{120}}$

$\Rightarrow \quad \frac{x}{4} = \frac{-90}{120}$

$\Rightarrow \quad x\times 120 = (-90)\times 4$ (On cross-multiplication)

$\Rightarrow \quad x = \frac{-90\times 4}{120}$

$\Rightarrow \quad x = \frac{-90}{30} = -30$

Hence, $\frac{\boxed{\mathbf{-30}}}{4} = \frac{-90}{120}$

(c) $\frac{\mathbf{15}}{\mathbf{45}} = \frac{\square}{\mathbf{9}}$

$\Rightarrow \quad \frac{15}{45} = \frac{x}{9}$

$\Rightarrow \quad 15\times 9 = x\times 45$ (On cross-multiplication)

$\Rightarrow \quad x = \frac{15\times 9}{45}$

$\Rightarrow \quad x = \frac{9}{3} = 3$

Hence, $\frac{15}{45} = \frac{\boxed{\mathbf{3}}}{9}$

(d) $\frac{\mathbf{-7}}{\mathbf{8}} = \frac{\square}{\mathbf{24}} = \frac{\mathbf{49}}{\square}$

$\Rightarrow \quad \frac{-7}{8} = \frac{x}{24} = \frac{49}{y}$

On taking first two terms, we get

$\Rightarrow \quad \frac{-7}{8} = \frac{x}{24}$

$\Rightarrow \quad (-7)\times 24 = 8\times x$ (On cross-multiplication)

$\Rightarrow \quad x = \frac{-7\times 24}{8}$

$\Rightarrow \quad = -7\times 3 = -21$

Now, on taking last two terms, we get

$= \frac{-21}{24} = \frac{49}{y}$

$\Rightarrow \quad (-21)\times y = 49\times 24$ (On cross-multiplication)

$y = -\frac{49\times 24}{21}$

$\Rightarrow \quad y = \frac{-7\times 24}{3}$

$\Rightarrow \quad y = -7\times 8 = -56$

Hence, $\frac{-7}{8} = \frac{\boxed{\mathbf{-21}}}{24} = \frac{49}{\boxed{\mathbf{-56}}}$

(e) $\frac{\mathbf{9}}{\mathbf{-11}} = \frac{\mathbf{-18}}{\square} = \frac{\mathbf{-54}}{\square}$

$\frac{9}{-11} = \frac{-18}{x} = \frac{-54}{y}$

On taking first two terms, we get

$\Rightarrow \quad \frac{9}{-11} = \frac{-18}{x}$

$\Rightarrow \quad 9\times x = (-11)\times(-18)$

(On cross-multiplication)

$\Rightarrow \quad x = \frac{(-11)\times(-18)}{9}$

$\Rightarrow \quad x = (-11)\times(-2) = 22$

Now, on taking last two terms, we get

$\Rightarrow \quad \frac{-18}{22} = \frac{-54}{y}$

$\Rightarrow \quad (-18)\times y = (-54)\times 22$ (On cross multiplication)

$\Rightarrow \quad y = \frac{-54\times 22}{-18}$

$\Rightarrow \quad y = -3\times 22 = 66$

Hence, $\frac{9}{-11} = \frac{-18}{\boxed{\mathbf{22}}} = \frac{-54}{\boxed{\mathbf{66}}}$

(f) $\dfrac{\mathbf{6}}{\mathbf{-13}} = \dfrac{\mathbf{30}}{\square} = \dfrac{\square}{\mathbf{39}}$

$$\frac{6}{-13} = \frac{30}{x} = \frac{y}{39}$$

On taking first two terms, we get

$$\Rightarrow \quad \frac{6}{-13} = \frac{30}{x}$$

$$\Rightarrow \quad 6 \times x = (-13) \times 30$$

(On cross-multiplication)

$$\Rightarrow \quad x = \frac{-13 \times 30}{6}$$

$$\Rightarrow \quad x = -13 \times 5 = -65$$

Now, on taking first two terms, we get

$$\frac{30}{-65} = \frac{y}{39}$$

$$\Rightarrow \quad 30 \times 39 = y \times (-65)$$

$$\Rightarrow \quad y = -\frac{30 \times 39}{65}$$

$$= -\frac{30 \times 3}{5} = -6 \times 3 = -18$$

Hence, $\dfrac{6}{-13} = \dfrac{30}{\boxed{\mathbf{-65}}} = \dfrac{\boxed{\mathbf{-18}}}{39}$

10. **(a)** Zero is a rational number. (T)

(b) $\frac{1}{0}$ is not a rational number. (T)

(c) Every integer is a rational number. (T)

(d) $\frac{-3}{5}$ is not a rational number (F)

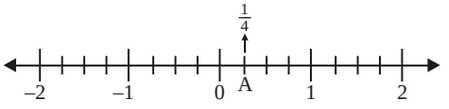
(e) All whole numbers are natural numbers. (F)

(f) All whole numbers are rational numbers. (T)

Exercise-2B

1. **(a)** $\mathbf{\frac{1}{4}}$

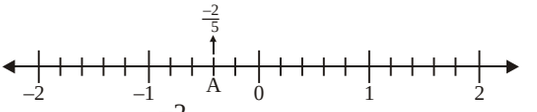
Denominator of given rational number is 4, so we divide one part of the number-line into 4 small equal part, as shown below :



So, A represent $\frac{1}{4}$.

(b) $\mathbf{\frac{-2}{5}}$

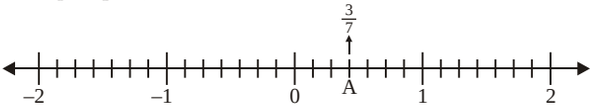
Denominator of given rational number is 5, so we divide one part of the number-line into 5 small equal part, as shown below :



So, A represent $\frac{-2}{5}$.

(c) $\mathbf{\frac{3}{7}}$

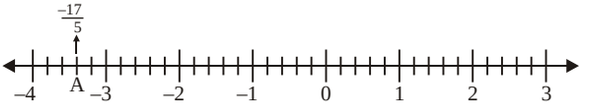
Denominator of given rational number is 7, so we divide one part of the number-line into 7 small equal part, as shown below :



So, A represent $\frac{3}{7}$.

(d) $\mathbf{-\frac{17}{5}}$

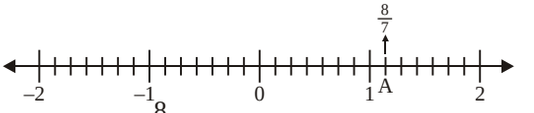
Denominator of given rational number is 5, so we divide one part of the number-line into 5 small equal part, as shown below :



So, A represent $-\frac{17}{5}$.

(e) $\mathbf{\frac{8}{7}}$

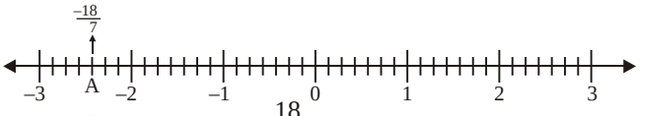
Denominator of given rational number is 7, so we divide one part of the number-line into 7 small equal part, as shown below :



So, A represent $\frac{8}{7}$.

(f) $\mathbf{-\frac{18}{7}}$

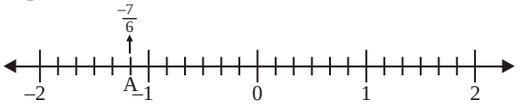
Denominator of given rational number is 7, so we divide one part of the number-line into 7 small equal part, as shown below :



So, A represent $-\frac{18}{7}$.

(g) $-\frac{7}{6}$

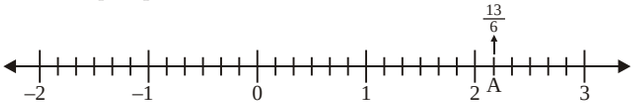
Denominator of given rational number is 6, so we divide one part of the number-line into 6 small equal part, as shown below :



So, A represent $-\frac{7}{6}$.

(h) $\frac{13}{6}$

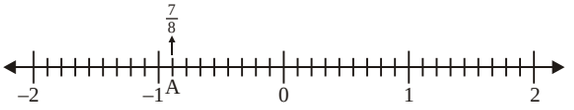
Denominator of given rational number is 6, so we divide one part of the number-line into 6 small equal part, as shown below :



So, A represent $\frac{13}{6}$.

(i) $\frac{-7}{8}$

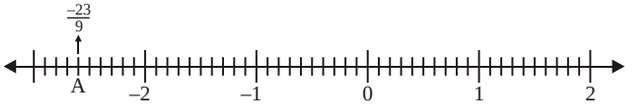
Denominator of given rational number is 8, so we divide one part of the number-line into 8 small equal part, as shown below :



So, A represent $\frac{-7}{8}$.

(j) $-\frac{23}{9}$

Denominator of given rational number is 9, so we divide one part of the number-line into 9 small equal part, as shown below :



So, A represent $-\frac{23}{9}$.

2. (a) $\frac{2}{3}$ **or** $\frac{5}{2}$

Since, LCM of 3 and 2 is 6.

So, $\frac{2}{3}\times\frac{2}{2}=\frac{4}{6}$

and $\frac{5}{2}\times\frac{3}{3}=\frac{15}{6}$

Since, $4<15$

So, $\frac{2}{3}$ is smaller in given pair.

(b) $\frac{-5}{6}$ **or** $\frac{-4}{3}$

Since, LCM of 6 and 3 is 6.

So, $\frac{-5}{6}\times\frac{1}{1}=\frac{-5}{6}$

and $\frac{-4}{3}\times\frac{2}{2}=\frac{-8}{6}$

Since, -5 is right to -8 on number-line.

So, $\frac{2}{3}$ is smaller in given pair.

(c) $-\frac{1}{4}$ **or** $\frac{1}{4}$

Since, negative rational number smaller than positive rational number.

Hence, $-\frac{1}{4}$ is smaller in given pair.

(d) **0 or** $\frac{-3}{5}$

Since, 0 is right to -3 on number-line.

Hence, $\frac{-3}{5}$ is smaller in given pair.

(e) $\frac{-4}{9}$ **or** $\frac{-5}{6}$

Since, LCM of 9 and 6 is 18.

So, $\frac{-4}{9}\times\frac{2}{2}=\frac{-8}{18}$

and $\frac{-5}{6}\times\frac{3}{3}=\frac{-15}{18}$

Since, -8 is right to -15 on number-line.

Hence, $\frac{-5}{6}$ is smaller in given pair.

(f) $\frac{-5}{8}$ **or** $\frac{-3}{12}$

Since, LCM of 8 and 12 is 24.

So, $\frac{-5}{8}\times\frac{3}{3}=\frac{-15}{24}$

and $\frac{-3}{12}\times\frac{2}{2}=\frac{-6}{24}$

Since, -15 is left to -6 on number-line.

Hence, $\frac{-5}{8}$ is smaller in given pair.

(g) $\frac{4}{8}$ **or** $\frac{-3}{6}$

Since, negative rational number smaller than positive rational number.

Hence, $\frac{-3}{6}$ is smaller in given pair.

(h) $\frac{6}{7}$ **or** $\frac{2}{1}$

Since, LCM of 7 and 1 is 7.

So, $\frac{6}{7} \times \frac{1}{1} = \frac{6}{7}$

and $\frac{2}{1} \times \frac{7}{7} = \frac{14}{17}$

Since, $6 < 14$

So, $\frac{6}{7} < \frac{14}{7}$ or $\frac{6}{7} < 2$

Hence, $\frac{6}{7}$ is smaller in given pair.

3. (a) $\frac{-6}{13}$ **or** $\frac{-7}{13}$

Since, -6 is right to -7 on number-line.

Hence, $\frac{-6}{13}$ is greater in given pair.

(b) $\frac{7}{15}$ **or** $\frac{-5}{12}$

Since, positive rational number is greater than negative rational number.

Hence, $\frac{7}{15}$ is greater in given pair.

(c) $\frac{4}{8}$ **or** $\frac{1}{4}$

Since, LCM of 8 and 4 is 8.

So, $\frac{4}{8} \times \frac{1}{1} = \frac{4}{8}$

and $\frac{1}{4} \times \frac{2}{2} = \frac{2}{8}$

Since, $4 > 2$

So, $\frac{4}{8} > \frac{2}{8}$ or $\frac{1}{2} > \frac{1}{4}$

Hence, $\frac{1}{2}$ is greater in given pair.

(d) $-\frac{17}{8}$ **or** $\frac{-3}{1}$

Since, LCM of 8 and 1 is 8.

So, $\frac{-17}{8} \times \frac{1}{1} = \frac{-17}{8}$

and $\frac{-3}{1} \times \frac{8}{8} = \frac{-24}{8}$

Since, -17 is right to -24 on number-line.

So, $\frac{-17}{8} > \frac{-24}{8}$

Hence, $-\frac{17}{8}$ is greater in given pair.

(e) $\frac{5}{12}$ **or** $\frac{-6}{17}$

Since, positive rational number is greater than negative rational number.

So, $\frac{5}{12} > \frac{-6}{17}$

Hence, $\frac{5}{12}$ is greater in given pair.

(f) $\frac{6}{7}$ **or** $\frac{-6}{1}$

Since, positive rational number is greater than negative rational number.

So, $\frac{6}{7} > \frac{-6}{1}$

Hence, $\frac{6}{7}$ is greater in given pair.

(g) $\frac{-4}{1}$ **or** $\frac{-16}{5}$

Since, LCM of 1 and 5 is 5.

So, $\frac{-4}{1} \times \frac{5}{5} = \frac{-20}{5}$

and $\frac{-16}{5} \times \frac{1}{1} = \frac{-16}{5}$

Since, -16 is right to -20 on number-line.

So, $\frac{-16}{5} > \frac{-20}{5}$

or $\frac{-16}{5} > \frac{-4}{1}$

Hence, $\frac{-16}{5}$ is greater in given pair.

(h) $\frac{-5}{6}$ **or 1**

Since, positive rational number is greater than negative rational number.

So, $\frac{-5}{6} < 1$

Hence, 1 is greater in given pair.

4. **(a)** $\frac{1}{6} \square \frac{-6}{7}$

By cross-multiplication

$1\times 7 = 7$ and $6\times(-6) = -36$

Since, $7 > -36$

So, $\frac{1}{7} \boxed{>} \frac{-6}{7}$

(b) $\frac{-8}{9} \square \frac{6}{7}$

Since, positive rational number is greater than negative rational number.

So, $\frac{-8}{9} \boxed{<} \frac{6}{7}$

(c) $\frac{-7}{11} \square \frac{5}{11}$

Since, positive rational number is greater than negative rational number.

So, $\frac{-7}{11} \boxed{<} \frac{5}{11}$

(d) $0 \square \frac{-6}{7}$

Since, 0 is right to -6 on number-line.

So, $0 \boxed{>} \frac{-6}{7}$

(e) $\frac{-2}{3} \square \frac{5}{-8}$

By cross-multiplication

$-2\times(-8) = 16$ and $3\times 5 = 15$

Since, $16 > 15$

So, $\frac{-2}{3} \boxed{>} \frac{5}{-8}$

(f) $-5 \square \frac{-4}{5}$

By cross-multiplication

$-5\times 5 = -25$ and $1\times(-4) = -4$

Since, -4 is right to -24 on number line.

So, $-25 < -4$

Hence, $-5 \boxed{<} \frac{-4}{5}$

(g) $\frac{6}{8} \square \frac{-5}{17}$

Since, positive rational number is greater than negative rational number.

So, $\frac{6}{8} \boxed{>} \frac{-5}{17}$

(h) $\frac{6}{17} \square 0$

Since, 0 is left to 6 on number line.

So, $\frac{6}{17} \boxed{>} 0$

5. **(a)** $\frac{2}{21}, \frac{-5}{14}, 0$ **and** $\frac{-3}{7}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominator.

2	21,14, 7
3	21, 7, 7
7	7, 7, 7
	1, 1, 1

$\because$ LCM of 21, 14 and 7 = 42

$\therefore$ $\frac{2}{21} = \frac{4}{42}; \frac{-5}{14} = \frac{-15}{42};$

$\frac{-3}{7} = \frac{-18}{42}$

Since, $-18 < -15 < 0 < 4$

So, $\frac{-18}{42} < \frac{-15}{42} < 0 < \frac{4}{42}$

or $\frac{-3}{7} < \frac{-5}{14} < 0 < \frac{2}{21}$

(b) $\frac{-5}{11}, 2, \frac{-6}{22}$ **and** $\frac{-7}{11}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominator.

2	11,22,11
11	11,11,11
	1, 1, 1

$\because$ LCM of 11, 22 and 11 = 22

So, $\frac{-5}{11} = \frac{-5\times 2}{11\times 2} = \frac{-10}{22};$

$2 = \frac{2\times 22}{22} = \frac{44}{22};$

$\frac{-6}{22} = \frac{-6\times 1}{22\times 1} = \frac{-6}{22}$

and $\frac{-7}{11} = \frac{-7\times 2}{11\times 2} = \frac{-14}{22}$

Since, $-14 < -10 < -6 < 44$

$\therefore$ $\frac{-14}{22} < \frac{-10}{22} < \frac{-6}{22} < \frac{44}{22}$

or $\frac{-7}{11} < \frac{-5}{11} < \frac{-6}{22} < 2$

(c) $\frac{-6}{25}, \frac{-5}{20}, \frac{7}{15}$ **and** $\frac{-3}{10}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominator.

$\because$ LCM of 25, 20, 15 and 10 = 300

$\therefore \quad \frac{-6}{25} = \frac{-6\times12}{25\times12} = \frac{-72}{300};$

$\frac{-5}{20} = \frac{-5\times15}{20\times15} = \frac{-75}{300};$

$\frac{7}{15} = \frac{7\times20}{15\times20} = \frac{140}{300};$

and $\quad \frac{-3}{10} = \frac{-3\times30}{10\times30} = \frac{-90}{300}$

2	25, 20, 15, 10
2	25, 10, 15, 5
3	25, 5, 15, 5
5	25, 5, 5, 5
5	5, 1, 1, 1
	1, 1 1 1

Since, $\quad -90 < -75 < -72 < 140$

So, $\quad \frac{-90}{300} < \frac{-75}{300} < \frac{-72}{300} < \frac{140}{300}$

or $\quad \frac{-3}{10} < \frac{-5}{20} < \frac{-6}{25} < \frac{7}{15}$

(d) $\frac{5}{16}, \frac{-3}{4}, \frac{-8}{12}$ **and** $\frac{9}{24}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominators.

$\because$ LCM of 16, 4, 12 and 24 is = 48

$\therefore \quad \frac{5}{16} = \frac{5\times3}{16\times3} = \frac{15}{48};$

$\frac{-3}{4} = \frac{-3\times12}{4\times12} = \frac{-36}{48};$

$\frac{-8}{12} = \frac{-8\times4}{12\times4} = \frac{-32}{48};$

and $\quad \frac{9}{24} = \frac{9\times2}{24\times2} = \frac{18}{48}$

2	25, 20, 15, 10
2	25, 10, 15, 5
3	25, 5, 15, 5
5	25, 5, 5, 5
5	5, 1, 1, 1
	1, 1 1 1

Since, $\quad -36 < -32 < 15 < 18$

So, $\quad \frac{-36}{48} < \frac{-32}{48} < \frac{15}{48} < \frac{18}{48}$

or, $\quad \frac{-3}{4} < \frac{-8}{12} < \frac{5}{16} < \frac{9}{24}$

6. (a) $\frac{7}{-18}, \frac{-4}{27}, \frac{-2}{3}$ **and** $\frac{-4}{9}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominators.

$\because$ LCM of 18, 27, 3 and 9 = 54

$\therefore \quad \frac{7}{-18} = \frac{7\times3}{-18\times3} = \frac{21}{-54}$

$\frac{-4}{27} = \frac{-4\times2}{27\times2} = \frac{-8}{54}$

$\frac{-2}{3} = \frac{-2\times18}{3\times18} = \frac{-36}{54}$

and $\quad \frac{-4}{9} = \frac{-4\times6}{9\times6} = \frac{-24}{54}$

2	18, 27, 3, 9
3	9, 27, 3, 9
3	3, 9, 1, 3
3	1, 3, 1, 1
	1, 1, 1, 1

Since, $\quad -8 > -21 > -24 > -36$

So, $\quad \frac{-8}{54} > \frac{-21}{54} > \frac{-24}{54} > \frac{36}{54}$

or $\quad \frac{-4}{27} > \frac{-7}{18} > \frac{-4}{9} > \frac{-2}{3}$

(b) $\frac{-6}{21}, -1, \frac{-3}{14}$ **and** $\frac{-5}{7}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominators.

$\because$ LCM of 21, 14 and 7 = 42

$\therefore \quad \frac{-6}{21} = \frac{-6\times2}{21\times2} = \frac{-12}{42};$

$-1 = \frac{-1\times42}{42} = \frac{-42}{42};$

$\frac{-3}{14} = \frac{-3\times3}{14\times3} = \frac{-9}{42}$

and $\quad \frac{-5}{7} = \frac{-5}{7}\times\frac{6}{6} = \frac{-30}{42}$

2	21, 14, 7
3	21, 7, 7
7	7, 7, 7
	1, 1, 1

Since, $\quad -9 > -12 > -30 > -42$

So, $\quad \frac{-9}{42} > \frac{-12}{42} > \frac{-30}{42} > \frac{-42}{42}$

or $\quad \frac{-3}{14} > \frac{-6}{21} > \frac{-5}{7} > -1$

(c) $\frac{-1}{5}, \frac{2}{3}, \frac{-5}{6}$ **and** $\frac{-7}{12}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominators.

$\because$ LCM of 5, 3, 6 and 12 = 60

$\therefore \quad \frac{-1}{5} = -\frac{1\times12}{5\times12} = -\frac{12}{60};$

$\frac{2}{3} = \frac{2\times20}{3\times20} = \frac{40}{60};$

$\frac{-5}{6} = \frac{-5\times10}{6\times10} = \frac{-50}{60};$

and $\quad \frac{-7}{12} = \frac{-7}{12}\times\frac{5}{5} = \frac{-35}{60}$

2	5, 3, 6, 12
2	5, 3, 3, 6
3	5, 3, 3, 3
5	5, 1, 1, 1
	1, 1, 1, 1

Since, $\quad 40 > -12 > -35 > -50$

So, $\quad \frac{40}{60} > \frac{-12}{60} > \frac{-35}{60} > \frac{-50}{60}$

or $\quad \frac{2}{3} > \frac{-1}{5} > \frac{-7}{12} > \frac{-5}{6}$

(d) $-3, \frac{-6}{5}, \frac{-8}{3}$ **and** $\frac{-1}{3}$

First convert the given rational number into like rational number. For this we need to find out the LCM of the denominators.

$\because$ LCM of 1, 5, 3 and $3 = 15$

3	5, 3, 3
5	5, 1, 1
	1, 1, 1

$\therefore \quad -3 = \frac{-3}{15} \times 15 = \frac{-45}{15};$

$\frac{-6}{5} = \frac{-6 \times 3}{5 \times 3} = \frac{-18}{15};$

$\frac{-8}{3} = \frac{-8 \times 5}{3 \times 5} = \frac{-40}{15};$

and $\frac{-1}{3} = \frac{-1 \times 5}{3 \times 5} = \frac{-5}{15}$

Since, $-5 > -18 > -40 > -45$

So, $\frac{-5}{15} > \frac{-18}{15} > \frac{-40}{15} > \frac{-45}{15}$

or $\frac{-1}{3} > \frac{-6}{5} > \frac{-8}{3} > -3$

7. (a) $\frac{\mathbf{6}}{\mathbf{17}} = \left|\frac{6}{17}\right| = \frac{6}{17}$

(b) $\frac{\mathbf{-5}}{\mathbf{6}} = \left|\frac{-5}{6}\right| = \frac{5}{6}$

(c) $\frac{\mathbf{-2}}{\mathbf{15}} = \left|\frac{-2}{15}\right| = \frac{2}{15}$

(d) $\frac{\mathbf{-21}}{\mathbf{32}} = \left|\frac{-21}{32}\right| = \frac{21}{32}$

(e) $\frac{\mathbf{18}}{\mathbf{23}} = \left|\frac{18}{23}\right| = \frac{18}{23}$

(f) $\frac{\mathbf{-8}}{\mathbf{19}} = \left|\frac{-8}{19}\right| = \frac{8}{19}$

(g) $\frac{\mathbf{-4}}{\mathbf{-3}} = \left|\frac{-4}{-3}\right| = \frac{4}{3}$

(h) $\frac{\mathbf{3}}{\mathbf{18}} = \left|\frac{8}{18}\right| = \frac{3}{18}$

(i) $\frac{\mathbf{-16}}{\mathbf{25}} = \left|\frac{-16}{25}\right| = \frac{16}{25}$

(j) $\frac{\mathbf{-6}}{\mathbf{19}} = \left|\frac{-6}{19}\right| = \frac{6}{19}$

8. (a) –1 and 0

First rational number $= \frac{1}{2}(-1+0)$

$= -\frac{1}{2} + 0 = -\frac{1}{2}$

Second rational number $= \frac{1}{2}\left[-\frac{1}{2} + 0\right]$

$= -\frac{1}{4} + 0 = -\frac{1}{4}$

Hence, $-\frac{1}{2}$ and $-\frac{1}{4}$ are two rational number between -1 and 0.

(b) –2 and –1

First rational number $= \frac{1}{2}\left[(-2)+(-1)\right]$

$= \frac{-2}{2} + \left(\frac{-1}{2}\right)$

$= -1 - \frac{1}{2} = \frac{-3}{2}$

Second rational number $= \frac{1}{2} \times \left(\frac{-3}{2}\right) = \frac{-3}{4}$

Hence, $\frac{-3}{2}$ and $\frac{-3}{4}$ are two rational number between -2 and -1.

(c) $\frac{-3}{5}$ and 1

Two rational number may be $\frac{-2}{5}, \frac{-1}{5}$

Hence, $\frac{-2}{5}$ and $\frac{-1}{5}$ are two rational number between $\frac{-3}{5}$ and 1.

(d) $\frac{-6}{7}$ and $\frac{3}{4}$

$\frac{-6}{7}$ can be written as $\frac{-6 \times 4}{7 \times 4} = \frac{-24}{28}$

and $\frac{3}{4}$ can be written as $\frac{3}{4} \times \frac{7}{7} = \frac{21}{28}$

Now, find the rational number between $\frac{-24}{28}$ and $\frac{21}{28}$.

It may be $\frac{-23}{28}, \frac{-22}{28}, \frac{-21}{28}, \ldots\ldots \frac{19}{28}, \frac{20}{28},$

but we have to find only three rational numbers that many be any the above,

as $\frac{-23}{28}, \frac{-22}{28}$

Hence, $\frac{-23}{28}$ and $\frac{-22}{28}$ are two rational numbers between $\frac{-6}{7}$ and $\frac{3}{4}$.

9. (a) $\frac{-5}{7}$ and 2

LCM of 7 and 1 is 7.

So, $\frac{-5}{7}=\frac{-5\times1}{7\times1}=\frac{-5}{7}$

and $2=\frac{2\times7}{7}=\frac{14}{7}$

So, five rational numbers between $\frac{-5}{7}$ and 2 are $\frac{-4}{7},\frac{-3}{7},\frac{-2}{7},\frac{-1}{7}$ and $\frac{1}{7}$.

(b) $\frac{-6}{13}$ **and 1**

LCM of 13 and 1 is 13.

So, $\frac{-6}{13}=\frac{-6\times1}{13\times1}=\frac{-6}{13}$

and $1=\frac{1\times13}{13}=\frac{13}{13}$

So, five rational numbers between $\frac{-6}{13}$ and 1 are $\frac{-5}{13},\frac{-4}{13},\frac{-3}{13},\frac{-2}{13}$ and $\frac{-1}{13}$.

(c) –4 and 2

Five rational numbers between –4 and 2 are –3, – 2, – 1, 0 and 1.

(d) –3 and 5

Five rational numbers between –3 and 5 are –2, – 1, 0, 1 and 2.

10. (a) The rational number $\frac{-5}{13}$ is left to zero on number-line. [T]

(b) –2 and 2 are on opposite side of rational number. [T]

(c) 0 is lesser than $\frac{-6}{13}$ [F]

(d) If $|x|=|y|$, then $x=y$ [F]

(e) There are infinite rational number between two rational numbers. [T]

Exercise-2C

1. (a) $\frac{-5}{11}+\frac{3}{11}$

$=\frac{-5+3}{11}=\frac{-2}{11}$

(b) $\frac{3}{17}+\frac{6}{17}+\frac{-4}{17}$

$=\frac{3}{17}+\frac{6}{17}-\frac{4}{17}$

$=\frac{3+6-4}{17}$

$=\frac{9-4}{17}=\frac{5}{17}$

(c) $\frac{-6}{25}+\frac{4}{25}+\frac{3}{25}$

$=\frac{-6+4+3}{25}$

$=\frac{-6+7}{25}$

$=\frac{1}{25}$

(d) $\frac{18}{19}+\frac{-3}{19}+\frac{-4}{19}$

$=\frac{18}{19}-\frac{3}{19}-\frac{4}{19}$

$=\frac{18-3-4}{19}$

$=\frac{18-7}{19}=\frac{11}{19}$

(e) $\frac{-6}{29}+\frac{6}{29}+\frac{3}{39}$

$=\frac{-6+6+3}{29}$

$=\frac{9-6}{29}=\frac{3}{29}$

(f) $\frac{6}{23}+\frac{4}{23}+\frac{-10}{23}$

$=\frac{6}{23}+\frac{4}{23}-\frac{10}{23}$

$=\frac{6+4-10}{23}$

$=\frac{10-10}{23}=\frac{0}{23}=0$

(g) $\frac{-9}{23}+\frac{2}{23}+\frac{-11}{23}$

$=\frac{-9}{23}+\frac{2}{23}-\frac{11}{23}$

$=\frac{-9+2-11}{23}$

$=\frac{2-20}{23}=\frac{-18}{23}$

(h) $\frac{-11}{15}+\frac{11}{15}+\frac{-2}{15}$

$=\frac{-11}{15}+\frac{11}{15}-\frac{2}{15}$

$=\frac{-11+11-2}{15}$

$=\frac{11-13}{15}=\frac{-2}{15}$

(i) $\frac{11}{49}+\frac{-17}{49}+\frac{2}{49}$

$=\frac{11}{49}-\frac{17}{49}+\frac{2}{49}$

$=\frac{11-17+2}{49}$

$=\frac{13-17}{49}=\frac{-4}{49}$

2. (a) $\frac{-6}{9}+\frac{2}{15}$

$=\frac{-6\times5+2\times3}{45}$

(∵ LCM of 9 and 15 is 45.)

$=\frac{-30+6}{45}$

$=\frac{-24}{45}=\frac{-8}{15}$

(b) $\frac{-12}{7}+\frac{5}{14}$

$=\frac{-12\times2+5}{14}$

(∵ LCM of 7 and 14 is 14.)

$=\frac{-24+5}{14}=\frac{-19}{14}$

(c) $\frac{-5}{36}+\frac{2}{12}$

$=\frac{-5+2\times3}{36}$

(∵ LCM of 36 and 12 is 36.)

$=\frac{-5+6}{36}=\frac{1}{36}$

(d) $\frac{5}{18}+\frac{-7}{12}$

$=\frac{5}{18}-\frac{7}{12}$

$=\frac{5\times2-7\times3}{36}$

(∵ LCM of 18 and 12 is 36.)

$=\frac{10-21}{36}=\frac{-11}{36}$

(e) $\frac{7}{9}+\frac{-5}{18}$

$=\frac{7}{9}-\frac{5}{18}$

$=\frac{7\times2-5}{18}$

(∵ LCM of 9 and 18 is 18.)

$=\frac{14-5}{18}=\frac{9}{18}=\frac{1}{2}$

(f) $\frac{-3}{22}+\frac{6}{11}$

$=\frac{-3+6\times2}{22}$

(∵ LCM of 22 and 11 is 22.)

$=\frac{-3+12}{22}=\frac{9}{22}$

(g) $\frac{2}{51}+\frac{3}{34}+\frac{-6}{17}$

$=\frac{2}{51}+\frac{3}{34}-\frac{6}{17}$

$=\frac{2\times2+3\times3-6\times6}{102}$

(∵ LCM of 51, 34 and 17 is 102.)

$=\frac{4+9-36}{102}$

$=\frac{13-36}{102}=\frac{-23}{102}$

(h) $\frac{5}{9}+\frac{-7}{18}+\frac{-1}{2}$

$=\frac{5}{9}-\frac{7}{18}-\frac{1}{2}$

$=\frac{5\times2-7-9\times1}{18}$

(∵ LCM of 9, 18 and 2 is 18.)

$=\frac{10-7-9}{18}$

$=\frac{10-16}{18}=\frac{-6}{18}=\frac{-1}{3}$

(i) $\frac{6}{-7}+\frac{-2}{21}+\frac{5}{14}$

$=-\frac{6}{7}-\frac{2}{21}+\frac{5}{14}$

$=\frac{-6\times6-2\times2+5\times3}{42}$

(∵ LCM of 7, 21 and 14 is 42.)

$=\frac{-36-4+15}{42}=\frac{-25}{42}$

3. (a) $\frac{-3}{7}+(-2)+\frac{5}{14}+\frac{-9}{42}$

$=-\frac{3}{7}-\frac{2}{1}+\frac{5}{14}-\frac{9}{42}$

$=\frac{-3\times6-2\times42+5\times3-9\times1}{42}$

(∵ LCM of 7, 14 and 42 is 42.)

$=\frac{-18-84+15-9}{42}$

$=\frac{15-111}{42}=\frac{-96}{42}=\frac{-16}{7}$

(b) $\frac{4}{7}+\frac{-8}{9}+\frac{-12}{7}+0+\frac{16}{21}$

$=\frac{4}{7}-\frac{8}{9}-\frac{12}{7}+\frac{16}{21}$

$=\frac{4\times9-8\times7-12\times9+16\times3}{63}$

($\because$ LCM of 7, 9, 7 and 21 is 63.)

$=\frac{36-56-108+48}{63}$

$=\frac{48-164}{63}=\frac{-116}{63}$

(c) $\frac{-6}{13}+\frac{5}{26}+\frac{-7}{39}+0$

$=\frac{-6}{13}+\frac{5}{26}-\frac{7}{39}$

$=\frac{-6\times6+5\times3-7\times2}{78}$

($\because$ LCM of 13, 26 and 39 is 78.)

$=\frac{-36+15-14}{78}$

$=\frac{15-50}{78}=\frac{-35}{78}$

(d) $\frac{-7}{10}+\frac{5}{18}+\frac{-2}{5}+\frac{6}{15}$

$=\frac{-7}{10}+\frac{5}{18}-\frac{2}{5}+\frac{6}{15}$

$=\frac{-7\times9+5\times5-2\times18+6\times6}{90}$

($\because$ LCM of 10, 18, 5 and 15 is 90.)

$=\frac{-63+25-36+36}{90}$

$=\frac{25-63}{90}$

$=\frac{-38}{90}=\frac{-19}{45}$

4. (a) $\frac{6}{7}+\frac{-3}{5}+\frac{-2}{21}+\frac{2}{15}$

Re-arrange the rational numbers in suitable group, we get

$=\left(\frac{6}{7}+\frac{-2}{21}\right)+\left(\frac{-3}{5}+\frac{2}{15}\right)$

$=\left(\frac{6\times3-2}{21}\right)+\left(\frac{-3\times3+2}{15}\right)$

$=\left(\frac{18-2}{21}\right)+\left(\frac{-9+2}{15}\right)$

$=\frac{16}{21}-\frac{7}{15}$

$=\frac{16\times5-7\times7}{105}$

$=\frac{80-49}{105}=\frac{31}{105}$

(b) $\frac{3}{10}+\frac{4}{11}+\frac{-7}{20}+\frac{5}{33}$

Re-arrange the rational numbers in suitable group, we get

$=\left(\frac{3}{10}+\frac{-7}{20}\right)+\left(\frac{4}{11}+\frac{5}{33}\right)$

$=\left(\frac{3}{10}-\frac{7}{20}\right)+\left(\frac{4}{11}+\frac{5}{33}\right)$

$=\left(\frac{3\times2-7}{20}\right)+\left(\frac{4\times3+5}{33}\right)$

$=\left(\frac{6-7}{20}\right)+\left(\frac{12+5}{33}\right)$

$=-\frac{1}{20}+\frac{17}{33}$

$=\frac{-33+340}{660}=\frac{307}{660}$

(c) $\frac{-6}{15}+\frac{-7}{9}+\frac{3}{10}+\frac{-5}{6}$

Re-arrange the rational numbers in suitable group, we get

$=\left(\frac{-6}{15}+\frac{3}{10}\right)+\left(\frac{-7}{9}+\frac{-5}{6}\right)$

$=\left(\frac{-6\times2+3\times3}{30}\right)+\left(\frac{-7\times2-5\times3}{18}\right)$

$=\left(\frac{-12+9}{30}\right)+\left(\frac{-14-15}{18}\right)$

$=\frac{-3}{30}+\frac{-29}{18}=\frac{-1}{10}-\frac{29}{18}$

$=\frac{-9-145}{90}=\frac{-154}{90}=\frac{-77}{45}$

(d) $\frac{-3}{5}+\frac{5}{8}+\frac{-4}{15}+\frac{-1}{3}+\frac{1}{4}$

$=\left(\frac{-3}{5}+\frac{-4}{15}+\frac{-1}{3}\right)+\left(\frac{5}{8}+\frac{1}{4}\right)$

$=\left(\frac{-3\times3-4\times1-1\times5}{15}\right)+\left(\frac{5+2}{8}\right)$

$=\left(\frac{-9-4-5}{15}\right)+\frac{7}{8}$

$=\frac{-18}{15}+\frac{7}{8}=\frac{-6}{5}+\frac{7}{8}$

$=\frac{-6\times8+7\times5}{40}$

$=\frac{-48+35}{40}=\frac{-13}{40}$

5. **The given** $\left(\frac{p}{q}+\frac{r}{s}=\frac{r}{s}+\frac{p}{q}\right)$

(a) $\frac{3}{5}$ **and** $\frac{6}{7}$

Let $\frac{p}{q}=\frac{3}{5}, \frac{r}{s}=\frac{6}{7}$

$$\text{LHS}=\frac{p}{q}+\frac{r}{s}=\frac{3}{5}+\frac{6}{7}$$
$$=\frac{3\times7+6\times5}{35}$$
$$=\frac{21+30}{35}=\frac{51}{35}$$

$$\text{RHS}=\frac{r}{s}+\frac{p}{q}=\frac{6}{7}+\frac{3}{5}$$
$$=\frac{6\times5+3\times7}{35}$$
$$=\frac{30+21}{35}=\frac{51}{35}$$

Since, LHS = RHS

So, $\frac{p}{q}+\frac{r}{s}=\frac{r}{s}+\frac{p}{q}$

(b) $\frac{-4}{11}$ **and** $\frac{5}{9}$

Let $\frac{p}{q}=-\frac{4}{11}$ and $\frac{r}{s}=\frac{5}{9}$

$$\text{LHS}=\frac{p}{q}+\frac{r}{s}=\frac{-4}{11}+\frac{5}{9}$$
$$=\frac{-4\times9+5\times11}{99}$$
$$=\frac{-36+55}{99}=\frac{19}{99}$$

$$\text{RHS}=\frac{r}{s}+\frac{p}{q}=\frac{5}{9}+\left(-\frac{4}{11}\right)$$
$$=\frac{5}{9}-\frac{4}{11}$$
$$=\frac{5\times11-4\times9}{99}$$
$$=\frac{55-36}{99}=\frac{19}{99}$$

Since, LHS = RHS

So, $\frac{p}{q}+\frac{r}{s}=\frac{r}{s}+\frac{p}{q}$

(c) $\frac{-9}{14}$ **and** $\frac{-6}{7}$

Let $\frac{p}{q}=-\frac{9}{14}$ and $\frac{r}{s}=\frac{-6}{7}$

$$\text{LHS}=\frac{p}{q}+\frac{r}{s}=\frac{-9}{14}+\left(-\frac{6}{7}\right)$$
$$=-\frac{9}{14}-\frac{6}{7}=\frac{-9-6\times2}{14}$$
$$=\frac{-9-12}{14}=\frac{-21}{14}$$

$$\text{RHS}=\frac{r}{s}+\frac{p}{q}=\frac{-6}{7}+\left(\frac{-9}{14}\right)$$
$$=-\frac{6}{7}-\frac{9}{14}=\frac{-6\times2-9}{14}$$
$$=\frac{-12-9}{14}=\frac{-21}{14}$$

Since, LHS = RHS

So, $\frac{p}{q}+\frac{r}{s}=\frac{r}{s}+\frac{p}{q}$

(d) **–2 and** $\frac{13}{17}$

Let $\frac{p}{q}=-2$ and $\frac{r}{s}=\frac{13}{17}$

$$\text{LHS}=\frac{p}{q}+\frac{r}{s}=-2+\frac{13}{17}$$
$$=\frac{-2\times17+13}{17}$$
$$=\frac{-34+13}{17}=\frac{21}{17}$$

$$\text{RHS}=\frac{r}{s}+\frac{p}{q}=\frac{13}{17}+(-2)$$
$$=\frac{13-2\times17}{17}$$
$$=\frac{13-34}{17}=\frac{-21}{17}$$

Since, LHS = RHS

So, $\frac{p}{q}+\frac{r}{s}=\frac{r}{s}+\frac{p}{q}$

6. **The given** $\frac{p}{q}+\left(\frac{r}{s}+\frac{m}{n}\right)=\left(\frac{p}{q}+\frac{r}{s}\right)+\frac{m}{n}$

(a) $\frac{-5}{8}, \frac{3}{10}$ **and** -3

Let $\frac{p}{q}=\frac{-5}{8}, \frac{r}{s}=\frac{3}{10}$ and $\frac{m}{n}=-3$

$$\text{LHS}=\frac{p}{q}+\left(\frac{r}{s}+\frac{m}{n}\right)$$
$$=-\frac{5}{8}+\left(\frac{3}{10}+(-3)\right)$$
$$=\frac{-5}{8}+\left(\frac{3-3\times10}{10}\right)$$

$$= \frac{-5}{8} + \left(\frac{3-30}{10}\right) = \frac{-5}{8} - \frac{27}{10}$$

$$= \frac{-5\times 5 - 27\times 4}{40}$$

$$= \frac{-25-108}{40} = \frac{-133}{40}$$

$$\text{RHS} = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{m}{n}$$

$$= \left(-\frac{5}{8} + \frac{3}{10}\right) + (-3)$$

$$= \left(\frac{-5\times 5 + 3\times 4}{40}\right) - 3$$

$$= \frac{-25+12}{40} - 3 = \frac{-13}{40} - 3$$

$$= \frac{-13-120}{40} = \frac{-133}{40}$$

Since, LHS = RHS

So, $\frac{p}{q} + \left(\frac{r}{s} + \frac{m}{n}\right) = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{m}{n}$

(b) $\frac{-7}{11}, \frac{2}{-5}$ **and** $\frac{-13}{22}$

Let $\frac{p}{q} = \frac{-7}{11}, \frac{r}{s} = \frac{-2}{5}$ and $\frac{m}{n} = \frac{-13}{22}$

$$\text{LHS} = \frac{p}{q} + \left(\frac{r}{s} + \frac{m}{n}\right)$$

$$= \frac{-7}{11} + \left(-\frac{2}{5} - \frac{13}{22}\right)$$

$$= -\frac{7}{11} + \left(\frac{-2\times 22 - 13\times 5}{110}\right)$$

$$= -\frac{7}{11} + \left(\frac{-44-65}{110}\right)$$

$$= \frac{-7}{11} - \frac{109}{110} = \frac{-7\times 10 - 109}{110}$$

$$= \frac{-70-109}{110} = \frac{-179}{110}$$

$$\text{RHS} = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{m}{n}$$

$$= \left(\frac{-7}{11} + \left(\frac{-2}{3}\right)\right) + \left(-\frac{13}{22}\right)$$

$$= \left(-\frac{7}{11} - \frac{2}{5}\right) - \frac{13}{22}$$

$$= \left(\frac{-7\times 5 - 22}{55}\right) - \frac{13}{22}$$

$$= \frac{-35-22}{55} - \frac{13}{22}$$

$$= \frac{-57}{55} - \frac{13}{22} = \frac{-57\times 2 - 13\times 5}{110}$$

$$= \frac{-114-65}{110} = \frac{-179}{110}$$

Since, LHS = RHS

So, $\frac{p}{q} + \left(\frac{r}{s} + \frac{m}{n}\right) = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{m}{n}$

(c) $\frac{5}{9}, \frac{13}{18}$ **and** $\frac{-4}{21}$

Let $\frac{p}{q} = \frac{5}{9}, \frac{r}{s} = \frac{13}{18}$ and $\frac{m}{n} = \frac{-4}{21}$

$$\text{LHS} = \frac{p}{q} + \left(\frac{r}{s} + \frac{m}{n}\right)$$

$$= \frac{5}{9} + \left(\frac{13}{18} - \frac{4}{21}\right)$$

$$= \frac{5}{9} + \left(\frac{13\times 7 - 4\times 6}{126}\right)$$

$$= \frac{5}{9} + \left(\frac{91-24}{126}\right)$$

$$= \frac{5}{9} + \frac{67}{126} = \frac{5\times 14 + 67}{126}$$

$$= \frac{70+67}{126} = \frac{137}{126}$$

$$\text{RHS} = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{m}{n}$$

$$= \left(\frac{5}{9} + \frac{13}{18}\right) + \left(-\frac{4}{21}\right)$$

$$= \left(\frac{5\times 2 + 13}{18}\right) - \frac{4}{21}$$

$$= \frac{10+13}{18} - \frac{4}{21}$$

$$= \frac{23}{18} - \frac{4}{21} = \frac{23\times 7 - 4\times 6}{126}$$

$$= \frac{161-24}{126} = \frac{137}{126}$$

Since, LHS = RHS

So, $\frac{p}{q} + \left(\frac{r}{s} + \frac{m}{n}\right) = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{m}{n}$

7. **(a)** Additive inverse of $\left(-\frac{5}{7}\right)$ is $-\left(-\frac{5}{7}\right) = \frac{5}{7}$.

(b) Additive inverse of $\left(\frac{6}{13}\right)$ is $-\left(\frac{6}{13}\right) = -\frac{6}{13}$.

(c) Additive inverse of $\left(\frac{-14}{-17}\right)$ is $-\left(\frac{14}{17}\right) = -\frac{14}{17}$.

(d) Additive inverse of $\left(-\frac{15}{23}\right)$ is $-\left(-\frac{15}{23}\right) = \frac{15}{23}$.

(e) Additive inverse of $\left(\frac{16}{18}\right)$ is $-\left(\frac{16}{18}\right) = -\frac{16}{18}$.

(f) Additive inverse of $\left(\frac{-4}{-21}\right)$ is $-\left(\frac{4}{21}\right) = -\frac{4}{21}$.

(g) Additive inverse of $\left(\frac{13}{19}\right)$ is $-\left(\frac{13}{19}\right) = -\frac{13}{19}$.

(h) Additive inverse of $\left(\frac{146}{287}\right)$ is $-\left(\frac{146}{287}\right) = -\frac{146}{287}$.

(i) Additive inverse of $\left(\frac{-41}{-63}\right)$ is $-\left(-\frac{41}{63}\right) = -\frac{41}{63}$.

(j) Additive inverse of $\left(\frac{4}{-18}\right)$ is $-\left(-\frac{4}{18}\right) = \frac{4}{18}$.

8. (a) $\frac{-17}{23} + \underline{\mathbf{0}} = \frac{-17}{23}$ (Property of zero)

(b) $\frac{-3}{16} + \frac{17}{18} = \frac{17}{\underline{\mathbf{18}}} + \frac{-3}{16}$ (Commutative property)

(c) $\frac{-15}{19} + 0 = 0 + \frac{-15}{19} = \underline{\frac{\mathbf{-15}}{\mathbf{19}}}$ (Property of zero)

(d) $-\frac{9}{17} + \frac{\mathbf{8}}{\underline{\mathbf{13}}} = \frac{8}{13} + \underline{\frac{\mathbf{-9}}{\mathbf{17}}}$ (Commutative property)

(e) $-\frac{5}{7} + \left(\frac{8}{19} + \frac{5}{16}\right) = \left(\frac{-5}{7} + \frac{8}{19}\right) + \underline{\frac{\mathbf{5}}{\mathbf{16}}}$

(Associative property)

(f) $\frac{17}{18} + \frac{19}{\underline{\mathbf{23}}} = \frac{19}{23} + \frac{17}{18}$ (Commutative property)

(g) $(-3) + \left(\frac{-11}{12}\right) = -\frac{11}{\underline{\mathbf{12}}} + (-3)$

(Commutative property)

(h) $0 + \underline{\left(\frac{\mathbf{-18}}{\mathbf{29}}\right)} = \frac{-18}{29} + \underline{0} = \frac{-18}{29}$ (Property of zero)

Exercise-2D

1. (a) $\mathbf{-2 - \frac{7}{18}}$

$= \frac{-2}{1} - \frac{7}{18}$

$= \frac{-36-7}{18} = -\frac{43}{18}$

(b) $\mathbf{-\frac{6}{11} - \left(\frac{-5}{13}\right)}$

$= -\frac{6}{11} + \frac{5}{13}$

$= \frac{-78+55}{143}$ (∵ LCM of 11 and 13 is 143.)

$= \frac{-23}{143}$

(c) $\mathbf{\frac{-9}{25} - \frac{18}{35}}$

$= \frac{-63-90}{175}$ (∵ LCM of 25 and 35 is 175.)

$= -\frac{153}{175}$

(d) $\mathbf{\frac{-5}{18} - \frac{13}{12}}$

$= \frac{-10-39}{36}$ (∵ LCM of 18 and 12 is 36.)

$= \frac{-49}{36}$

(e) $\mathbf{\frac{-4}{39} - \frac{5}{13}}$

$= \frac{-4-15}{39}$ (∵ LCM of 39 and 13 is 39.)

$= \frac{-19}{39}$

(f) $\mathbf{-\frac{6}{17} - \frac{1}{1}}$

$= \frac{-6-17}{17}$ (∵ LCM of 17 and 1 is 17.)

$= \frac{-23}{17}$

(g) $\mathbf{-\frac{9}{22} - \frac{5}{11}}$

$= \frac{-9-10}{22}$ (∵ LCM of 22 and 11 is 22.)

$= \frac{-19}{22}$

(h) $\mathbf{\frac{4}{39} - \left(\frac{-3}{13}\right)}$

$= \frac{4}{39} + \frac{3}{13}$

$= \frac{4+9}{39}$ (∵ LCM of 39 and 13 is 39.)

$= \frac{13}{39} = \frac{1}{3}$

2. (a) $\mathbf{\frac{3}{20} - \frac{5}{8}}$

$= \frac{6-25}{40}$ (∵ LCM of 20 and 8 is 40.)

$= -\frac{19}{40}$

(b) $\frac{-3}{7}$ **from** $\frac{5}{8}$

$= \frac{5}{8} - \left(\frac{-3}{7}\right)$

$= \frac{35+24}{56}$ ($\because$ LCM of 8 and 7 is 56.)

$= \frac{59}{56}$

(c) $\frac{5}{8}$ **from** $\frac{-1}{4}$

$= -\frac{1}{4} - \frac{5}{8}$

$= \frac{-2-5}{8}$ ($\because$ LCM of 4 and 8 is 8.)

$= \frac{-7}{8}$

(d) $\frac{-16}{23}$ **from 1**

$= 1 - \left(-\frac{16}{23}\right)$

$= 1 + \frac{16}{23}$

$= \frac{23+16}{23}$ ($\because$ LCM of 1 and 23 is 23.)

$= \frac{39}{23}$

(e) $\frac{-6}{7}$ **from** $\frac{-3}{14}$

$= \frac{-3}{14} - \left(-\frac{6}{7}\right)$

$= -\frac{3}{14} + \frac{6}{7}$

$= \frac{-3+12}{14}$ ($\because$ LCM of 14 and 7 is 14.)

$= \frac{9}{14}$

(f) $\frac{-8}{21}$ **from** $\frac{5}{42}$

$= \frac{5}{42} - \left(-\frac{8}{21}\right)$

$= \frac{5}{42} + \frac{8}{21}$

$= \frac{5+6}{42}$ ($\because$ LCM of 42 and 21 is 42.)

$= \frac{21}{42} = \frac{1}{2}$

(g) $\frac{-16}{33}$ **from** $\frac{4}{-11}$

$= -\frac{4}{11} - \left(\frac{-16}{33}\right)$

$= -\frac{4}{11} + \frac{16}{33}$

$= \frac{-12+16}{33}$ ($\because$ LCM of 11 and 33 is 33.)

$= \frac{4}{33}$

(h) -7 **from** $\frac{-3}{8}$

$= \left(\frac{-3}{8}\right) - (-7)$

$= -\frac{3}{8} + \frac{7}{1}$

$= \frac{-3+56}{8}$ ($\because$ LCM of 8 and 1 is 8.)

$= \frac{53}{8}$

(i) $\frac{-7}{15}$ **from** $\frac{-6}{13}$

$= -\frac{6}{13} - \left(-\frac{7}{15}\right)$

$= -\frac{6}{13} + \frac{7}{15}$ ($\because$ LCM of 15 and 13 is 195.)

$= \frac{-90+91}{195} = \frac{1}{195}$

3. (a) $\frac{8}{15} - \frac{2}{3} - \frac{7}{30} + \frac{1}{10} + 2$

($\because$ LCM of 15, 3, 30, 10 and 1 is 30.)

$= \frac{16-20-7+3+60}{30}$

$= \frac{79-27}{30}$

$= \frac{52}{30} = \frac{26}{15}$

2	15, 3, 30, 10
3	15, 3, 15, 5
5	5, 1, 5, 5
	1, 1, 1, 1

(b) $\frac{1}{12} - \frac{5}{18} - \frac{7}{24} + \frac{4}{27} + 1$

($\because$ LCM of 12, 18, 24 and 27 is 216.)

$= \frac{18-60-63+32+216}{216}$

$= \frac{266-123}{216}$

$= \frac{143}{216}$

2	12, 18, 24, 27
2	6, 9, 12, 27
2	3, 9, 6, 27
3	3, 9, 3, 27
3	1, 3, 1, 9
3	1, 1, 1, 3
	1, 1, 1, 1

(c) $\frac{-6}{25} - \frac{4}{15} + \frac{-7}{30} - 4 + 0$

$= -\frac{6}{25} - \frac{4}{15} - \frac{7}{30} - 4$

(∵ LCM of 25, 15, 30 and 1 is 150.)

$$= \frac{-36-40-35-600}{150}$$

$$= -\frac{711}{150} = \frac{-237}{50}$$

2	25, 30, 15
5	25, 15, 15
5	5, 3, 3
3	1, 3, 3
	1, 1, 1

(d) $-\frac{3}{11}+\frac{5}{22}+\frac{1}{5}+\frac{-2}{10}+1$

$$= -\frac{3}{11}+\frac{5}{22}+\frac{1}{5}-\frac{2}{10}+1$$

(∵ LCM of 11, 22, 5 and 10 is 110.)

$$= \frac{-30+25+22-22+110}{110}$$

$$= \frac{157-52}{110}$$

$$= \frac{105}{110} = \frac{21}{22}$$

2	11, 22, 5, 10
5	11, 11, 5, 5
11	11, 11, 1, 1
	1, 1, 1, 1

(e) $\frac{5}{14}-\frac{2}{7}-\frac{6}{10}+\frac{15}{28}-2$

(∵ LCM of 14, 7, 10 and 28 is 140.)

$$= \frac{50-40-84+75-280}{140}$$

$$= \frac{125-404}{140}$$

$$= \frac{-279}{140}$$

2	14, 7, 10, 28
2	7, 7, 5, 14
5	7, 7, 5, 7
7	7, 7, 1, 7
	1, 1, 1, 1

(f) $-\frac{5}{16}+\frac{7}{32}-\frac{11}{48}+\frac{3}{1}$

(∵ LCM of 16, 32 and 48 is 96.)

$$= \frac{-30+21-22+288}{96}$$

$$= \frac{309-52}{96}$$

$$= \frac{257}{96}$$

2	16, 32, 48
2	8, 16, 24
2	4, 8, 12
2	2, 4, 6
2	1, 2, 3
3	1, 1, 3
	1, 1, 1

4. Let x should be added to $\frac{5}{17}$ to get $\frac{-3}{5}$.

Then, $x+\frac{5}{17} = \frac{-3}{5}$

$$x = -\frac{3}{5}-\frac{5}{17}$$

$$= \frac{-51-25}{85} \quad (\because \text{LCM of 5 and 17 is 85.})$$

$$= -\frac{76}{85}$$

Hence, $\frac{-76}{85}$ should be added to $\frac{5}{17}$ to get $\frac{-3}{5}$.

5. Let x should be added to $\frac{-4}{5}$ to get -3.

Then, $x+\left(-\frac{4}{5}\right) = -3$

$$x = -3+\frac{4}{5}$$

$$x = \frac{-15+4}{5}$$

$$x = \frac{-11}{5}$$

Hence, $\frac{-11}{5}$ should be added to $\frac{-4}{5}$ to get -3.

6. Let x should be added to $\frac{3}{17}$ to get $\frac{-5}{34}$.

Then, $\frac{3}{17}-x = \frac{-5}{34}$

$$x = \frac{3}{17}+\frac{5}{34}$$

$$x = \frac{6+5}{34} \quad (\because \text{LCM of 34 and 17 is 34.})$$

$$x = \frac{11}{34}$$

Hence, $\frac{11}{34}$ should be subtracted from $\frac{3}{17}$ to get $\frac{-5}{34}$.

7. Let x should be subtracted from $\frac{-7}{10}$ to get $\frac{11}{30}$.

Then, $\frac{-7}{10}-x = \frac{11}{30}$

$$x = -\frac{7}{10}-\frac{11}{30}$$

$$x = \frac{-21-11}{30} \quad (\because \text{LCM of 30 and 10 is 30.})$$

$$x = -\frac{32}{30} = \frac{-16}{15}$$

Hence, $\frac{-16}{15}$ should be subtracted from $\frac{-7}{10}$ to get $\frac{11}{30}$.

8. According to the question,

$$\left[(-3)+\frac{7}{10}\right]-\left[\left(-\frac{3}{7}\right)+\frac{5}{14}\right]$$

$$= \left[-3+\frac{7}{10}\right]-\left[-\frac{3}{7}+\frac{5}{14}\right]$$

$$= \left[\frac{-30+7}{10}\right]-\left[\frac{-6+5}{14}\right]$$

$$= \frac{-23}{10}+\frac{1}{14} = \frac{-161+5}{70}$$

$$= \frac{-156}{70} = \frac{-78}{35}$$

9. According to the question,

$$\left[\left(-\frac{9}{10}+\frac{8}{15}\right)\right]-\left[(-5)+\left(\frac{-4}{13}\right)\right]$$

$$=\left[-\frac{9}{10}+\frac{8}{15}\right]-\left[-5-\frac{4}{13}\right]$$

$$=\left[\frac{-27+16}{30}\right]-\left[\frac{-65-4}{13}\right]$$

$$=\frac{-11}{30}+\frac{69}{13}$$

$$=\frac{-143+2070}{390}=\frac{1927}{390}$$

Exercise-2E

1. **(a)** $\frac{9}{8}$ **by** $\frac{16}{27}$

$$=\frac{9}{8}\times\frac{16}{27}$$

$$=\frac{2}{3}$$

(b) $\frac{6}{7}$ **by** $\frac{28}{-41}$

$$=\frac{6}{7}\times\frac{28}{(-41)}$$

$$=\frac{-6\times4}{41}=\frac{-24}{41}$$

(c) $\left(\frac{-15}{31}\right)$ **by** $\frac{62}{18}$

$$=-\frac{15}{31}\times\frac{62}{18}$$

$$=-\frac{15}{9}=\frac{-5}{3}$$

(d) $\frac{-9}{16}$ **by** $\frac{48}{27}$

$$=-32 \text{ by } \frac{5}{16}$$

$$=-32\times\frac{5}{16}$$

$$=-2\times5$$

$$=-10$$

(e) $\frac{-5}{13}$ **by** $\left(\frac{-52}{25}\right)$

$$=+\frac{5}{13}\times\frac{52}{25}$$

$$=\frac{4}{5}$$

(f) $\frac{13}{25}$ **by** $\frac{-40}{39}$

$$=\frac{13}{25}\times\left(\frac{-40}{39}\right)$$

$$=-\frac{13}{25}\times\frac{40}{39}$$

$$=\frac{-8}{5\times3}=\frac{-8}{15}$$

(g) $\frac{-9}{16}$ **by** $\frac{48}{27}$

$$=-\frac{9}{16}\times\frac{48}{27}$$

$$=-\frac{3}{3}=-1$$

(h) $-\frac{9}{11}$ **by** $\frac{22}{27}$

$$=-\frac{9}{11}\times\frac{22}{27}$$

$$=-\frac{2}{3}$$

(i) $\frac{-9}{16}$ **by** $\frac{4}{81}$

$$=\frac{-9}{16}\times\frac{64}{81}$$

$$=\frac{-4}{9}$$

2. **(a)** $\frac{-15}{29}\times58$

$$=\frac{-15\times58}{29}$$

$$=-15\times2$$

$$=-30$$

(b) $-17\times\frac{5}{34}$

$$=-\frac{17\times5}{34}$$

$$=-\frac{5}{2}$$

(c) $\frac{17}{25}\times\frac{-30}{68}$

$$=-\frac{17\times30}{25\times68}$$

$$=\frac{-6}{5\times4}=\frac{-3}{10}$$

(d) $-\frac{6}{7}\times28$

$$=-\frac{6\times28}{7}$$

$$=-6\times4$$

$$=-24$$

(e) $\frac{-13}{10}\times(-15)$

$$=\frac{(-13)\times(-15)}{10}$$

$$=\frac{13\times15}{10}$$

$$=\frac{13\times3}{2}=\frac{39}{2}$$

(f) $\frac{-6}{13}\times\frac{52}{-75}$

$$=\frac{-6\times52}{-13\times75}$$

$$=\frac{6\times52}{13\times75}=\frac{6\times4}{75}$$

$$=\frac{24}{75}=\frac{8}{25}$$

(g) $-32\times\frac{-9}{16}$

$$=\frac{(-32)\times(-9)}{16}$$

$$=\frac{32\times9}{16}$$

$$=2\times9=18$$

(h) $\frac{-9}{64}\times\frac{16}{25}$

$$=\frac{-9\times16}{64\times25}$$

$$=-\frac{9}{4\times25}=-\frac{9}{100}$$

(i) $2\frac{4}{9}\times2\frac{3}{5}$

$$=\left(\frac{2\times9+4}{9}\right)\times\left(\frac{2\times5+3}{5}\right)$$

$$=\frac{22}{9}\times\frac{13}{5}=\frac{286}{45}$$

3. **The given** $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

(a) $\frac{p}{q}=\frac{3}{7},\frac{r}{s}=\frac{-4}{5}$

$$\text{LHS}=\frac{p}{q}\times\frac{r}{s}=\frac{3}{7}\times\left(\frac{-4}{5}\right)$$

$$=\frac{-12}{35}$$

$$\text{RHS}=\frac{r}{s}\times\frac{p}{q}=\left(-\frac{4}{5}\right)\times\frac{3}{7}$$

$$=\frac{-12}{35}$$

Hence, $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

(b) $\frac{p}{q}=\frac{-4}{5},\frac{r}{s}=\frac{5}{7}$

$$\text{LHS}=\frac{p}{q}\times\frac{r}{s}=\left(\frac{-4}{5}\right)\times\frac{5}{7}$$

$$=\frac{-4}{7}$$

$$\text{RHS}=\frac{r}{s}\times\frac{p}{q}=\frac{5}{7}\times\left(\frac{-4}{5}\right)$$

$$=\frac{-4}{7}$$

Hence, $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

(c) $\frac{p}{q}=0,\frac{r}{s}=\frac{-5}{4}$

$$\text{LHS}=\frac{p}{q}\times\frac{r}{s}=0\times\left(\frac{-5}{4}\right)=0$$

$$\text{RHS}=\frac{r}{s}\times\frac{p}{q}=\left(\frac{-5}{4}\right)\times0=0$$

Hence, $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

(d) $\frac{p}{q}=\frac{7}{-8},\frac{r}{s}=\frac{-5}{9}$

$$\text{LHS}=\frac{p}{q}\times\frac{r}{s}=\left(-\frac{7}{8}\right)\times\left(-\frac{5}{9}\right)=\frac{35}{72}$$

$$\text{RHS}=\frac{r}{s}\times\frac{p}{q}=\left(-\frac{5}{9}\right)\times\left(-\frac{7}{8}\right)=\frac{35}{72}$$

Hence, $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

(e) $\frac{p}{q}=-3,\frac{r}{s}=\frac{4}{9}$

$$\text{LHS}=\frac{p}{q}\times\frac{r}{s}=(-3)\times\frac{4}{9}=\frac{-4}{3}$$

$$\text{RHS}=\frac{r}{s}\times\frac{p}{q}=\frac{4}{9}\times(-3)=\frac{-4}{3}$$

Hence, $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

(f) $\frac{p}{q}=\frac{-6}{17},\frac{r}{s}=\frac{7}{12}$

$$\text{LHS}=\frac{p}{q}\times\frac{r}{s}=\left(-\frac{6}{17}\right)\times\left(\frac{7}{12}\right)=-\frac{7}{34}$$

$$\text{RHS}=\frac{r}{s}\times\frac{p}{q}=\frac{7}{12}\times\left(\frac{-6}{17}\right)=-\frac{7}{34}$$

Hence, $\frac{p}{q}\times\frac{r}{s}=\frac{r}{s}\times\frac{p}{q}$

4. **The given** $\left\{\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}\right\}$

(a) $\frac{p}{q}=\frac{-5}{3}, \frac{r}{s}=\frac{7}{4}$ **and** $\frac{m}{n}=\frac{6}{11}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\left(-\frac{5}{3}\right)\times\left(\frac{7}{4}\times\frac{6}{11}\right)$$
$$=\left(-\frac{5}{3}\right)\times\left(\frac{7\times3}{2\times11}\right)$$
$$=\frac{-5}{3}\times\frac{21}{22}$$
$$=\frac{-5\times7}{22}=\frac{-35}{22}$$
$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}=\left(-\frac{5}{3}\times\frac{7}{4}\right)\times\frac{6}{11}$$
$$=\frac{-35}{12}\times\frac{6}{11}$$
$$=\frac{-35}{2\times11}=\frac{-35}{22}$$

Hence, LHS = RHS

(b) $\frac{p}{q}=\frac{-5}{9}, \frac{r}{s}=\frac{6}{7}$ **and** $\frac{m}{n}=\frac{5}{11}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\left(\frac{-5}{9}\right)\times\left(\frac{6}{7}\times\frac{5}{11}\right)$$
$$=\left(-\frac{5}{9}\right)\times\left(\frac{30}{77}\right)$$
$$=-\frac{5\times30}{9\times11}=-\frac{50}{33}$$
$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}=\left(-\frac{5}{9}\times\frac{6}{7}\right)\times\frac{5}{11}$$
$$=\frac{-30}{63}\times\frac{5}{11}$$
$$=-\frac{50}{33}$$

Hence, LHS = RHS

(c) $\frac{p}{q}=\frac{-5}{9}, \frac{r}{s}=\frac{7}{11}$ **and** $\frac{m}{n}=\frac{4}{3}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\left(\frac{-5}{9}\right)\times\left(\frac{7}{11}\times\frac{4}{3}\right)$$
$$=-\frac{5}{9}\times\frac{28}{33}$$
$$=-\frac{140}{297}$$
$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}=\left(\frac{-5}{9}\times\frac{7}{11}\right)\times\frac{4}{3}$$
$$=\frac{-35}{99}\times\frac{4}{3}$$
$$=-\frac{140}{297}$$

Hence, LHS = RHS

(d) $\frac{p}{q}=\frac{7}{11}, \frac{r}{s}=\frac{5}{22}$ **and** $\frac{m}{n}=\frac{17}{33}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\left(\frac{7}{11}\right)\times\left(\frac{5}{22}\times\frac{17}{33}\right)$$
$$=\frac{7}{11}\times\frac{85}{726}$$
$$=\frac{595}{7986}$$
$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}=\left(\frac{7}{11}\times\frac{5}{22}\right)\times\frac{17}{33}$$
$$=\frac{35}{242}\times\frac{17}{33}$$
$$=\frac{595}{7986}$$

Hence, LHS = RHS

(e) $\frac{p}{q}=\frac{1}{2}, \frac{r}{s}=\frac{-4}{3}$ **and** $\frac{m}{n}=\frac{-9}{16}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\frac{1}{2}\times\left[-\frac{4}{3}\times\left(-\frac{9}{16}\right)\right]$$
$$=\frac{1}{2}\times\frac{3}{4}=\frac{3}{8}$$
$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}=\left[\frac{1}{2}\times\left(\frac{-4}{3}\right)\right]\times\left(\frac{-9}{16}\right)$$
$$=\left(\frac{-2}{3}\right)\times\frac{-9}{16}$$
$$=\frac{9}{3\times8}=\frac{3}{8}$$

Hence, LHS = RHS

(f) $\frac{p}{q}=\frac{6}{7}, \frac{r}{s}=\frac{-14}{25}$ **and** $\frac{m}{n}=\frac{10}{21}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}\times\frac{m}{n}\right)=\frac{6}{7}\times\left(-\frac{14}{25}\times\frac{10}{21}\right)$$
$$=\frac{6}{7}\times\left(\frac{-4}{15}\right)$$
$$=-\frac{8}{35}$$
$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)\times\frac{m}{n}=\left(\frac{6}{7}\times\frac{-14}{25}\right)\times\frac{10}{21}$$
$$=\left(\frac{-12}{25}\right)\times\frac{10}{21}$$
$$=\frac{-4\times2}{5\times7}=\frac{-8}{35}$$

Hence, LHS = RHS

5. The given

$$\left\{\frac{p}{q}\times\left(\frac{r}{s}+\frac{m}{n}\right)=\left(\frac{p}{q}\times\frac{r}{s}\right)+\left(\frac{p}{q}\times\frac{m}{n}\right)\right\}$$

(a) $\frac{p}{q}=\frac{-4}{5}$, $\frac{r}{s}=\frac{6}{7}$ **and** $\frac{m}{n}=\frac{2}{3}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}+\frac{m}{n}\right)=\left(\frac{-4}{5}\right)\times\left(\frac{6}{7}+\frac{2}{3}\right)$$

$$=\left(\frac{-4}{5}\right)\times\left(\frac{18+14}{21}\right)$$

$$=\left(\frac{-4}{5}\right)\times\frac{32}{21}$$

$$=-\frac{128}{105}$$

$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)+\left(\frac{p}{q}\times\frac{m}{n}\right)$$

$$=\left(\frac{-4}{5}\times\frac{6}{7}\right)+\left(\frac{-4}{5}\times\frac{2}{3}\right)$$

$$=\left(\frac{-24}{35}\right)+\left(\frac{-8}{15}\right)$$

$$=\frac{-72-56}{105}=-\frac{128}{105}$$

Hence, LHS = RHS

(b) $\frac{p}{q}=-2$, $\frac{r}{s}=\frac{7}{6}$ **and** $\frac{m}{n}=\frac{-1}{2}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}+\frac{m}{n}\right)=(-2)\times\left(\frac{7}{6}-\frac{1}{2}\right)$$

$$=(-2)\times\left[\frac{7-3}{6}\right]$$

$$=(-2)\times\frac{4}{6}=\frac{-4}{3}$$

$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)+\left(\frac{p}{q}\times\frac{m}{n}\right)$$

$$=\left((-2)\times\frac{7}{6}\right)+\left((-2)\times\left(-\frac{1}{2}\right)\right)$$

$$=\left[-\frac{7}{3}+1\right]=\frac{-7+3}{3}=\frac{-4}{3}$$

Hence, LHS = RHS

(c) $\frac{p}{q}=\frac{-5}{2}$, $\frac{r}{s}=\frac{3}{8}$ **and** $\frac{m}{n}=\frac{-6}{7}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}+\frac{m}{n}\right)=\left(\frac{-5}{2}\right)\times\left(\frac{3}{8}-\frac{6}{7}\right)$$

$$=\left(\frac{-5}{2}\right)\times\left(\frac{21-48}{56}\right)$$

$$=\left(\frac{-5}{2}\right)\left(\frac{-27}{56}\right)=\frac{135}{112}$$

$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)+\left(\frac{p}{q}\times\frac{m}{n}\right)$$

$$=\left[\left(\frac{-5}{2}\right)\times\frac{3}{8}\right]+\left[\left(\frac{-5}{2}\right)\times\left(\frac{-6}{7}\right)\right]$$

$$=\left(\frac{-15}{16}\right)+\left(\frac{15}{7}\right)$$

$$=\frac{-105+240}{112}=\frac{135}{112}$$

Hence, LHS = RHS

(d) $\frac{p}{q}=\frac{-5}{2}$, $\frac{r}{s}=\frac{3}{8}$ **and** $\frac{m}{n}=\frac{-6}{7}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}+\frac{m}{n}\right)=\left(\frac{-5}{2}\right)\times\left(\frac{3}{8}+\frac{-6}{7}\right)$$

$$=\left(\frac{-5}{2}\right)\times\left(\frac{3}{8}-\frac{6}{7}\right)$$

$$=\left(\frac{-5}{2}\right)\times\left(\frac{21-48}{56}\right)$$

$$=\left(\frac{-5}{2}\right)\left(\frac{-27}{56}\right)=\frac{135}{112}$$

$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)+\left(\frac{p}{q}\times\frac{m}{n}\right)$$

$$=\left[\left(\frac{-5}{2}\right)\times\frac{3}{8}\right]+\left[\left(\frac{-5}{2}\right)\times\left(\frac{-6}{7}\right)\right]$$

$$=\left(\frac{-15}{16}\right)+\left(\frac{15}{7}\right)$$

$$=\frac{-105+240}{112}=\frac{135}{112}$$

Hence, LHS = RHS

(e) $\frac{p}{q}=0$, $\frac{r}{s}=\frac{-8}{3}$ **and** $\frac{m}{n}=\frac{-2}{3}$

$$\text{LHS}=\frac{p}{q}\times\left(\frac{r}{s}+\frac{m}{n}\right)=0\times\left(\frac{-8}{3}-\frac{2}{3}\right)$$

$$=0\times\left(\frac{-8-2}{3}\right)$$

$$=0\times\left(\frac{-10}{3}\right)=0$$

$$\text{RHS}=\left(\frac{p}{q}\times\frac{r}{s}\right)+\left(\frac{p}{q}\times\frac{m}{n}\right)$$

$$=\left(0\times\frac{-8}{3}\right)+\left(0\times\frac{-2}{3}\right)$$

$$=0+0=0$$

Hence, LHS = RHS

(f) $\frac{p}{q} = -2,\ \frac{r}{s} = \frac{-23}{8}$ and $\frac{m}{n} = \frac{35}{12}$

$$\text{LHS} = \frac{p}{q} \times \left(\frac{r}{s} + \frac{m}{n}\right) = (-2) \times \left(\frac{-22}{8} + \frac{35}{12}\right)$$

$$= (-2) \times \left[\frac{-69 + 70}{24}\right]$$

$$= (-2) \times \frac{1}{24} = -\frac{1}{12}$$

$$\text{RHS} = \left(\frac{p}{q} \times \frac{r}{s}\right) + \left(\frac{p}{q} \times \frac{m}{n}\right)$$

$$= \left\{(-2) \times \left(\frac{-23}{8}\right)\right\} + \left\{(-2) \times \frac{35}{12}\right\}$$

$$= \frac{23}{4} + \left(\frac{-35}{6}\right) = \frac{23}{4} - \frac{35}{6}$$

$$= \frac{69 - 70}{12} = -\frac{1}{12}$$

Hence, LHS = RHS

6. **(a)** The multiplicative inverse of (-16) is $-\frac{1}{16}$.

(b) The multiplicative inverse of $\frac{1}{18}$ is 18.

(c) The multiplicative inverse of $\frac{-5}{16}$ is $-\frac{16}{5}$.

(d) The multiplicative inverse of $\frac{6}{-11}$ is $-\frac{11}{6}$.

(e) The multiplicative inverse of $\frac{4}{5} \times \frac{-10}{16}$ is -2.

(f) The multiplicative inverse of $-2 \times \frac{-4}{5}$ is $\frac{5}{8}$.

(g) The multiplicative inverse of $\frac{6}{7} \times -3$ is $-\frac{7}{18}$.

(h) The multiplicative inverse of $\frac{4}{3} - \frac{1}{6}$ is $\frac{6}{7}$.

7. **(a)** $\frac{-1}{9} \times \frac{4}{-9} \times \frac{81}{-64} \times 2$

$$= \frac{-1 \times 4 \times 81 \times 2}{9 \times 9 \times 64}$$

$$= -\frac{8}{64} = -\frac{1}{8}$$

(b) $-8 \times \frac{-6}{11} \times \frac{33}{-24} \times \frac{6}{7}$

$$= -\frac{8 \times 6 \times 33 \times 6}{11 \times 24 \times 7}$$

$$= \frac{-6 \times 6 \times 8 \times 3}{24 \times 7}$$

$$= \frac{-6 \times 6}{7} = \frac{-36}{7}$$

(c) $\frac{-8}{17} \times \frac{34}{25} \times \frac{-35}{16} \times -4$

$$= \frac{-8 \times 34 \times 35 \times 4}{17 \times 25 \times 16}$$

$$= \frac{-2 \times 35 \times 4}{25 \times 2}$$

$$= \frac{-7 \times 4}{5} = \frac{-28}{5}$$

(d) $\frac{10}{16} \times \frac{-8}{25} \times \frac{11}{18} \times \frac{9}{-22}$

$$= +\frac{10 \times 8 \times 11 \times 9}{16 \times 25 \times 18 \times 22}$$

$$= \frac{2 \times 11 \times 9}{2 \times 5 \times 18 \times 22}$$

$$= \frac{11}{5 \times 2 \times 22} = \frac{1}{20}$$

(e) $\frac{-4}{5} \times \frac{10}{-13} \times \frac{-5}{6} \times \frac{26}{-35}$

$$= +\frac{4 \times 10 \times 5 \times 26}{5 \times 13 \times 6 \times 35}$$

$$= \frac{4 \times 10 \times 26}{13 \times 6 \times 35}$$

$$= \frac{4 \times 10 \times 2}{6 \times 35}$$

$$= \frac{4 \times 2}{3 \times 7} = \frac{8}{21}$$

(f) $\frac{13}{25} \times \frac{-5}{39} \times \frac{2}{11} \times \frac{22}{10}$

$$= -\frac{13 \times 5 \times 2 \times 22}{25 \times 39 \times 11 \times 10}$$

$$= -\frac{5 \times 2 \times 22}{25 \times 3 \times 11 \times 10}$$

$$= -\frac{2 \times 22}{5 \times 3 \times 11 \times 10}$$

$$= -\frac{22}{5 \times 3 \times 11 \times 5}$$

$$= -\frac{2}{5 \times 3 \times 5} = -\frac{2}{75}$$

8. **(a)** $\left(\frac{-2}{5}\right)^{-1}$

$$= \frac{1}{\left(-\frac{2}{5}\right)}$$

$$= -\frac{5}{2}$$

(b) $\left(\frac{-5}{6}\right)^{-1} = \frac{1}{\left(-\frac{5}{6}\right)}$

$= -\frac{6}{5}$

(c) $\left(\frac{-8}{9} \times \frac{18}{25}\right)^{-1}$

$= \left(\frac{-8 \times 2}{25}\right)^{-1} = \left(\frac{-16}{25}\right)^{-1}$

$= \frac{1}{\left(\frac{-16}{25}\right)} = \frac{-25}{16}$

(d) $\left(\frac{-3}{4}\right)^{-1} \times \frac{4}{9} \times \left(\frac{6}{7}\right)^{-1}$

$= \frac{1}{\left(\frac{-3}{4}\right)} \times \frac{4}{9} \times \frac{1}{\left(\frac{6}{7}\right)}$

$= \left(\frac{-4}{3}\right) \times \frac{4}{9} \times \frac{7}{6}$

$= \frac{-56}{81}$

(e) $\left(\frac{4}{-9}\right)^{-1} \times \left(\frac{16}{18}\right)^{-1} \times -9$

$= \frac{1}{\left(-\frac{4}{9}\right)} \times \frac{1}{\left(\frac{16}{18}\right)} \times (-9)$

$= \left(-\frac{9}{4}\right) \times \frac{18}{16} \times (-9)$

$= \frac{729}{32}$

(f) $\left(\frac{-5}{6} \times \frac{18}{25}\right)^{-1}$

$= \left(\frac{-3}{5}\right)^{-1}$

$= \frac{1}{\left(\frac{-3}{5}\right)} = -\frac{5}{3}$

9. (a) $\frac{-4}{7} \times \frac{-5}{9} = x \times \frac{-5}{9}$

$x = \frac{-4}{7}$

So, $\frac{-4}{7} \times \frac{-5}{9} = \underline{\mathbf{-4}}{\mathbf{7}} \times \frac{-5}{9}$ (Commutative property)

(b) $\frac{-6}{13} \times \left(\frac{5}{11} \times \frac{6}{11}\right) = \left(\frac{-6}{13} \times \frac{5}{11}\right) \times x$

$x = \frac{\frac{-6}{13} \times \left(\frac{5}{11} \times \frac{6}{11}\right)}{\left(\frac{-6}{13} \times \frac{5}{11}\right)}$

$x = \frac{6}{11}$

So, $\frac{-6}{13} \times \left(\frac{5}{11} \times \frac{6}{11}\right) = \left(\frac{-6}{13} \times \frac{5}{11}\right) \times \underline{\mathbf{6}}{\mathbf{11}}$

(Associative property)

(c) $1 \times \frac{5}{16} = \frac{5}{16} \times 1 = \underline{\mathbf{5}}{\mathbf{16}}$ (Multiplicative identity)

(d) $\frac{11}{17} \times 0 = \underline{\mathbf{0}}$ (Property of zero (0))

(e) $\frac{-6}{17} \times \left(\frac{5}{11} + \frac{3}{5}\right) = \left(\frac{-6}{17} \times \frac{5}{11}\right) + \underline{\left(\frac{\mathbf{-6}}{\mathbf{17}} \times \frac{\mathbf{3}}{\mathbf{5}}\right)}$

(Distributive property of multiplication over Addition)

(f) $\frac{-3}{7} \times \frac{5}{11} = \frac{5}{11} \times x$

$x = \frac{-3}{7}$

So, $\frac{-3}{7} \times \frac{5}{11} = \frac{5}{11} \times \underline{\mathbf{-3}}{\mathbf{7}}$ (Commutative property)

10. (a) The product of two rational numbers is always a rational number. **[T]**

(b) $-1 \times a$ is positive if a is negative. **[T]**

(c) Multiplication is not closed under rational numbers. **[F]**

(d) $x \times (y + z)$ is non-zero, if x is non-zero. **[T]**

(e) The product of two integers is never a fraction. **[T]**

Exercise-2F

1. Simplify :

(a) $\frac{\mathbf{-4}}{\mathbf{11}} \div \frac{\mathbf{12}}{\mathbf{33}}$

$= \frac{-4}{11} \times \frac{33}{12}$

$= \frac{-3}{3} = -1$

(b) $\mathbf{(-16)} \div \frac{\mathbf{4}}{\mathbf{19}}$

$= (-16) \times \frac{19}{4}$

$= -4 \times 19 = -76$

(c) $\left(\frac{-4}{11}\right) \div \frac{16}{55}$

$= \left(\frac{-4}{11}\right) \times \frac{55}{16}$

$= -\frac{5}{4}$

(d) $\left(-\frac{1}{10}\right) \div \left(\frac{-7}{15}\right)$

$= \left(-\frac{1}{10}\right) \times \left(-\frac{15}{7}\right)$

$= +\frac{15}{70} = \frac{3}{14}$

(e) $\left(\frac{-8}{13}\right) \div \frac{5}{52}$

$= \left(\frac{-8}{13}\right) \times \frac{52}{5}$

$= \frac{-8 \times 52}{13 \times 5}$

$= \frac{-8 \times 4}{5} = \frac{-32}{5}$

(f) $\frac{4}{13} \div \left(\frac{16}{-39}\right)$

$= \frac{4}{13} \times \left(\frac{-39}{16}\right)$

$= \frac{-4 \times 39}{13 \times 16} = \frac{-3}{4}$

(g) $(-5) \div \frac{45}{38}$

$= (-5) \times \frac{38}{45}$

$= \frac{-5 \times 38}{45} = \frac{-38}{9}$

(h) $\frac{6}{31} \div \left(\frac{-12}{62}\right)$

$= \frac{6}{31} \times \left(-\frac{62}{12}\right)$

$= \frac{-2}{2} = -1$

(i) $\frac{27}{40} \div (-18)$

$= \frac{27}{40} \times \frac{1}{(-18)}$

$= -\frac{3}{40 \times 2} = \frac{-3}{80}$

2. **(a)** $\left(\frac{-6}{7}\right) \div 1 = x$

$\frac{-6}{7} = x$

or $x = \frac{-6}{7}$

So, $\left(\frac{-6}{7}\right) \div 1 = \underline{\frac{-6}{7}}$

(b) $\left(\frac{-21}{35}\right) \div x = \frac{-21}{35}$

$\frac{-21}{35} \times \frac{1}{x} = \frac{-21}{35}$

$x = \frac{-21}{35} \times \left(-\frac{35}{21}\right) = 1$

So, $\left(\frac{-21}{35}\right) \div \underline{1} = \frac{-21}{35}$

(c) $\left(\frac{-16}{31}\right) \div 1 = x$

$x = \left(\frac{-16}{31}\right) \times \frac{1}{1}$

$x = -\frac{16}{31}$

So, $\left(\frac{-16}{31}\right) \div 1 = \underline{\frac{-16}{31}}$

(d) $\frac{16}{18} \div \frac{16}{18} = x$

or $x = \frac{16}{18} \times \frac{18}{16}$

$x = 1$

So, $\frac{16}{18} \div \frac{16}{18} = \underline{1}$

(e) $\frac{7}{18} \div \frac{-7}{18} = x$

or $x = \frac{7}{18} \times \left(-\frac{18}{7}\right)$

$x = -1$

So, $\frac{7}{18} \div \frac{-7}{18} = \underline{-1}$

(f) $\left(\frac{5}{11}\right) \div \left(\frac{-5}{11}\right) = x$

or $x = \frac{5}{11} \times \left(-\frac{11}{5}\right)$

$x = -1$

So, $\left(\frac{5}{11}\right) \div \left(\frac{-5}{11}\right) = \underline{-1}$

3. (a) $\mathbf{\frac{16}{17} \div \frac{5}{11} = \frac{5}{11} \div \frac{16}{17}}$

$$\text{LHS} = \frac{16}{17} \div \frac{5}{11} = \frac{16}{17} \times \frac{11}{5}$$

$$= \frac{176}{85}$$

$$\text{RHS} = \frac{5}{11} \div \frac{16}{17} = \frac{5}{11} \times \frac{17}{16}$$

$$= \frac{85}{176}$$

Since, LHS $\neq$ RHS

So, statement is false.

(b) $\mathbf{\frac{3}{4} \div \left(\frac{-15}{16}\right) = \left(\frac{-15}{16}\right) \div \frac{3}{4}}$

$$\text{LHS} = \frac{3}{4} \div \left(\frac{-15}{16}\right) = \frac{3}{4} \times \frac{-16}{15}$$

$$= \frac{-4}{5}$$

$$\text{RHS} = \left(\frac{-15}{16}\right) \div \frac{3}{4} = \frac{-15}{16} \times \frac{4}{3}$$

$$= \frac{-5}{4}$$

Since, LHS $\neq$ RHS

So, statement is false.

(c) $\mathbf{\frac{5}{19} \div \left(\frac{-6}{15}\right) = \left(\frac{-6}{15}\right) \div \frac{5}{19}}$

$$\text{LHS} = \frac{5}{19} \div \left(\frac{-6}{15}\right) = \frac{5}{19} \times \frac{-15}{6}$$

$$= \frac{-5 \times 5}{19 \times 2} = \frac{-25}{38}$$

$$\text{RHS} = \left(\frac{-6}{15}\right) \div \frac{5}{19} = \left(\frac{-6}{15}\right) \times \frac{19}{5}$$

$$= \frac{-114}{75}$$

Since, LHS $\neq$ RHS

So, statement is false.

(d) $\mathbf{\left(\frac{19}{-16}\right) \div 1 = 1 \div \left(\frac{19}{-16}\right)}$

$$\text{LHS} = \left(\frac{19}{-16}\right) \div 1 = \frac{19}{-16} \times 1$$

$$= -\frac{19}{16}$$

$$\text{RHS} = 1 \div \left(\frac{19}{-16}\right) = 1 \times \left(\frac{-16}{19}\right)$$

$$= -\frac{16}{19}$$

Since, LHS $\neq$ RHS

So, statement is false.

4. (a) $\mathbf{\frac{5}{14} \div \left(\frac{16}{45} \div \frac{9}{14}\right) = \left(\frac{5}{14} \div \frac{16}{45}\right) \div \frac{9}{14}}$

$$\text{LHS} = \frac{5}{14} \div \left(\frac{16}{45} \div \frac{9}{14}\right) = \frac{5}{14} \div \left(\frac{16}{45} \times \frac{14}{9}\right)$$

$$= \frac{5}{14} \times \frac{45 \times 9}{16 \times 14}$$

$$= \frac{2025}{3136}$$

$$\text{RHS} = \left(\frac{5}{14} \div \frac{16}{45}\right) \div \frac{9}{14} = \left(\frac{5}{14} \div \frac{16}{45}\right) \times \frac{14}{9}$$

$$= \left(\frac{15}{14} \times \frac{45}{16}\right) \times \frac{14}{9}$$

$$= \frac{5 \times 45 \times 14}{14 \times 16 \times 9}$$

$$= \frac{5 \times 5}{16} = \frac{25}{16}$$

Since, LHS $\neq$ RHS

So, statement is false.

(b) $\mathbf{\frac{4}{7} \div \left(\frac{-6}{7} \div \frac{4}{9}\right) = \left(\frac{4}{7} \div \frac{-6}{7}\right) \div \frac{4}{9}}$

$$\text{LHS} = \frac{4}{7} \div \left(\frac{-6}{7} \div \frac{4}{9}\right) = \frac{4}{7} \div \left(\frac{-6}{7} \times \frac{9}{4}\right)$$

$$= \frac{4}{7} \div \left(-\frac{27}{14}\right)$$

$$= \frac{4}{7} \times \left(-\frac{14}{27}\right)$$

$$= \frac{4 \times (-2)}{27} = \frac{-8}{27}$$

$$\text{RHS} = \left(\frac{4}{7} \div \frac{-6}{7}\right) \div \frac{4}{9} = \left(\frac{4}{7} \times \frac{-7}{6}\right) \div \frac{4}{9}$$

$$= \left(\frac{-2}{3}\right) \div \frac{4}{9}$$

$$= \left(-\frac{2}{3}\right) \times \frac{9}{4} = \frac{-3}{2}$$

Since, LHS $\neq$ RHS

So, statement is false.

(c) $\frac{-3}{8} \div \left(\frac{4}{5} \div \frac{-6}{7}\right) = \left(\frac{-3}{8} \div \frac{4}{5}\right) \div \frac{-6}{7}$

$$\text{LHS} = \frac{-3}{8} \div \left(\frac{4}{5} \times \frac{-7}{6}\right) = \frac{-3}{8} \div \left(\frac{-14}{15}\right)$$

$$= \frac{-3}{8} \times \left(-\frac{15}{14}\right) = \frac{45}{112}$$

$$\text{RHS} = \left(\frac{-3}{8} \div \frac{4}{5}\right) \div \frac{-6}{7} = \left(\frac{-3}{8} \div \frac{4}{5}\right) \times \frac{-7}{6}$$

$$= \left(\frac{-3}{8} \times \frac{5}{4}\right) \times \frac{-7}{6}$$

$$= \left(\frac{-15}{32}\right) \times \left(\frac{-7}{6}\right) = \frac{105}{192}$$

Since, $\text{LHS} \neq \text{RHS}$

So, statement is false.

(d) $\left(\frac{-10}{11} \div \frac{16}{33}\right) \div \frac{7}{18} = \frac{-10}{11} \div \left(\frac{16}{33} \div \frac{7}{8}\right)$

$$\text{LHS} = \left(\frac{-10}{11} \div \frac{16}{33}\right) \div \frac{7}{18}$$

$$= \left(\frac{-10}{11} \times \frac{33}{16}\right) \div \frac{7}{18}$$

$$= \left(\frac{-5 \times 3}{8}\right) \div \frac{7}{18} = \left(\frac{-15}{8}\right) \times \frac{18}{7}$$

$$= \frac{-15 \times 9}{4 \times 7} = \frac{-135}{28}$$

$$\text{RHS} = \frac{-10}{11} \div \left(\frac{16}{33} \div \frac{7}{8}\right)$$

$$= \frac{-10}{11} \div \left(\frac{16}{33} \times \frac{8}{7}\right)$$

$$= \frac{-10}{11} \div \left(\frac{128}{231}\right) = \frac{-10}{11} \times \frac{231}{128}$$

$$= \frac{-5 \times 21}{64} = \frac{-105}{64}$$

Since, $\text{LHS} \neq \text{RHS}$

So, statement is false.

5. The product of two rational number $= \frac{-5}{16}$

$$\text{One number} = \frac{4}{11}$$

$$\text{So, other number} = \left(\frac{-5}{16}\right) \div \frac{4}{11}$$

$$= \frac{-5}{16} \times \frac{11}{4} = \frac{-55}{64}$$

Hence, the other number is $\frac{-55}{64}$.

6. Product of two rational numbers $= \frac{11}{169}$

$$\text{One number} = \frac{-21}{13}$$

$$\text{So, other number} = \frac{11}{169} \div \left(\frac{-21}{13}\right)$$

$$= \frac{11}{169} \times \left(-\frac{13}{21}\right)$$

$$= \frac{-11 \times 13}{169 \times 21}$$

$$= \frac{-11}{13 \times 21} = \frac{-11}{273}$$

Hence, the other number is $\frac{-11}{273}$.

7. Let x should $\frac{-9}{11}$ be multiplied to get $\frac{27}{-55}$.

Then, $x \times \left(\frac{-9}{11}\right) = \frac{27}{-55}$

$$x = + \frac{27 \times 11}{9 \times 55}$$

$$x = \frac{3}{5}$$

Hence, $\frac{3}{5}$ should $-\frac{9}{11}$ be multiplied to get $\frac{27}{-55}$.

8. Let x should $\frac{4}{13}$ be multiplied to get $\frac{-16}{39}$.

Then, $x \times \frac{4}{13} = \frac{-16}{39}$

$$x = \frac{-16 \times 13}{4 \times 39}$$

$$x = \frac{-4}{3}$$

Hence, $\left(\frac{-4}{3}\right)$ should $\frac{4}{13}$ be multiplied to get $\frac{-16}{39}$.

MCQs

1. (c) **2.** (a) **3.** (b) **4.** (a) **5.** (b)

6. (a) **7.** (c) **8.** (b) **9.** (b) **10.** (b)

CHAPTER 3 : DECIMALS

Exercise-3A

1. (a) 3.712, 5.12, 8.19, 15.17 and 13.9128.

On converting the given decimals into like decimals, we get

3.7120, 5.1200, 8.1900, 15.1700 and 13.9128

Now, arranging the like decimals in the column,

3.7120
5.1200
8.1900
15.1700
+13.9128
46.1048

Hence, the sum of given decimals is 46.1048.

(b) 23.08, 8.96, 7.168, 4.321, 2.6 and 14.

On converting the given decimals into like decimals, we get

23.080, 8.960, 7.168, 4.321, 2.600 and 14.000

Now, arranging the like decimals in the column,

23.080
8.960
7.168
4.321
2.600
+14.000
60.129

Hence, the sum of given decimals is 60.129.

(c) 91.678, 4.123, 9.813, 3.1968 and 13.41.

On converting the given decimals into like decimals, we get

91.6780, 4.1230, 9.8130, 3.1968 and 13.4100

Now, arranging the like decimals in the column,

91.6780
4.1230
9.8130
3.1968
+13.4100
122.2208

Hence, the sum of given decimals is 122.2208.

(d) 0.006, 0.6, 6.666, 0.0006 and 6.

On converting the given decimals into like decimals, we get

0.0060, 0.6000, 6.6660, 0.0006 and 6.0000

Now, arranging the like decimals in the column,

0.0060
0.6000
6.6660
0.0006
+6.0000
13.2726

Hence, the sum of given decimals is 13.2726.

(e) 7.007, 7.864, 9.183, 4.148 and 146.21.

On converting the given decimals into like decimals, we get

7.007, 7.864, 9.183, 4.148 and 146.21

Now, arranging the like decimals in the column,

7.007
7.864
9.183
4.148
+146.210
174.412

Hence, the sum of given decimals is 174.412.

(f) 6.67, 16.678, 9.613, 10.916 and 13.

On converting the given decimals into like decimals, we get

6.670, 16.678, 9.613, 10.916 and 13.000

Now, arranging the like decimals in the column,

6.670
16.678
9.613
10.916
+13.000
56.877

Hence, the sum of given decimals is 56.877.

2. (a) 39.41 from 42.9

On converting the given decimals into like decimals, we get

39.41 and 42.90

Now, arranging the like decimals in the column,

42.90
–39.41
3.49

Hence, the difference is 3.49.

(b) 19.678 from 20

On converting the given decimals into like decimals and arrange in column, we get

20.000
–19.678
0.322

Hence, the difference is 0.322.

(c) 15.176 from 18.10

On converting the given decimals into like decimals and arrange in column, we get

18.100
–15.176
2.924

Hence, the difference is 2.924.

(d) 36.74 from 40.123

On converting the given decimals into like decimals and arrange in column, we get

40.123
–36.740
3.383

Hence, the difference is 3.383.

(e) 2.374 from 10

On converting the given decimals into like decimals and arrange in column, we get

10.000
–2.374
7.626

Hence, the difference is 7.626.

(f) 192.68 from 200

On converting the given decimals into like decimals and arrange in column, we get

200.00
–192.68
7.32

Hence, the difference is 7.32.

3. (a) 17.628 – 9.168 + 4.186 – 2.912

On converting the given decimals into like decimals and on adding the decimals of same signs one side and others on other side, we get

17.628
+ 4.186
21.814

9.168
+2.912
12.080

Now, on subtracting, we get

21.814
–12.080
9.734

Hence, on simplifying given decimals, we get 9.734.

(b) 50.06 + 13.912 + 9.16 – 60.006

On converting the given decimals into like decimals and on adding the decimals of same signs one side and others on other side, we get

50.060
13.912
+ 9.160
73.132

60.006
+ 0
60.006

Now, on subtracting, we get

73.132
–60.006
13.126

Hence, on simplifying given decimals, we get 13.126.

(c) 15.178 – 14.6382 – 19.416 + 30

On converting the given decimals into like decimals and on adding the decimals of same signs one side and others on other side, we get

15.1780
+ 30.0000
45.1780

14.6382
+ 19.4160
34.0542

Now, on subtracting, we get

45.1780
–34.0542
11.1238

Hence, on simplifying given decimals, we get 11.1238.

(d) 10.067 – 3.783 + 8.3054 – 9.618

On converting the given decimals into like decimals and on adding the decimals of same signs one side and others on other side, we get

10.0670
+ 8.3054
18.3724

3.7830
+9.6180
13.4010

Now, on subtracting, we get

18.3724
–13.4010
4.9714

Hence, on simplifying given decimals, we get 4.9714.

(e) 63.7 – 23.48 + 78.96 – 92.78

On converting the given decimals into like decimals and on adding the decimals of same signs one side and others on other side, we get

63.70
+78.96
142.66

23.48
+92.78
116.26

Now, on subtracting, we get

142.66
–1 16.26
26.40

Hence, on simplifying given decimals, we get 26.40.

(f) **50.6 + 14.912 − 15.62 − 28.912**

On converting the given decimals into like decimals and on adding the decimals of same signs one side and others on other side, we get

50.600
+14.912
65.512

15.620
+28.912
44.532

Now, on subtracting, we get

65.512
–44.532
20.980

Hence, on simplifying given decimals, we get 20.980.

4. Cost of a calculator = ₹ 125.50

Cost of a note-book = ₹ 12.35

Total cost of both items = ₹ (125.50 + 12.35)

= ₹ 137.85

Hence, she pay ₹ 137.85 in all.

5. Cost of a book = ₹ 65.90

Cost of two pens = ₹ 48.80

So, total cost of both items = ₹ (65.90 + 48.80)

= ₹ 114.70

Pragya gave money to shopkeeper = ₹ 100 × 2

= ₹ 200

So, she got in return = ₹ (200 − 114.70)

= ₹ 85.30

Hence, Pragya got ₹ 85.30 from shopkeeper.

6. Total cost of towel and bed sheet = ₹ 426.78

But Radha had = ₹ 400

So, required money to purchase towel and bed sheet

= ₹ (426 .78 − 400)

= ₹ 26.78

Hence, she required ₹ 26.78 to purchase towel and bed sheet.

Exercise-3B

1. **(a)** $3.762 \times 10 = 37.62$

(On shifting decimal point to the right by one place)

(b) $9.12 \times 10 = 91.2$

(On shifting decimal point to the right by one place)

(c) $0.06 \times 10 = 0.6$

(On shifting decimal point to the right by one place)

(d) $4.167 \times 10 = 41.67$

(On shifting decimal point to the right by one place)

(e) $19.638 \times 10 = 196.38$

(On shifting decimal point to the right by one place)

(f) $0.042 \times 10 = 0.42$

(On shifting decimal point to the right by one place)

(g) $18.617 \times 100 = 1861.7$

(On shifting decimal point to the right by two place)

(h) $0.068 \times 100 = 6.8$

(On shifting decimal point to the right by two place)

(i) $3.718 \times 100 = 371.8$

(On shifting decimal point to the right by two place)

(j) $41.376 \times 100 = 4137.6$

(On shifting decimal point to the right by two place)

(k) $9.006 \times 100 = 900.6$

(On shifting decimal point to the right by two place)

(l) $0.0918 \times 100 = 9.18$

(On shifting decimal point to the right by two place)

2. **Find the product :**

(a) $13.618 \times 1000 = 13618$

(On shifting decimal point to the right by three place)

(b) $9.0182 \times 1000 = 9018.2$

(On shifting decimal point to the right by three place)

(c) $9.2361 \times 1000 = 9236.1$

(On shifting decimal point to the right by three place)

(d) $17.6281 \times 1000 = 17628.1$

(On shifting decimal point to the right by three place)

(e) $0.003 \times 1000 = 3$

(On shifting decimal point to the right by three place)

(f) $0.1923 \times 1000 = 1923$

(On shifting decimal point to the right by three place)

(g) $113.678 \times 10000 = 1136780$

(On shifting decimal point to the right by four place)

(h) $0.0623 \times 10000 = 6230$

(On shifting decimal point to the right by four place)

(i) $2.376 \times 10000 = 23760$

(On shifting decimal point to the right by four place)

(j) $0.0678 \times 10000 = 6780$

(On shifting decimal point to the right by four place)

(k) $17.128 \times 10000 = 171280$

(On shifting decimal point to the right by four place)

(l) $0.00125 \times 10000 = 1250$

(On shifting decimal point to the right by four place)

3. (a) $\mathbf{6.082 \times 23}$

By putting decimals before three digits from right to left in the product, since decimal point is placed before three digits from right to left in given decimal.

6.082
× 23
18246
121640
139.886

(b) $\mathbf{3.617 \times 18}$

3.617
× 18
28936
36170
65.106

Place the decimal point as given in the above rule.

(c) $\mathbf{8.164 \times 46}$

8.164
× 46
48984
326560
375.544

Place the decimal point as given in the above rule.

(d) $\mathbf{9.63 \times 42}$

9.63
× 42
1926
38520
404.46

Place the decimal point as given in the above rule.

(e) $\mathbf{14.187 \times 14}$

14.187
× 14
56748
141870
198.618

Place the decimal point as given in the above rule.

(f) $\mathbf{15.628 \times 64}$

15.628
× 64
62512
937680
1000.192

Place the decimal point as given in the above rule.

(g) $\mathbf{23.912 \times 48}$

23.912
× 48
191296
956480
1147.776

Place the decimal point as given in the above rule.

(h) $\mathbf{0.0638 \times 52}$

0.0638
× 52
1276
31900
3.3176

Place the decimal point as given in the above rule.

(i) $\mathbf{0.9152 \times 72}$

0.9152
× 72
18304
640640
65.8944

Place the decimal point as given in the above rule.

4. (a) $\mathbf{7.12 \times 3.6}$

712
× 36
4272
21360
25632

First, multiply 712 by 36

Sum of the decimals place after decimal point in the given decimals

$2 + 1 = 3$

So, product would have decimal point before three digits from right to left.

Hence, $7.12 \times 3.6 = 25.632$.

(b) **15.238×0.052**

First, multiply 15238 by 52

15238
× 52
30476
+ 761900
792376

Sum of the decimals place after decimal point in the given decimals

$3+3=6$

So, product would have decimal point before six digits from right to left.

Hence, $15.238 \times 0.052 = 0.792376$.

(c) **0.012×0.0138**

First, multiply 12 by 138

12
× 138
96
360
1200
1656

Sum of the decimals place after decimal point in the given decimals

$3+4=7$

So, product would have decimal point before seven digits from right to left.

Hence, $0.012 \times 0.0138 = 0.0001656$.

(d) **1.245×3.67**

First, multiply 1245 by 367

1245
× 367
8715
74700
373500
456915

Sum of the decimals place after decimal point in the given decimals

$3+2=5$

So, product would have decimal point before six digits from right to left.

Hence, $1.245 \times 3.67 = 4.56915$.

(e) **6.617×8.012**

First, multiply 6617 by 8012

6617
× 8012
13234
66170
00000
+ 52936000
53015404

Sum of the decimals place after decimal point in the given decimals

$3+3=6$

So, product would have decimal point before six digits from right to left.

Hence, $6.617 \times 8.012 = 53.015404$.

(f) **9.62×3.178**

First, multiply 962 by 3178

962
× 3178
7696
67340
96200
+ 2886000
3057236

Sum of the decimals place after decimal point in the given decimals

$2+3=5$

So, product would have decimal point before five digits from right to left.

Hence, $9.62 \times 3.178 = 30.57236$.

(g) **18.562×3.612**

First, multiply 18562 by 3612

18562
× 3612
37124
185620
1137200
55686000
67045945

Sum of the decimals place after decimal point in the given decimals

$3+3=6$

So, product would have decimal point before six digits from right to left.

Hence, $18.562 \times 3.612 = 67.045944$.

(h) **3.1623×0.061**

First, multiply 31623 by 61

31623
× 61
31623
1897380
1929003

Sum of the decimals place after decimal point in the given decimals

$4+3=7$

So, product would have decimal point before seven digits from right to left.

Hence, $3.1623 \times 0.061 = 0.1929003$.

(i) **0.542×3.62**

First, multiply 542 by 362

542
× 362
1084
32520
162600
196204

Sum of the decimals place after decimal point in the given decimals

$2+3=5$

So, product would have decimal point before five digits from right to left.

Hence, $0.542 \times 3.62 = 1.96204$.

5. **(a)** **$3.6 \times 1.6 \times 8.323$**

First, find the product of 36×16 and 576×832.

36
× 16
216
360
576

576
× 832
1152
17280
460800
479232

Sum of the decimals place after decimal point in the given decimals

$1+1+2=4$

Hence, $3.6 \times 1.6 \times 8.32 = 47.9232$.

(b) $\mathbf{6.9 \times 1.2 \times 2.5}$

First, find the product of 69×12 and 828×25.

69		828	
× 12		× 25	
138		4140	
690		+ 16560	
828		20700	

Sum of the decimals place after decimal point in the given decimals

$1+1+1=3$

Hence, $6.9 \times 1.2 \times 2.5 = 20.700$.

(c) $\mathbf{0.8 \times 4.25 \times 0.005}$

First, find the product of 8×425 and 3400×5.

8		3400	
× 425		× 5	
40		17000	
160			
+3200			
3400			

Sum of the decimals place after decimal point in the given decimals

$1+2+3=6$

Hence, $0.8 \times 4.25 \times 0.005 = 0.017000$.

(d) $\mathbf{13 \times 1.3 \times 0.13}$

First, find the product of 13×13 and 169×13.

13		169	
× 13		× 13	
39		507	
+ 130		+ 1690	
169		2197	

Sum of the decimals place after decimal point in the given decimals

$1+2=3$

Hence, $13 \times 1.3 \times 0.13 = 2.197$.

(e) $\mathbf{0.3 \times 0.003 \times 0.0003}$

First, find the product of 3×3 and 9×3.

3		9	
× 3		× 3	
9		27	

Sum of the decimals place after decimal point in the given decimals

$1+3+4=8$

Hence, $0.3 \times 0.003 \times 0.0003 = 0.00000027$.

(f) $\mathbf{2.4 \times 1.5 \times 1.86}$

First, find the product of 24×15 and 360×186.

24		360	
× 15		× 186	
120		2160	
+ 240		28800	
360		+ 36000	
		66960	

Sum of the decimals place after decimal point in the given decimals

$1+1+2=4$

Hence, $2.4 \times 1.5 \times 1.86 = 6.6960$.

(g) $\mathbf{40.4 \times 4.04 \times 4.1}$

First, find the product of 404×404 and 163216×41.

404		163216	
× 404		× 41	
1616		163216	
0000		+ 6528640	
+ 161600		6691856	
163216			

Sum of the decimals place after decimal point in the given decimals

$1+2+1=4$

Hence, $40.4 \times 4.04 \times 4.1 = 669.1856$.

(h) $\mathbf{0.21 \times 2.1 \times 0.0021}$

First, find the product of 21×21 and 441×21.

21		441	
× 21		× 21	
21		441	
+ 420		+ 8820	
441		9261	

Sum of the decimals place after decimal point in the given decimals

$2+1+4=7$

Hence, $0.21 \times 2.1 \times 0.0021 = 0.0009261$

Exercise-3C

1. (a) $17.8 \div 10 = 1.78$

(On shifting decimal point to the left by one place)

(b) $9.67 \div 10 = 0.967$

(On shifting decimal point to the left by one place)

(c) $21.376 \div 10 = 2.1376$

(On shifting decimal point to the left by one place)

(d) $0.467 \div 10 = 0.0467$

(On shifting decimal point to the left by one place)

(e) $18.48 \div 10 = 1.848$

(On shifting decimal point to the left by one place)

(f) $0.076 \div 10 = 0.0076$

(On shifting decimal point to the left by one place)

(g) $0.624 \div 100 = 0.00624$

(On shifting decimal point to the left by two place)

(h) $0.527 \div 100 = 0.00527$

(On shifting decimal point to the left by two place)

(i) $14.126 \div 100 = 0.14126$

(On shifting decimal point to the left by two place)

(j) $19.678 \div 100 = 0.19678$

(On shifting decimal point to the left by two place)

(k) $1.376 \div 100 = 0.01376$

(On shifting decimal point to the left by two place)

(l) $192.68 \div 100 = 1.9268$

(On shifting decimal point to the left by two place)

2. Find the product :

(a) $7.64 \div 1000 = 0.00764$

(On shifting decimal point to the left by three places)

(b) $41.679 \div 1000 = 0.041679$

(On shifting decimal point to the left by three places)

(c) $3.718 \div 1000 = 0.003718$

(On shifting decimal point to the left by three places)

(d) $0.718 \div 1000 = 0.000718$

(On shifting decimal point to the left by three places)

(e) $1.674 \div 1000 = 0.001674$

(On shifting decimal point to the left by three places)

(f) $0.0782 \div 1000 = 0.0000782$

(On shifting decimal point to the left by three places)

(g) $18.37 \div 10000 = 0.001837$

(On shifting decimal point to the left by four places)

(h) $6.548 \div 10000 = 0.0006548$

(On shifting decimal point to the left by four places)

(i) $0.0123 \div 10000 = 0.00000123$

(On shifting decimal point to the left by four places)

(j) $91.678 \div 10000 = 0.0091678$

(On shifting decimal point to the left by four places)

(k) $0.5624 \div 10000 = 0.00005624$

(On shifting decimal point to the left by four places)

(l) $0.0064 \div 10000 = 0.0000064$

(On shifting decimal point to the left by

3. (a) 23 by 5

$= 23 \div 5$

$= \frac{23}{5} = 4.6$

Hence, $23 \div 5 = 4.6$

$$\begin{array}{r|l} 5 & 23 \\ -20 & \hline 30 & 4.6 \\ -30 & \\ \hline \times & \end{array}$$

(b) 467 by 4

$= 467 \div 4$

$= \frac{467}{4} = 116.75$

Hence, $467 \div 4 = 116.75$

$$\begin{array}{r|l} 5 & 467 \\ -4 & \hline 06 & 116.75 \\ -4 & \\ \hline 27 & \\ -24 & \\ \hline 30 & \\ -28 & \\ \hline 20 & \\ -20 & \\ \hline \times & \end{array}$$

(c) 125 by 8

$= 125 \div 8$

$= \frac{125}{8} = 15.625$

Hence, $125 \div 8 = 15.625$

$$\begin{array}{r|l} 8 & 125 \\ -8 & \hline 45 & 15.625 \\ -40 & \\ \hline 50 & \\ -48 & \\ \hline 20 & \\ -16 & \\ \hline 40 & \\ -40 & \\ \hline \times & \end{array}$$

(d) 56 by 5

$= 56 \div 5$

$= \frac{56}{5} = 11.2$

Hence, $56 \div 5 = 11.2$

$$\begin{array}{r|l} 5 & 56 \\ -5 & \hline 06 & 11.2 \\ -5 & \\ \hline 10 & \\ -10 & \\ \hline \times & \end{array}$$

(e) 712 by 12

$= 712 \div 12$

$= \frac{712}{12} = 59.33$

Hence, $712 \div 12 = 59.3333$

$$\begin{array}{r|l} 12 & 712 \\ -60 & \hline 112 & 59.33 \\ -108 & \\ \hline 40 & \\ -36 & \\ \hline 40 & \\ -36 & \\ \hline 40 & \\ -36 & \\ \hline 4 & \end{array}$$

(f) 913 by 25

$= 913 \div 25$

$= \frac{913}{25} = 36.52$

Hence, $913 \div 25 = 36.52$

$$\begin{array}{r|l} 25 & 913 \\ -75 & \\ \hline 163 & \\ -150 & \\ \hline 130 & \\ -125 & \\ \hline 50 & \\ -50 & \\ \hline \times & \end{array} \quad 36.52$$

(g) 163 by 12

$= 163 \div 12$

$= \frac{163}{12} = 13.5833$

Hence, $163 \div 12 = 13.5833$

$$\begin{array}{r|l} 12 & 163 \\ -12 & \\ \hline 43 & \\ -36 & \\ \hline 70 & \\ -60 & \\ \hline 100 & \\ -96 & \\ \hline 40 & \\ -36 & \\ \hline 4 & \end{array} \quad 13.5833$$

(h) 678 by 18

$= 678 \div 18$

$= \frac{678}{18} = 37.6666$

Hence, $678 \div 18 = 37.6666$

$$\begin{array}{r|l} 18 & 678 \\ -54 & \\ \hline 138 & \\ -126 & \\ \hline 120 & \\ -108 & \\ \hline 120 & \\ -108 & \\ \hline 120 & \\ -108 & \\ \hline 120 & \\ -108 & \\ \hline 12 & \end{array} \quad 37.6666$$

(i) 162 by 15

$= 162 \div 15$

$= \frac{162}{15} = 10.8$

Hence, $162 \div 15 = 10.8$

$$\begin{array}{r|l} 15 & 162 \\ -15 & \\ \hline 120 & \\ -120 & \\ \hline \times & \end{array} \quad 10.8$$

4. (a) 76.8 by 4

$$\begin{array}{r|l} 4 & 76.8 \\ -4 & \\ \hline 36 & \\ -36 & \\ \hline 8 & \\ -8 & \\ \hline \times & \end{array} \quad 19.2$$

Hence, $768 \div 4 = 19.2$

(b) 6.08 by 8

$$\begin{array}{r|l} 8 & 6.08 \\ -56 & \\ \hline 48 & \\ -48 & \\ \hline \times & \end{array} \quad 0.76$$

Hence, $6.08 \div 8 = 0.76$

(c) 117.6 by 21

$$\begin{array}{r|l} 21 & 117.6 \\ -105 & \\ \hline 126 & \\ -126 & \\ \hline \times & \end{array} \quad 5.6$$

Hence, $117.6 \div 21 = 5.6$

(d) 1.236 by 6

$$\begin{array}{r|l} 6 & 1.236 \\ -12 & \\ \hline 36 & \\ -36 & \\ \hline \times & \end{array} \quad 0.206$$

Hence, $1.236 \div 6 = 0.206$

(e) 1.625 by 25

$$\begin{array}{r|l} 25 & 1.625 \\ -150 & \\ \hline 125 & \\ -125 & \\ \hline \times & \end{array} \quad 0.065$$

Hence, $1.625 \div 25 = 0.065$

(f) 60.48 by 12

$$\begin{array}{r|l} 12 & 60.48 \\ -60 & \\ \hline 48 & \\ -48 & \\ \hline \times & \end{array} \quad 5.04$$

Hence, $60.48 \div 12 = 5.04$

(g) 217.44 by 18

$$\begin{array}{r|l} 18 & 217.44 \\ -18 & \\ \hline 37 & \\ -36 & \\ \hline 144 & \\ -144 & \\ \hline \times & \end{array} \quad 12.08$$

Hence, $217.44 \div 18 = 12.08$

(h) 19.2 by 8

$$\begin{array}{r|l} 8 & 19.2 \\ -16 & \\ \hline 32 & \\ -32 & \\ \hline \times & \end{array} \quad 2.4$$

Hence, $19.2 \div 8 = 2.4$

(i) 13.6 by 4

$$\begin{array}{r|l} 4 & 13.6 \\ -12 & \\ \hline 16 & \\ -16 & \\ \hline \times & \end{array} \quad 3.4$$

Hence, $13.6 \div 4 = 3.4$

5. (a) 718.6 by 200

$$= \frac{718.6}{200} = \frac{718.6}{2\times100}$$

$$= \frac{718.6}{2}\times\frac{1}{100}$$

$$= \frac{7.186}{2} = 3.593$$

Hence, $718.6 \div 200 = 3.593$

$$\begin{array}{r|l} 2 & 7.186 \\ -6 & \\ \hline 11 & \\ -10 & \\ \hline 18 & \\ -18 & \\ \hline 6 & \\ -6 & \\ \hline \times & \end{array} \quad 3.593$$

(b) 156.8 by 40

$$= \frac{156.8}{40} = \frac{156.8}{4\times10}$$

$$= \frac{156.8}{4}\times\frac{1}{10}$$

$$= \frac{15.68}{4} = 3.92$$

Hence, $156.8 \div 40 = 3.92$

$$\begin{array}{r|l} 4 & 15.68 \\ -12 & \\ \hline 36 & \\ -36 & \\ \hline 8 & \\ -8 & \\ \hline \times & \end{array} \quad 3.92$$

(c) 6.25 by 200

$$= \frac{6.25}{200} = \frac{6.25}{2\times100}$$

$$= \frac{6.25}{2}\times\frac{1}{100}$$

$$= \frac{0.0625}{2} = 0.03125$$

Hence, $6.25 \div 200 = 0.03125$

$$\begin{array}{r|l} 2 & 0.0625 \\ -6 & \\ \hline 2 & \\ -2 & \\ \hline 5 & \\ -4 & \\ \hline 10 & \\ -10 & \\ \hline \times & \end{array} \quad 0.03125$$

(d) 403.8 by 30

$$= \frac{403.8}{30} = \frac{403.8}{3\times10}$$

$$= \frac{403.8}{3}\times\frac{1}{10}$$

$$= \frac{40.38}{3} = 13.46$$

Hence, $403.8 \div 30 = 13.46$

$$\begin{array}{r|l} 3 & 40.38 \\ -3 & \\ \hline 10 & \\ -9 & \\ \hline 13 & \\ -12 & \\ \hline 18 & \\ -18 & \\ \hline \times & \end{array} \quad 13.46$$

(e) 18.08 by 800

$$= \frac{18.08}{800} = \frac{18.08}{8\times100}$$

$$= \frac{18.08}{8}\times\frac{1}{100}$$

$$= \frac{0.1808}{8} = 0.0226$$

Hence, $18.08 \div 800 = 0.0226$

$$\begin{array}{r|l} 8 & 0.1808 \\ -16 & \\ \hline 20 & \\ -16 & \\ \hline 48 & \\ -48 & \\ \hline \times & \end{array} \quad 0.0226$$

(f) 1.25 by 500

$$= \frac{1.25}{500} = \frac{1.25}{5\times100}$$

$$= \frac{1.25}{5}\times\frac{1}{100}$$

$$= \frac{0.0125}{5} = 0.0025$$

Hence, $1.25 \div 500 = 0.0025$

$$\begin{array}{r|l} 5 & 1.25 \\ -10 & \\ \hline 25 & \\ -25 & \\ \hline \times & \end{array} \quad 0.0025$$

(g) 12.8 by 500

$$= \frac{12.8}{500} = \frac{12.8}{5\times100}$$

$$= \frac{12.8}{5}\times\frac{1}{100}$$

$$= \frac{0.128}{5} = 0.0256$$

Hence, $12.8 \div 500 = 0.0256$

$$\begin{array}{r|l} 5 & 0.128 \\ -10 & \\ \hline 28 & \\ -25 & \\ \hline 30 & \\ -30 & \\ \hline \times & \end{array} \quad 0.0256$$

(h) 3.969 by 300

$$= \frac{3.969}{300} = \frac{3.969}{3\times100}$$

$$= \frac{3.969}{3}\times\frac{1}{100}$$

$$= \frac{0.03969}{3} = 0.01323$$

Hence, $3.969 \div 300 = 0.01323$

$$\begin{array}{r|l} 3 & 0.03969 \\ -3 & \\ \hline 9 & \\ -9 & \\ \hline 6 & \\ -6 & \\ \hline 9 & \\ -9 & \\ \hline \times & \end{array} \quad 0.01323$$

(i) 12.6 by 400

$$= \frac{12.6}{400} = \frac{12.6}{4\times100}$$

$$= \frac{12.6}{4}\times\frac{1}{100}$$

$$= \frac{0.126}{4} = 0.0315$$

Hence, $12.6 \div 400 = 0.0315$

$$\begin{array}{r|l} 4 & 0.126 \\ -12 & \\ \hline 6 & \\ -4 & \\ \hline 20 & \\ -20 & \\ \hline \times & \end{array} \quad 0.0315$$

6. (a) 6.612 by 0.012

$$= 6.612 \div 0.012$$

$$= \frac{6.612}{0.012}\times\frac{1000}{1000}$$

$$= \frac{6612}{12} = 551$$

Hence, $6.612 \div 0.012 = 551$

$$\begin{array}{r|l} 12 & 6612 \\ -60 & \\ \hline 61 & \\ -60 & \\ \hline 12 & \\ -12 & \\ \hline \times & \end{array} \quad 551$$

(b) 0.076 by 0.19

$$= \frac{0.076}{0.19}\times\frac{100}{100}$$

$$= \frac{7.6}{19} = 0.4$$

Hence, $0.076 \div 1.9 = 0.4$

$$\begin{array}{r|l} 19 & 7.6 \\ -7.6 & \\ \hline \times & \end{array} \quad 0.4$$

(c) 0.8085 by 0.35

$= 0.8085 \div 0.35$

$= \frac{0.8085}{0.35} \times \frac{100}{100}$

$= \frac{80.85}{35}$

$35\overline{)80.85}(2.31$
-70
108
-105
35
-35
$\times$

Hence, $0.8085 \div 0.35 = 2.31$

(d) 16.578 by 5.4

$= 16.578 \div 5.4$

$= \frac{16.578}{5.4} \times \frac{10}{10}$

$= \frac{165.78}{54} = 3.07$

$54\overline{)165.78}(3.07$
-162
378
-378
$\times$

Hence, $16.578 \div 5.4 = 3.07$

(e) 0.00639 by 2.13

$= 0.00639 \div 2.13$

$= \frac{0.00639}{2.13} \times \frac{100}{100}$

$= \frac{0.639}{213} = 0.003$

$213\overline{)0.639}(0.003$
-639
$\times$

Hence, $0.00639 \div 21.3 = 0.003$

(f) 0.076 by 0.19

$= 0.076 \div 0.19$

$= \frac{0.076}{0.19} \times \frac{100}{100}$

$= \frac{7.6}{19} = 0.4$

$19\overline{)7.6}(0.4$
-7.6
$\times$

Hence, $7.6 \div 19 = 0.4$

(g) 0.87976 by 0.035

$= 0.87976 \div 0.035$

$= \frac{0.87976}{0.035} \times \frac{1000}{1000}$

$= \frac{879.76}{35} = 25.136$

$35\overline{)879.76}(25.136$
-70
179
-175
47
-35
12

Hence, $0.87976 \div 0.035 = 25.136$

(h) 0.3564 by 0.27

$= 0.3564 \div 0.27$

$= \frac{0.3564}{0.27} \times \frac{100}{100}$

$= \frac{35.64}{27} = 1.32$

$27\overline{)35.64}(1.32$
-27
86
-81
54
-54
$\times$

Hence, $0.3564 \div 0.27 = 1.32$

(i) 25.345 by 25

$= 25.345 \div 25$

$= \frac{25.345}{25} = 1.0138$

Hence, $25.345 \div 25 = 1.0138$

$25\overline{)25.345}(1.0138$
-25
34
-25
95
-75
200
-200
$\times$

Exercise-3D

1. Cost of a pen = ₹ 15.45

∴ Cost of 15 pens = ₹ 15×15.45

= ₹ 231.75

Hence, the cost of 15 pens is ₹ 231.75.

2. Cost of a book = ₹ 85.70

∴ Cost of 85 books = ₹ 85×85.70

= ₹ 7284.50

Hence, the cost of 85 such books is ₹ 7284.50.

3. Cost of a toy car = ₹ 56.95

∴ Cost of 34 toy cars = ₹ $34 \times$ 56.95

= ₹ 1936.30

Hence, the cost of 34 such toy cars is ₹ 1936.30.

4. Cost one kg sugar = ₹ 18.49

∴ Cost of 27 kg sugar = ₹ 27×18.49

= ₹ 499.23

Hence, the cost of 27 kg sugar is ₹ 499.23.

5. Cost of a table fan = ₹ 1078.56

∴ Cost of 19 such table fans = ₹ 19×1078.56

= ₹ 20492.64

Hence, the cost of 19 such table fans is ₹ 20492.64.

6. Cost of 1 kg desi ghee = ₹ 195.18

∴ Cost of 34 kg desi ghee = ₹ 34×195.18

= ₹ 6636.12

Hence, the cost of 34 kg desi ghee is ₹ 6636.12.

7. Capacity of a tin = $15.5\,l$

∴ Capacity of 39 such tins = (39×15.5) litres

= 604.5 litres

Hence, 604.5 litres of oil-can hold 39 such tins.

8. Total cost of 48 calculators = ₹ 4722.24

∴ the cost of one calculator = ₹ $4722.24 \div 48$

= ₹ 98.38

$$
\begin{array}{r}
48\overline{)4722.24}(98.38 \\
-432 \\
\hline
402 \\
-384 \\
\hline
182 \\
-144 \\
\hline
384 \\
-384 \\
\hline
\times
\end{array}
$$

Hence, the cost of one calculator is ₹ 98.38.

9. Total cost of 68 chairs = ₹ 9231.68

∴ Cost of one chair = ₹ 9231.68 ÷ 68

= ₹ 135.76

$$
\begin{array}{r}
68\overline{)9231.68}(135.76 \\
-68 \\
\hline
243 \\
-204 \\
\hline
391 \\
-340 \\
\hline
516 \\
-476 \\
\hline
408 \\
-408 \\
\hline
\times
\end{array}
$$

Hence, the cost of one chair is ₹ 135.76.

10. Cost of 35 wall clock = ₹ 39397.05

∴ Cost of one wall clock = ₹ (39397.05 ÷ 35) = ₹ 1125.63

$$
\begin{array}{r}
35\overline{)39397.05}(1125.63 \\
-35 \\
\hline
43 \\
-35 \\
\hline
89 \\
-70 \\
\hline
197 \\
-175 \\
\hline
220 \\
-210 \\
\hline
105 \\
-105 \\
\hline
\times
\end{array}
$$

Hence, the cost of one wall clock is ₹ 1125.63.

11. A tin holds of dalda ghee = 16.5 litres

Total capacity of dalda ghee = 3349.5 litres

∴ Number of tins = $\frac{\text{Total capacity of dalda ghee}}{\text{A tin holds of dalda ghee}}$

= (3349.5 ÷ 16.5) = 203

$$
\begin{array}{r}
16.5\overline{)3349.5}(203 \\
-330 \\
\hline
495 \\
-495 \\
\hline
\times
\end{array}
$$

Hence, 203 such tins are required to hold 3349.5 litres of dalda ghee.

12. Weight of 32 bags of rice = 939.936 kg

So, weight of one bag of rice = (939.936 ÷ 32) kg

= 29.373 kg

$$
\begin{array}{r}
32\overline{)939.936}(29.373 \\
-64 \\
\hline
299 \\
-288 \\
\hline
119 \\
-96 \\
\hline
233 \\
-224 \\
\hline
96 \\
-96 \\
\hline
\times
\end{array}
$$

Hence, weight of one bag of rice is 29.373 kg.

MCQS

1. (a) **2.** (b) **3.** (c) **4.** (a) **5.** (b)

6. (a) **7.** (b) **8.** (b) **9.** (c) **10.** (a)

11. (c) **12.** (c)

CHAPTER 4 : FRACTIONS

Exercise-4A

1. (a) $\frac{\mathbf{85}}{\mathbf{105}}$

HCF of 85 and 105 is 5.

So, divide the numerator and denominator by 5. We get,

$$\frac{85 \div 5}{105 \div 5} = \frac{17}{21}$$

(b) $\frac{\mathbf{-48}}{\mathbf{144}}$

HCF of 48 and 144 is 48.

So, divide the numerator and denominator by 48. We get,

$$\frac{-48 \div 48}{144 \div 48} = \frac{-1}{3}$$

(c) $\frac{\mathbf{35}}{\mathbf{120}}$

HCF of 35 and 120 is 5.

So, divide the numerator and denominator by 5. We get,

$$\frac{35 \div 5}{120 \div 5} = \frac{7}{24}$$

(d) $\frac{60}{96}$

HCF of 60 and 96 is 12.

So, divide the numerator and denominator by 12. We get,

$$\frac{60\div 12}{96\div 12}=\frac{5}{8}$$

(e) $\frac{142}{180}$

HCF of 142 and 180 is 2.

So, divide the numerator and denominator by 2. We get,

$$\frac{142\div 2}{180\div 2}=\frac{71}{90}$$

(f) $\frac{75}{220}$

HCF of 75 and 220 is 5.

So, divide the numerator and denominator by 5. We get,

$$\frac{75\div 5}{220\div 5}=\frac{15}{44}$$

(g) $\frac{-45}{150}$

HCF of 45 and 150 is 15.

So, divide the numerator and denominator by 15. We get,

$$\frac{-45\div 15}{150\div 15}=\frac{-3}{10}$$

(h) $\frac{65}{117}$

HCF of 65 and 117 is 13.

So, divide the numerator and denominator by 13. We get,

$$\frac{65\div 13}{117\div 13}=\frac{5}{9}$$

2. (a) $3\frac{1}{4}-2\frac{2}{5}+1\frac{1}{10}$

$$=\frac{3\times 4+1}{4}-\frac{2\times 5+2}{5}+\frac{1\times 10+1}{10}$$

$$=\frac{12+1}{4}-\frac{10+2}{5}+\frac{10+1}{10}$$

$$=\frac{13}{4}-\frac{12}{5}+\frac{11}{10}$$

$$=\frac{65-48+22}{20}$$

(∵ LCM of 4, 5 and 10 is 20.)

$$=\frac{87-48}{20}$$

$$=\frac{39}{20}=1\frac{19}{20}$$

(b) $7\frac{5}{6}-4\frac{3}{8}+1\frac{5}{12}$

$$=\frac{7\times 6+5}{6}-\frac{4\times 8+3}{8}+\frac{1\times 12+5}{12}$$

$$=\frac{42+5}{6}-\frac{32+3}{8}+\frac{12+5}{12}$$

$$=\frac{47}{6}-\frac{35}{8}+\frac{17}{12}$$

$$=\frac{188-105+34}{24}$$

(∵ LCM of 6, 8 and 12 is 24.)

$$=\frac{222-105}{24}$$

$$=\frac{117}{24}=4\frac{21}{24}$$

(c) $4\frac{1}{3}+2\frac{5}{12}-5\frac{1}{6}$

$$=\frac{4\times 3+1}{3}+\frac{2\times 12+5}{12}-\frac{5\times 6+1}{6}$$

$$=\frac{12+1}{3}+\frac{24+5}{12}-\frac{30+1}{6}$$

$$=\frac{13}{3}+\frac{29}{12}-\frac{31}{6}$$

$$=\frac{52+29-62}{12}$$

(∵ LCM of 3, 12 and 6 is 12.)

$$=\frac{81-62}{12}$$

$$=\frac{19}{12}=1\frac{7}{12}$$

(d) $5-3\frac{1}{7}+2\frac{3}{14}$

$$=\frac{5}{1}-\frac{3\times 7+1}{7}+\frac{2\times 14+3}{14}$$

$$=\frac{5}{1}-\frac{21+1}{7}+\frac{28+3}{14}$$

$$=\frac{70-44+31}{14}$$

(∵ LCM of 1, 14 and 7 is 14.)

$$=\frac{101-44}{14}$$

$$=\frac{57}{14}=4\frac{1}{14}$$

(e) $3\frac{1}{5} + 2\frac{1}{10} - 1\frac{1}{2} - \frac{1}{4}$

$$= \frac{3\times5+1}{5} + \frac{2\times10+1}{10} - \frac{1\times2+1}{2} - \frac{1}{4}$$

$$= \frac{15+1}{5} + \frac{20+1}{10} - \frac{2+1}{2} - \frac{1}{4}$$

$$= \frac{16}{5} + \frac{21}{10} - \frac{3}{2} - \frac{1}{4}$$

$$= \frac{64+42-30-5}{20}$$

(∵ LCM of 2, 4, 5 and 10 is 20.)

$$= \frac{106-35}{20}$$

$$= \frac{71}{20} = 3\frac{11}{20}$$

(f) $6\frac{1}{10} - 3\frac{2}{5} - 2\frac{1}{6} + 3$

$$= \frac{6\times10+1}{10} - \frac{3\times5+2}{5} - \frac{2\times6+1}{6} + \frac{3}{1}$$

$$= \frac{60+1}{10} - \frac{15+2}{5} - \frac{12+1}{6} + \frac{3}{1}$$

$$= \frac{61}{10} - \frac{17}{5} - \frac{13}{6} + \frac{3}{1}$$

$$= \frac{183-102-65+90}{30}$$

(∵ LCM of 1, 5, 6 and 10 is 30.)

$$= \frac{273-167}{30}$$

$$= \frac{106}{30} = \frac{53}{15} = 3\frac{11}{15}$$

3. (a) $\frac{5}{8}$ **and** $\frac{4}{7}$

By cross-multiplication, we have

$5\times7 = 35$

$8\times4 = 32$

Since, $35 > 32$

So, $\frac{5}{8} > \frac{4}{7}$

(b) $\frac{4}{9}$ **and** $\frac{6}{13}$

By cross-multiplication, we have

$4\times13 = 52$

$6\times9 = 54$

Since, $52 < 54$

So, $\frac{4}{9} < \frac{6}{13}$

(c) $\frac{-6}{13}$ **and** $\frac{-4}{13}$

$13\times-4 = -52$

Since, $-6 < -4$

So, $\frac{-6}{13} < \frac{-4}{13}$

(d) $\frac{5}{16}$ **and** $\frac{3}{8}$

By cross-multiplication, we have

$5\times8 = 40$

$3\times16 = 48$

Since, $40 < 48$

So, $\frac{5}{16} < \frac{3}{8}$

(e) $\frac{-4}{19}$ **and** $\frac{-3}{17}$

By cross-multiplication, we have

$-4\times17 = -68$

$-3\times19 = -57$

Since, $-68 < -57$

So, $\frac{-4}{19} < \frac{-3}{17}$

(f) $\frac{11}{12}$ **and** $\frac{14}{16}$

By cross-multiplication, we have

$11\times16 = 176$

$14\times12 = 168$

Since, $176 > 168$

So, $\frac{11}{12} > \frac{14}{16}$

4. (a) $\frac{2}{3}, \frac{5}{6}, \frac{7}{18}$ **and** $\frac{1}{24}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 3, 6, 18 and 24 = 72

$\therefore \quad \frac{2}{3} = \frac{48}{72}; \frac{5}{6} = \frac{60}{72}; \frac{7}{18} = \frac{28}{72}; \frac{1}{24} = \frac{3}{72}$

$\because \quad 3 < 28 < 48 < 60$

$\therefore \quad \frac{3}{72} < \frac{28}{72} < \frac{48}{72} < \frac{60}{72}$

or $\frac{1}{24} < \frac{7}{18} < \frac{2}{3} < \frac{5}{6}$

2	3, 6, 18, 24
2	3, 3, 9, 12
2	3, 3, 9, 6
3	3, 3, 9, 3
3	1, 1, 3, 1
	1, 1, 1, 1

(b) $\frac{3}{4}, \frac{7}{8}, \frac{17}{32}$ **and** $\frac{7}{16}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 4, 8, 32 and 16 = 32

$\therefore \quad \frac{3}{4}=\frac{3\times 8}{4\times 8}=\frac{24}{32}; \frac{7}{8}=\frac{7\times 4}{8\times 4}=\frac{28}{32};$

$\frac{17}{32}=\frac{17\times 1}{32\times 1}=\frac{17}{32}; \frac{7}{6}=\frac{7\times 2}{16\times 2}=\frac{14}{32}$

2	4, 8, 32, 16
2	2, 4, 16, 8
2	1, 2, 8, 4
2	1, 1, 4, 2
2	1, 1, 2, 1
	1, 1, 1, 1

$\because \quad 14 < 17 < 24 < 28$

$\therefore \quad \frac{14}{32} < \frac{17}{32} < \frac{24}{32} < \frac{28}{32}$

or $\quad \frac{7}{16} < \frac{17}{32} < \frac{7}{8} < \frac{3}{4}$

(c) $\frac{3}{5}, \frac{3}{10}, \frac{9}{14}$ **and** $\frac{14}{35}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 5, 10, 14 and 35 = 70

$\therefore \quad \frac{3}{5}=\frac{3\times 14}{5\times 14}=\frac{42}{70}; \frac{3}{10}=\frac{3\times 7}{10\times 7}=\frac{21}{70};$

$\frac{9}{14}=\frac{9\times 5}{14\times 5}=\frac{45}{70}; \frac{14}{35}=\frac{14\times 2}{35\times 2}=\frac{28}{70}$

2	5, 10, 14, 35
5	5, 5, 7, 35
7	1, 1, 7, 7
	1, 1, 1, 1

$\because \quad 21 < 28 < 42 < 45$

$\therefore \quad \frac{21}{70} < \frac{28}{70} < \frac{42}{70} < \frac{45}{70}$

or $\quad \frac{3}{10} < \frac{14}{35} < \frac{3}{5} < \frac{9}{14}$

(d) $\frac{7}{18}, \frac{5}{12}, \frac{19}{21}$ **and** $\frac{25}{36}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 18, 12, 21 and 36 = 252

$\therefore \quad \frac{7}{18}=\frac{7\times 14}{18\times 14}=\frac{98}{252}; \frac{5}{12}=\frac{5\times 21}{12\times 21}=\frac{105}{252};$

$\frac{19}{21}=\frac{19\times 12}{21\times 12}=\frac{228}{252}; \frac{25}{36}=\frac{25\times 7}{36\times 7}=\frac{175}{252}$

2	18, 12, 21, 36
2	9, 6, 21, 18
3	9, 3, 21, 9
3	3, 1, 7, 3
7	1, 1, 7, 1
	1, 1, 1, 1

$\because \quad 98 < 105 < 175 < 228$

$\therefore \quad \frac{98}{252} < \frac{105}{252} < \frac{175}{252} < \frac{228}{252}$

or $\quad \frac{7}{18} < \frac{5}{12} < \frac{25}{36} < \frac{19}{21}$

5. (a) $\frac{11}{12}, \frac{5}{9}, \frac{3}{4}$ **and** $\frac{1}{6}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 12, 9, 4 and 6 = 36

$\therefore \quad \frac{11}{12}=\frac{11\times 3}{12\times 3}=\frac{33}{36}; \frac{5}{9}=\frac{5\times 4}{9\times 4}=\frac{20}{36};$

$\frac{3}{4}=\frac{3\times 9}{4\times 9}=\frac{27}{36}$ and $\frac{1}{6}=\frac{1\times 6}{6\times 6}=\frac{6}{36}$

2	12, 9, 4, 6
2	6, 9, 2, 3
3	3, 9, 1, 3
3	1, 3, 1, 1
	1, 1, 1, 1

$\because \quad 33 > 27 > 20 > 6$

$\therefore \quad \frac{33}{36} > \frac{27}{36} > \frac{20}{36} > \frac{6}{36}$

or $\quad \frac{11}{12} > \frac{3}{4} > \frac{5}{9} > \frac{1}{6}$

(b) $\frac{3}{25}, \frac{1}{5}, \frac{7}{20}$ **and** $\frac{4}{15}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 25, 5, 20 and 15 = 300

$\therefore \quad \frac{3}{25}=\frac{3\times 12}{25\times 12}=\frac{36}{300}; \frac{1}{5}=\frac{1\times 60}{5\times 60}=\frac{60}{300};$

$\frac{7}{20}=\frac{7\times 15}{20\times 15}=\frac{105}{300}; \frac{4}{15}=\frac{4\times 20}{15\times 20}=\frac{80}{300}$

2	25, 5, 20, 15
2	25, 5, 10, 15
3	25, 5, 5, 15
5	25, 5, 5, 5
5	5, 1, 1, 1
	1, 1, 1, 1

$\because \quad 105 > 80 > 60 > 36$

$\therefore \quad \frac{105}{300} > \frac{80}{300} > \frac{60}{300} > \frac{36}{300}$

or $\quad \frac{7}{20} > \frac{4}{15} > \frac{1}{5} > \frac{3}{25}$

(c) $\frac{7}{18}, \frac{5}{12}, \frac{6}{24}$ **and** $\frac{3}{10}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 18, 12, 24 and 10 = 360

$\therefore \quad \frac{7}{18}=\frac{7\times 20}{18\times 20}=\frac{140}{360}; \frac{5}{12}=\frac{5\times 30}{12\times 30}=\frac{150}{360};$

$\frac{6}{24}=\frac{6\times 15}{24\times 15}=\frac{90}{360}; \frac{3}{10}=\frac{3\times 36}{10\times 36}=\frac{108}{360}$

2	18, 12, 24, 10
2	9, 6, 12, 5
2	9, 3, 6, 5
3	9, 3, 3, 5
3	3, 1, 1, 5
5	1, 1, 1, 5
	1, 1, 1, 1

$\because \quad 150 > 140 > 108 > 90$

$\therefore \quad \frac{150}{360} > \frac{140}{360} > \frac{108}{360} > \frac{90}{360}$

or $\quad \frac{5}{12} > \frac{7}{18} > \frac{3}{10} > \frac{6}{24}$

(d) $\frac{5}{14}, \frac{3}{7}, \frac{13}{28}$ **and** $\frac{10}{35}$

First convert the given fractions into like fractions. For this we need to find out the LCM of the denominators.

LCM of 14, 7, 28 and 35 = 140

$\therefore \quad \frac{5}{14} = \frac{5\times10}{14\times10} = \frac{50}{140}; \frac{3}{7} = \frac{3\times20}{7\times20} = \frac{60}{140};$

$\frac{13}{28} = \frac{13\times5}{28\times5} = \frac{65}{140}$ and $\frac{10}{35} = \frac{10\times4}{35\times4} = \frac{40}{140}$

2	14, 7, 28, 35
2	7, 7, 14, 35
5	7, 7, 7, 35
7	7, 7, 7, 7
	1, 1, 1, 1

$\because \quad 65 > 60 > 50 > 40$

$\therefore \quad \frac{65}{140} > \frac{60}{140} > \frac{50}{140} > \frac{40}{140}$

or $\frac{13}{28} > \frac{3}{7} > \frac{5}{14} > \frac{10}{35}$

6. Required number $= 7\frac{2}{5} - 5\frac{1}{4}$

$= \frac{7\times5+2}{5} - \frac{5\times4+1}{4}$

$= \frac{35+2}{5} - \frac{20+1}{4}$

$= \frac{37}{5} - \frac{21}{4}$

$= \frac{37\times4 - 21\times5}{20}$

$= \frac{148-105}{20} = \frac{43}{20} = 2\frac{3}{20}$

Hence, $2\frac{3}{20}$ should be added.

7. Required number $= 10\frac{1}{14} - 9\frac{2}{7}$

$= \frac{10\times14+1}{14} - \frac{9\times7+2}{7}$

$= \frac{140+1}{14} - \frac{63+2}{7}$

$= \frac{141}{14} - \frac{65}{7}$

$= \frac{141-130}{14} = \frac{11}{14}$

Hence, $\frac{11}{14}$ should be added.

8. Required number $= 5\frac{2}{3} - 2\frac{1}{5}$

$= \frac{5\times3+2}{3} - \frac{2\times5+1}{5}$

$= \frac{15+2}{3} - \frac{10+1}{5}$

$= \frac{17}{3} - \frac{11}{5}$

$= \frac{85-53}{15} = \frac{52}{15} = 3\frac{7}{15}$

Hence, $3\frac{7}{15}$ should be subtracted.

9. Cost of a English book = ₹ $35\frac{1}{5}$ = ₹ $\frac{176}{5}$

Cost of a Hindi book = ₹ $32\frac{4}{5}$ = ₹ $\frac{164}{5}$

Since, ₹ $\frac{176}{5} > \frac{164}{5}$

So, English book is costlier than Hindi book and difference

$= ₹\left(\frac{176}{5} - \frac{164}{5}\right)$

$= ₹\frac{12}{5} = ₹ 2\frac{2}{5}$

Hence, English book is costlier than Hindi book by ₹ $2\frac{2}{5}$.

10. Total time of studies = $5\frac{2}{3}$ hours = $\frac{17}{3}$ hours

Devoted time for Maths and English = $2\frac{4}{5}$ hours

$= \frac{14}{5}$ hours

So, devoted time for other subject

$= \left(\frac{17}{3} - \frac{14}{5}\right)$ hours

$= \left(\frac{85-42}{15}\right)$ hours

$= \frac{43}{15}$ hours = $3\frac{13}{5}$ hours

11. Total length of a rope = 7 m

Length of cut piece = $4\frac{3}{5}$ m

Remaining length of piece = $\left(7 - 4\frac{3}{5}\right)$ m

$= \left(7 - \frac{23}{7}\right)$ m = $\left(\frac{35-23}{5}\right)$ m

$= \frac{12}{5}$ m = $2\frac{2}{5}$ m

Hence, $2\frac{2}{5}$ m is the length of remaining piece.

12. Hema's height = $1\frac{2}{5}$ m = $\frac{7}{5}$ m

Shama's height = $1\frac{3}{5}$ m = $\frac{8}{5}$ m

Since, $\frac{7}{5}\text{ m} < \frac{8}{5}\text{ m}$

So, Shama's height is longer than Hema's height

and difference $= \left(\frac{8}{5} - \frac{7}{5}\right)\text{ m} = \frac{1}{5}\text{ m}$

Hence, Shama's height is longger than Hema's height by $\frac{1}{5}$ m.

13. Let the orange be considered as 1.

Part of the orange Renu ate $\frac{3}{5}$

$\therefore$ Dinu ate $= 1 - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}$ orange

$\because$ $3 > 2$

$\therefore$ $\frac{3}{5} > \frac{2}{5}$

Hence, Renu had a largr share.

By how much : $\frac{3}{5} - \frac{2}{5} = \frac{1}{5}$

i.e. Renu ate $\frac{1}{5}$ part more than Dinu.

14. Width of the picture $= 8\frac{3}{6}\text{ cm} = \frac{51}{6}\text{ cm}$

Width of the frame $= 8\frac{3}{10}\text{ cm} = \frac{83}{10}\text{ cm}$

Width of the picture to be trimmed $= \left(\frac{51}{6} - \frac{83}{10}\right)\text{cm}$

$= \left(\frac{510-498}{60}\right)\text{cm}$

$= \frac{12}{60}\text{ cm} = \frac{1}{5}\text{ cm}$

Exercise-4B

1. Find the product :

(a) $\mathbf{2\frac{4}{15} \times 20}$

$= \left(\frac{2\times15+4}{15}\right)\times 20$

$= \left(\frac{30+4}{15}\right)\times 20 = \frac{34}{15}\times 20$

$= \frac{136}{3} = 45\frac{1}{3}$

(b) $\mathbf{5\frac{5}{6} \times 1\frac{5}{7}}$

$= \left(\frac{5\times6+5}{6}\right)\times\left(\frac{1\times7+5}{7}\right)$

$= \left(\frac{30+5}{6}\right)\times\left(\frac{7+5}{7}\right)$

$= \frac{35}{6}\times\frac{12}{7}$

$= 5\times 2 = 10$

(c) $\mathbf{9\frac{1}{2} \times 1\frac{9}{19}}$

$= \left(\frac{9\times2+1}{2}\right)\times\left(\frac{1\times19+9}{19}\right)$

$= \left(\frac{18+1}{2}\right)\times\left(\frac{19+9}{19}\right)$

$= \frac{19}{2}\times\frac{28}{19}$

$= 14$

(d) $\mathbf{2\frac{1}{8} \times 1\frac{13}{51}}$

$= \left(\frac{2\times8+1}{8}\right)\times\left(\frac{1\times51+13}{51}\right)$

$= \left(\frac{16+1}{8}\right)\times\left(\frac{51+13}{51}\right)$

$= \frac{17}{8}\times\frac{64}{51}$

$= \frac{8}{3} = 2\frac{2}{8}$

(e) $\mathbf{5\frac{3}{5} \times 42\frac{1}{2}}$

$= \left(\frac{5\times5+3}{5}\right)\times\left(\frac{42\times2+1}{2}\right)$

$= \left(\frac{25+3}{5}\right)\times\left(\frac{84+1}{2}\right)$

$= \frac{28}{5}\times\frac{85}{2}$

$= 14\times17 = 238$

(f) $\mathbf{4\frac{2}{3} \times 3\frac{6}{7}}$

$= \left(\frac{4\times3+2}{3}\right)\times\left(\frac{3\times7+6}{7}\right)$

$= \left(\frac{12+2}{3}\right)\times\left(\frac{21+6}{7}\right)$

$= \frac{14}{3}\times\frac{27}{7}$

$= 2\times9 = 18$

(g) $5\frac{1}{16} \times \frac{4}{9}$

$= \left(\frac{5\times16+1}{16}\right)\times\frac{4}{9}$

$= \left(\frac{80+1}{16}\right)\times\frac{4}{9}$

$= \frac{81}{16}\times\frac{4}{9}$

$= \frac{9}{4} = 2\frac{1}{4}$

(h) $6\frac{2}{3} \times \frac{6}{15}$

$= \left(\frac{6\times3+2}{3}\right)\times\frac{6}{15}$

$= \left(\frac{18+2}{3}\right)\times\frac{6}{15}$

$= \frac{20}{3}\times\frac{6}{15}$

$= \frac{4\times2}{3} = \frac{8}{3} = 2\frac{2}{3}$

(i) $18\frac{3}{5} \times 41\frac{2}{3}$

$= \left(\frac{18\times5+3}{5}\right)\times\left(\frac{41\times3+2}{3}\right)$

$= \left(\frac{90+3}{5}\right)\times\left(\frac{123+2}{3}\right)$

$= \frac{93}{5}\times\frac{125}{3}$

$= 31\times25 = 775$

2. **(a)** $\frac{3}{8}$ **of 40**

$= \frac{3}{8}\times40$

$= 3\times5$

$= 15$

(b) $\frac{3}{25}$ **of 150**

$= \frac{3}{25}\times150$

$= 3\times6$

$= 18$

(c) $\frac{7}{15}$ **of 120**

$= \frac{7}{15}\times120$

$= 7\times8$

$= 56$

(d) $\frac{5}{14}$ **of 84**

$= \frac{5}{14}\times84$

$= 5\times6$

$= 30$

(e) $\frac{6}{17}$ **of 85**

$= \frac{6}{17}\times85$

$= 6\times5$

$= 30$

(f) $\frac{7}{11}$ **of 220**

$= \frac{7}{11}\times220$

$= 7\times20$

$= 140$

(g) $\frac{17}{19}$ **of 95**

$= \frac{17}{19}\times95$

$= 17\times5$

$= 85$

(h) $\frac{6}{10}$ **of 90**

$= \frac{6}{10}\times90$

$= 6\times9$

$= 54$

(i) $\frac{3}{8}$ **of 240**

$= \frac{3}{8}\times240 = 3\times30 = 90$

3. **(a)** $\frac{9}{18}$ **of ₹ 90**

$= ₹\left(\frac{9}{18}\times90\right)$

$= ₹\,(9\times5)$

$= ₹\,45$

(b) $\frac{4}{7}$ **of a week**

$= \frac{4}{7}\times7\,\text{days}$

$= (4\times1)\,\text{days}$

$= 4\,\text{days}$

(c) $\frac{3}{10}$ **of a litre**

$= \frac{3}{10}\times1000\,\text{ml}$

$= 300\,\text{ml}$

(d) $\frac{5}{8}$ **of 40 m**

$= \left(\frac{5}{8}\times40\right)\text{m}$

$= (5\times5)\,\text{m}$

$= 25\,\text{m}$

(e) $\frac{3}{15}$ **of ₹ 120**

$= ₹\left(\frac{3}{15}\times120\right)$

$= ₹\,(3\times8)$

$= ₹\,24$

(f) $\frac{9}{18}$ **of 108 kg**

$= \left(\frac{9}{18}\times108\right)\text{kg}$

$= (9\times6)\,\text{kg}$

$= 54\,\text{kg}$

(g) $\frac{14}{24}$ **of 3 hours**

$= \left(\frac{14}{24}\times3\times60\right)\text{min}$

$= \left(\frac{14}{8}\times60\right)\text{min}$

$= (7\times15)\,\text{min}$

$= 105\,\text{min}$

(h) $\frac{5}{12}$ **of a year**

$= \frac{5}{12}\times365\,\text{days}$

$= 152\,\text{days}$

(i) $\frac{5}{9}$ **of 270 gm.**

$= \left(\frac{5}{9}\times270\right)\text{gm}$

$= (5\times30)\,\text{gm} = 150\,\text{gm}$

4. **(a)** $\frac{22}{25}\times\frac{10}{27}\times\frac{36}{55}$

$=\frac{2}{5}\times\frac{2}{9}\times\frac{12}{5}$

$=\frac{2}{5}\times\frac{2}{3}\times\frac{4}{5}=\frac{16}{75}$

(b) $\frac{46}{65}\times\frac{10}{23}\times\frac{26}{45}$

$=\frac{2}{5}\times\frac{2}{1}\times\frac{2}{9}$

$=\frac{8}{45}$

(c) $\frac{12}{25}\times\frac{15}{28}\times\frac{35}{36}$

$=\frac{1}{5}\times\frac{3}{4}\times\frac{5}{3}$

$=\frac{1}{4}$

(d) $2\frac{2}{17}\times1\frac{33}{52}\times7\frac{2}{9}$

$=\frac{36}{16}\times\frac{85}{52}\times\frac{65}{9}$

$=\frac{4\times5\times5}{4}=25$

(e) $1\frac{2}{3}\times2\frac{2}{5}\times4\frac{3}{5}$

$=\frac{5}{3}\times\frac{12}{5}\times\frac{23}{5}$

$=\frac{4\times23}{5}$

$=\frac{92}{5}=18\frac{2}{5}$

(f) $1\frac{4}{7}\times1\frac{1}{15}\times1\frac{13}{22}$

$=\frac{11}{7}\times\frac{16}{15}\times\frac{35}{22}$

$=\frac{8}{15}\times5$

$=\frac{8}{3}=2\frac{2}{3}$

(g) $3\frac{1}{16}\times7\frac{3}{7}\times1\frac{25}{39}$

$=\frac{49}{16}\times\frac{52}{7}\times\frac{64}{39}$

$=\frac{7}{4}\times\frac{4}{1}\times\frac{16}{3}$

$=\frac{7\times16}{3}=\frac{112}{3}=37\frac{1}{3}$

(h) $2\frac{1}{5}\times5\frac{5}{11}\times10$

$=\frac{11}{5}\times\frac{60}{11}\times10$

$=60\times2=120$

(i) $4\frac{1}{16}\times3\frac{5}{13}\times1\frac{1}{5}$

$=\frac{65}{16}\times\frac{44}{13}\times\frac{6}{5}$

$=\frac{5\times11\times6}{4\times1\times5}$

$=\frac{6}{4}=\frac{3}{2}=1\frac{1}{2}$

5. Cost of 1 kg orange $=₹\ 20\frac{2}{5}=₹\ \frac{102}{5}$

$\therefore$ Cost of $1\frac{2}{3}$ kg oranges $=₹\ \frac{102}{5}\times\frac{5}{3}$

$=₹\ 34$

Hence, ₹ 34 is the cost of $1\frac{2}{3}$ kg oranges.

6. Cost of 1 *l* milk $=₹\ 24\frac{1}{2}=₹\ \frac{49}{2}$

$\therefore$ Cost of 8 *l* milk $=₹\ \frac{49}{2}\times8$

$=₹\ 49\times4=₹\ 196$

7. Distance covered in 1 litre of petrol = 8 km

$\therefore$ Distance covered in $2\frac{3}{4}$ litres of petrol

$=\left(8\times2\frac{3}{4}\right)\text{km}=\left(8\times\frac{11}{4}\right)\text{km}$

$=(2\times11)\text{ km}=22\text{ km}$

Hence, it will cover 22 km using $2\frac{3}{4}$ litres of petrol.

8. Cost of 1 ticket from Jaipur to Kota = ₹ 160

$\therefore$ Cost of $4\frac{1}{2}$ tickets for same distance $=₹\ 160\times4\frac{1}{2}$

$=₹\ 160\times\frac{9}{2}$

$=₹\ 80\times9=₹\ 720$

9. Distance covered by Ram in 1 hour $=2\frac{2}{5}$ km

$=\frac{12}{5}$ km

$\therefore$ Distance covered by Ram in $3\frac{1}{3}$ hours $=\left(\frac{12}{5}\times\frac{10}{3}\right)\text{km}$

$=(4\times2)\text{ km}=8\text{ km}$

Hence, he will cover 8 km in $3\frac{1}{3}$ hours.

10. Shikha's monthy income = ₹ 30000

$\therefore$ Shikha's spends income = ₹ $30000 \times \frac{1}{5}$ = ₹ 6000

Therefore, she save every month = ₹ (30000 – 6000)

= ₹ 24000

11. Total number of pages of a book = 340

$\therefore$ Mamta has reads $\frac{3}{4}$ of the book = $340 \times \frac{3}{4} = 255$

$\therefore$ She read 255 pages of a book

12. Number of hours Seema spent every day

$$= 2\frac{3}{4} \text{ hours} = \frac{11}{4} \text{hours}$$

$\because$ She reads the entire book in 16 days

$\therefore$ Total number of hours required to read the book

$$= 16 \times \frac{11}{4} \text{hours}$$

$$= 4 \times 11 \text{hours} = 44 \text{ hours}$$

Exercise-4C

1. (a) $\frac{5}{8}$ **by** $\frac{15}{16}$

$= \frac{5}{8} \div \frac{15}{16}$

$= \frac{5}{8} \times \frac{16}{15}$

$= \frac{2}{3}$

(b) $\frac{5}{7}$ **by 20**

$= \frac{5}{7} \div 20$

$= \frac{5}{7} \times \frac{1}{20}$

$= \frac{1}{7 \times 4} = \frac{1}{28}$

(c) **48 by** $3\frac{3}{5}$

$= 48 \div 3\frac{3}{5}$

$= 48 \div \frac{18}{5}$

$= 48 \times \frac{5}{18}$

$= \frac{8 \times 5}{3} = \frac{40}{3} = 13\frac{1}{3}$

(d) $\frac{7}{15}$ **by** $\frac{21}{25}$

$= \frac{7}{15} \div \frac{21}{25}$

$= \frac{7}{15} \times \frac{25}{21}$

$= \frac{5}{9}$

(e) $\frac{11}{24}$ **by** $\frac{7}{8}$

$= \frac{11}{24} \div \frac{7}{8}$

$= \frac{11}{24} \times \frac{8}{7}$

$= \frac{11}{3 \times 7}$

$= \frac{11}{21}$

(f) $9\frac{4}{5}$ **by 42**

$= 9\frac{4}{5} \div 42$

$= \frac{49}{5} \div 42$

$= \frac{49}{5} \times \frac{1}{42}$

$= \frac{7}{5 \times 6} = \frac{7}{30}$

(g) $6\frac{2}{9}$ **by** $4\frac{2}{3}$

$= 6\frac{2}{9} \div 4\frac{2}{3}$

$= \frac{56}{9} \div \frac{14}{3}$

$= \frac{56}{9} \times \frac{3}{14}$

$= \frac{4}{3} = 1\frac{1}{3}$

(h) $20\frac{1}{4}$ **by** $\frac{3}{4}$

$= 20\frac{1}{4} \div \frac{3}{4}$

$= \frac{81}{4} \div \frac{3}{4}$

$= \frac{81}{4} \times \frac{4}{3}$

$= 27$

(i) $7\frac{1}{2}$ **by 15**

$= 7\frac{1}{2} \div 15 = \frac{15}{2} \div 15$

$= \frac{15}{2} \times \frac{1}{15} = \frac{1}{2}$

2. (a) $\frac{5}{16} \div \frac{25}{32}$

$= \frac{5}{16} \times \frac{32}{25}$

$= \frac{2}{5}$

(b) $\frac{6}{17} \div \frac{16}{51}$

$= \frac{6}{17} \times \frac{51}{16}$

$= \frac{3 \times 3}{8}$

$= \frac{9}{8} = 1\frac{1}{8}$

(c) $3\frac{3}{7} \div \frac{8}{21}$

$= \frac{24}{7} \div \frac{8}{21}$

$= \frac{24}{7} \times \frac{21}{8}$

$= 3 \times 3 = 9$

(d) $20\frac{2}{3} \div 7\frac{3}{4}$

$= \frac{62}{3} \div \frac{31}{4}$

$= \frac{62}{3} \times \frac{4}{31}$

$= \frac{2 \times 4}{3}$

$= \frac{8}{3} = 2\frac{2}{3}$

(e) $69\frac{3}{4} \div 7\frac{3}{4}$

$= \frac{279}{4} \div \frac{31}{4}$

$= \frac{279}{4} \times \frac{4}{31}$

$= 9$

(f) $45 \div 1\frac{4}{5}$

$= 45 \div \frac{9}{5}$

$= 45 \times \frac{5}{9}$

$= 5 \times 5$

$= 25$

(g) $72 \div 2\frac{1}{4}$

$= 72 \div \frac{9}{4}$

$= 72 \times \frac{4}{9}$

$= 8 \times 4$

$= 32$

(h) $16\frac{2}{3} \div 50$

$= \frac{50}{3} \div 50$

$= \frac{50}{3} \times \frac{1}{50}$

$= \frac{1}{3}$

(i) $\mathbf{9\frac{2}{7} \div 13}$

$$= 9\frac{2}{7} \div 13$$

$$= \frac{65}{7} \div 13$$

$$= \frac{65}{7} \times \frac{1}{13} = \frac{5}{7}$$

3. Product of two numbers = 63

One of the number $= 2\frac{1}{4} = \frac{9}{4}$

$\therefore$ Other number $= 63 \div \frac{9}{4}$

$$= 63 \times \frac{4}{9}$$

$$= 7 \times 4$$

$$= 28$$

4. Product of two numbers = 12

One of the number $= 4\frac{1}{8} = \frac{33}{8}$

$\therefore$ Other number $= 12 \div \frac{33}{8}$

$$= 12 \times \frac{8}{33}$$

$$= \frac{4 \times 8}{11} = \frac{32}{11} = 2\frac{10}{11}$$

Hence, the other number is $2\frac{10}{11}$.

5. Let the number be *x*. Then,

$$\frac{36}{7} \times x = 18$$

$\Rightarrow$ $$x = \frac{18 \times 7}{36}$$

$$= \frac{7}{2} = 3\frac{1}{2}$$

Hence, $\frac{36}{7}$ should be multiplied by $\frac{2}{7}$ to get 18.

6. Let the number be *x*. Then,

$$4\frac{2}{9} \div x = \frac{19}{27}$$

$$\frac{38}{9} \times \frac{1}{x} = \frac{19}{27}$$

$$\frac{1}{x} = \frac{19}{27} \times \frac{9}{38}$$

$$\frac{1}{x} = \frac{1}{3 \times 2}$$

$$\frac{1}{x} = \frac{1}{6}$$

or $x = 6$

Hence, $4\frac{2}{9}$ should be divided by 6 to obtain $\frac{19}{27}$.

7. Cost of 1 orange $= ₹\, 3\frac{3}{4} = ₹\, \frac{15}{4}$

Total cost of oranges = ₹ 840

$\therefore$ Number of oranges $= \left(840 \div \frac{15}{4}\right)$

$$= 840 \times \frac{4}{15}$$

$$= 56 \times 4 = 224$$

Hence, he sell 224 oranges.

8. Cost of 12 pens $= ₹\, 15\frac{3}{4} = ₹\, \frac{63}{4}$

$\therefore$ Cost of 1 pen $= ₹\left(\frac{63}{4} \div 12\right)$

$$= ₹\, \frac{63}{4} \times \frac{1}{12} = ₹\, \frac{63}{48}$$

$$= ₹\, 1\frac{15}{48} = ₹\, 1\frac{5}{16}$$

Hence, the cost of 1 pen is $₹\, 1\frac{5}{16}$.

9. Cost of 1 kg mangoes $= ₹\, 25\frac{1}{2} = ₹\, \frac{51}{2}$

Total cost of mangoes = ₹ 255

$\therefore$ Weight of mangoes (in kg) $= ₹\, 255 \div ₹\, \frac{51}{2}$

$$= \left(255 \times \frac{2}{51}\right) \text{kg}$$

$$= (5 \times 2)\,\text{kg}$$

$$= 10\,\text{kg}$$

Hence, 10 kg of mangoes can be bought by ₹ 225.

10. Total length of a wire $= 10\frac{2}{5}\,\text{m} = \frac{52}{5}\,\text{m}$

Number of pieces = 13

So, length of each piece $= \left(\frac{52}{5} \div 13\right)\text{m}$

$$= \left(\frac{52}{5} \times \frac{1}{13}\right)\text{m}$$

$$= \frac{4}{5}\,\text{m}$$

Hence, length of each piece is $\frac{4}{5}$ m.

11. Total length of a rope $= 17\frac{1}{2}\text{ m} = \frac{35}{2}\text{ m}$

Number of pieces = 7

So, the length of each piece $= \left(\frac{35}{2} \div 7\right)\text{m}$

$= \left(\frac{35}{2} \times \frac{1}{7}\right)\text{m}$

$= \frac{5}{2}\text{m} = 2\frac{1}{2}\text{ m}$

Hence, the length of each piece is $2\frac{1}{2}$ m.

12. Distance covered by Amit in $5\frac{1}{2}$ hours $= 50\frac{1}{4}$ km

$\therefore$ Distance covered by Amit in 1 hour $= \left(50\frac{1}{4} \div 5\frac{1}{2}\right)\text{km}$

$= \left(\frac{201}{4} \div \frac{11}{2}\right)\text{km}$

$= \left(\frac{201}{4} \times \frac{2}{11}\right)\text{km}$

$= \frac{201}{22}\text{ km}$

$= 9\frac{3}{22}\text{ km}$

Hence, he will cover $9\frac{3}{22}$ km in $5\frac{1}{2}$ hours by bicycle.

MCQs

1.	(a)	**2.**	(b)	**3.**	(b)	**4.**	(c)	**5.**	(b)
6.	(c)	**7.**	(a)	**8.**	(b)	**9.**	(c)	**10.**	(b)
11.	(a)	**12.**	(a)	**13.**	(c)				

CHAPTER 5 : PROFIT AND LOSS

Exercise-5A

1. Cost of a pair of table and chair (C.P.) = ₹ 550

And selling price of a pair of table and chair = ₹ 700

Since, SP > CP. So, there is a profit

Profit = SP – CP

= ₹ (700 – 550)

= ₹ 150

$\text{Profit per cent} = \left(\frac{\text{Profit}}{\text{CP}} \times 100\right)\%$

$= \left(\frac{150}{500} \times 100\right)\% = 27.27\%$

2. Cost of a old bicycle = ₹ 500

Amount spent on repairs = ₹ 60

Total amount of a old bicycle = ₹ (500 + 60)

= ₹ 560

SP of a old bicycle = ₹ 700

Since, SP > CP. So, there is a profit.

$\text{Profit per cent} = \left(\frac{\text{SP} - \text{CP}}{\text{CP}} \times 100\right)\%$

$= \left(\frac{700 - 560}{560} \times 100\right)\%$

$= \left(\frac{140}{560} \times 100\right)\% = 25\%$

3. Cost of 2 oranges = ₹ 1

$\therefore$ Cost of 1 orange = ₹ $\frac{1}{2}$

Similarly, Selling price of 5 oranges = ₹ 3

$\therefore$ SP of 1 orange = ₹ $\frac{3}{5}$

Since SP > CP. There is a profit.

$\text{Profit per cent} = \left(\frac{\text{SP} - \text{CP}}{\text{CP}} \times 100\right)\%$

$= \left(\frac{\frac{3}{5} - \frac{1}{2}}{\frac{1}{2}} \times 100\right)\%$

$= \left(\frac{\frac{6-5}{10}}{\frac{1}{2}} \times 100\right)\%$

$= \left(\frac{1}{10} \times \frac{2}{1} \times 100\right)\%$

$= \frac{100}{5}\% = 20\%$

4. Cost of a toy car = ₹ 225

Amount spent for other expenses = ₹ 25

Total amount of CP = ₹ (225 + 25)

= ₹ 250

SP of a toy car = ₹ 380

Since SP > CP. There is a profit.

$\text{Profit per cent} = \left(\frac{\text{SP} - \text{CP}}{\text{CP}} \times 100\right)\%$

$= \left(\frac{380 - 250}{250} \times 100\right)\%$

$= \left(\frac{130}{250} \times 100\right)\% = 52\%$

5. Here, loss per cent = 25% and SP = ₹ 900

CP = ?

$$\text{Cost price of the table} = \frac{\text{S.P}\times 100}{100-\text{Loss\%}}$$

$$= ₹\ \frac{900\times 100}{100-25}$$

$$= ₹\ \frac{900\times 100}{75}$$

$$= ₹\ 1200$$

Hence, the cost price of the table is ₹ 1200.

6. Here, CP of an article = ₹ 550

Profit% = 10%

CP = ?

$$\text{CP} = \frac{\text{SP}\times 100}{100+\text{Gain\%}}$$

$$= ₹\ \frac{550\times 100}{100+10}$$

$$= ₹\ \frac{55000}{110} = ₹\ 500$$

Hence, the cost price of the article is ₹ 500.

7. Gain% = 15% and SP of a old taxi = ₹ 43470

CP of the car = ?

$\therefore$ $$\text{CP of the car} = \frac{\text{SP}\times 100}{100+\text{gain\%}}$$

$$= ₹\ \frac{43470\times 100}{100+15} = ₹\ 37800$$

Hence, the CP of the car is ₹ 37800.

8. CP of a colour TV = ₹ 12500

Profit% = 18%

SP of the colour TV = ?

$\therefore$ $$\text{SP of the colour TV} = \frac{(100+\text{Profit})}{100}\times \text{CP}$$

$$= ₹\ \frac{(100+18)}{100}\times 12500$$

$$= ₹\ 118\times 125$$

$$= ₹\ 14750$$

9. SP of a moped = ₹ 2200

Loss% = 12%

Cost price (CP) of the moped = ?

$\therefore$ $$\text{Cost price (CP) of the moped} = \frac{\text{SP}\times 100}{100-\text{Loss\%}}$$

$$= ₹\ \frac{2200\times 100}{100-12}$$

$$= ₹\ \frac{220000}{88} = ₹\ 2500$$

Hence, the cost price of the moped is ₹ 2500.

10. Gain% = 15% and SP of an old car = ₹ 57960

First we find the CP of the old car = ?

$\therefore$ $$\text{CP of the old car} = \frac{\text{SP}\times 100}{100+\text{Gain\%}}$$

$$= ₹\ \frac{57960\times 100}{100+15}$$

$$= ₹\ \frac{5796000}{115}$$

$$= ₹\ 50400$$

To make 21%, let the new selling price be ₹ X.

Then, $$X = \frac{100+\text{Gain\%}}{100}\times \text{CP}$$

$$= ₹\ \frac{100+21}{100}\times 50400$$

$$= ₹\ 121\times 504$$

$$= ₹\ 60984$$

Hence, he should sell it for ₹ 60984 to make 21% profit.

11. Loss% = 15% and SP of scooty = ₹ 6375

First we find the CP of scooty = ?

$\therefore$ $$\text{CP of the scooty} = \frac{\text{SP}\times 100}{100-\text{Loss\%}}$$

$$= ₹\ \frac{6375\times 100}{100-15}$$

$$= ₹\ \frac{637500}{85}$$

$$= ₹\ 7500$$

To make 12%, let the new selling price be ₹ A.

Then, $$A = \frac{100+\text{Gain\%}}{100}\times \text{CP}$$

$$= ₹\ \frac{100+12}{100}\times 7500$$

$$= ₹\ \frac{112\times 7500}{100} = ₹\ 8400$$

Hence, she should sell it for ₹ 8400 to make 12% profit.

12. SP of the first bicycle = ₹ 960

and profit gained = 20%

Therefore, $$\text{CP} = \frac{100\times \text{SP}}{(100+\text{Profit\%})}$$

$$= ₹\ \frac{100\times 960}{(100+20)} = ₹\ 800$$

SP of the second bicycles = ₹ 960

and loss = 20%

Therefore, $$\text{CP} = \frac{100\times \text{SP}}{100-\text{Loss\%}}$$

$$= ₹\ \frac{100\times 960}{(100-20)} = ₹\ 1200$$

Now, total CP = ₹ 800 + ₹ 1200 = ₹ 2000

and total SP = ₹ 2×960 = ₹ 1920

Since SP < CP. There is a loss.

$$\text{Loss\%} = \left(\frac{\text{CP} - \text{SP}}{\text{CP}} \times 100\right)\%$$

$$= \left(\frac{2000 - 1920}{2000} \times 100\right)\%$$

$$= \frac{8000}{2000}\% = 4\%$$

13. SP of the first goat = ₹ 4928

and profit gained = 12%

Therefore, $\text{CP} = \frac{100 \times \text{SP}}{(100 + \text{Profit\%})}$

$$= ₹\ \frac{100 \times 4928}{(100 + 12)} = ₹\ 4400$$

SP of second goat = ₹ 4928

and Loss = 12%

Therefore, $\text{CP} = \frac{100 \times \text{SP}}{(100 - \text{loss\%})}$

$$= ₹\ \frac{100 \times 4928}{(100 - 12)} = ₹\ 5600$$

Now, total CP = ₹ 4400 + ₹ 5600 = ₹ 10000

and, total SP = ₹ 2×4928 = ₹ 9856

Since SP < CP. There is a loss.

So, $\text{Loss\%} = \left(\frac{\text{CP} - \text{SP}}{\text{CP}} \times 100\right)\%$

$$= \left(\frac{10000 - 9856}{10000} \times 100\right)\%$$

$$= \frac{14400}{10000}\% = 1.44\%$$

14. Let of CP of each bat = ₹ 100

Then, CP of 25 bats = ₹ 25×100 = ₹ 2500

Also, SP of 21 bats = ₹ 2500

So, SP of 1 bat = ₹ $\frac{2500}{21}$

Profit on 1 bat = ₹ $\frac{2500}{21}$ − ₹ 100

$$= ₹\left(\frac{2500 - 2100}{21}\right)$$

$$= ₹\ \frac{400}{21}$$

Hence, profit per cent = $\frac{400}{21} \times \frac{100}{100}\%$

= 19.047% or 19.05%

15. Let the CP of each pen = ₹ 100

Then, CP of 12 pens = ₹ 12×100 = ₹ 1200

Also, SP of 15 pens = ₹ 1200

So, SP of 1 pen = ₹ $\frac{1200}{15}$ = ₹ 80

∴ Loss on 1 pen = ₹ 100 − ₹ 80 = ₹ 20

Hence, less per cent = $\frac{20}{100} \times 100\%$

= 20%

Exercise-5B

1. **(a)** Here, MP = ₹ 400, S.P = ₹ 350

So, Discount% = $\left(\frac{\text{MP} - \text{SP}}{\text{MP}} \times 100\right)\%$

$$= \left(\frac{400 - 350}{400} \times 100\right)\%$$

$$= \frac{5000}{400}\%$$

= 12.5%

(b) Here, MP = ₹ 800, S.P = ₹ 750

So, Discount% = $\left(\frac{\text{MP} - \text{SP}}{\text{MP}} \times 100\right)\%$

$$= \left(\frac{800 - 750}{800} \times 100\right)\%$$

$$= \frac{5000}{800}\%$$

= 6.25%

(c) Here, M.P = ₹ 1200, S.P = ₹ 1000

So, Discount% = $\left(\frac{\text{MP} - \text{SP}}{\text{MP}} \times 100\right)\%$

$$= \left(\frac{1200 - 1000}{1200} \times 100\right)\%$$

$$= \frac{200 \times 100}{1200}\%$$

= 16.66%

(d) MP = ₹ 3120, S.P = ₹ 2350

So, Discount% = $\left(\frac{\text{MP} - \text{SP}}{\text{MP}} \times 100\right)\%$

$$= \left(\frac{3120 - 2350}{3120} \times 100\right)\%$$

$$= \frac{770 \times 100}{3120}\%$$

$$= \frac{77000}{3120}\%$$

= 24.68%

2. **(a)** Here, MP = ₹ 600 and Discount% = 15%

$$\text{So, Discount\%} = \left(\frac{\text{Discount}}{\text{MP}} \times 100\right)\%$$

$$15 = \frac{\text{Discount}}{600} \times 100$$

$$\text{Discount} = ₹\ 15 \times 6 = ₹\ 90$$

So, the SP = MP – Discount

$$= ₹\ (600 - 90) = ₹\ 510$$

(b) Here, MP = ₹ 1000 and Discount% = 8%

$$\text{So, Discount\%} = \left(\frac{\text{Discount}}{\text{MP}} \times 100\right)\%$$

$$8 = \frac{\text{Discount}}{1000} \times 100$$

$$\text{Discount} = ₹\ 8 \times 10 = ₹\ 80$$

So, the SP = MP – Discount

$$= ₹\ (1000 - 80) = ₹\ 920$$

(c) Here, M.P = ₹ 1780 and $\text{Discount\%} = 7\frac{1}{2}\% = \frac{15}{2}\%$

$$\text{So, Discount\%} = \left(\frac{\text{Discount}}{\text{MP}} \times 100\right)\%$$

$$\frac{15}{2} = \frac{\text{Discount}}{1780} \times 100$$

$$\text{Discount} = ₹\ \frac{15 \times 178}{10 \times 2} = ₹\ 133.50$$

So, the SP = MP – Discount

$$= ₹\ (1780 - 133.50)$$

$$= ₹\ 1646.50$$

(d) Here, M.P = ₹ 9850 and Discount = 12%

$$\text{So, Discount\%} = \left(\frac{\text{Discount}}{\text{MP}} \times 100\right)\%$$

$$12 = \frac{\text{Discount}}{9850} \times 100$$

$$\text{Discount} = ₹\ \frac{985 \times 12}{10} = ₹\ 1182$$

So, the SP = MP – Discount

$$= ₹\ 9850 - ₹\ 1182$$

$$= ₹\ 8668$$

3. **(a)** Here, S.P = ₹ 552 and Discount% = 8%

$$\text{So, MP} = \frac{100 \times \text{SP}}{(100 - \text{Discount\%})}$$

$$= ₹\ \frac{100 \times 552}{(100 - 8)}$$

$$= ₹\ \frac{55200}{92}$$

$$= ₹\ 600$$

(b) Here, S.P = ₹ 2115 and Discount% = 6%

$$\text{So, MP} = \frac{100 \times \text{SP}}{(100 - \text{Discount\%})}$$

$$= ₹\ \frac{100 \times 2115}{(100 - 6)}$$

$$= ₹\ \frac{211500}{94}$$

$$= ₹\ 2250$$

(c) Here, S.P. = ₹ 2464 and Discount% = 12%

$$\text{So, MP} = \frac{100 \times \text{SP}}{(100 - \text{Discount\%})}$$

$$= ₹\ \frac{100 \times 2464}{100 - 12}$$

$$= ₹\ \frac{246400}{88}$$

$$= ₹\ 2800$$

(d) Here, S.P. = ₹ 2975 and Discount% = 15%

$$\text{So, MP} = \frac{100 \times \text{SP}}{(100 - \text{Discount\%})}$$

$$= ₹\ \frac{100 \times 2975}{(100 - 15)}$$

$$= ₹\ \frac{297500}{85}$$

$$= ₹\ 3500$$

4. MP of a toaster = ₹ 2500

SP of a toaster = ₹ 2300

$$\text{So, Discount\%} = \left(\frac{\text{MP} - \text{SP}}{\text{MP}} \times 100\right)\%$$

$$= \left(\frac{2500 - 2300}{2500} \times 100\right)\%$$

$$= \frac{200 \times 100}{2500}\% = 8\%$$

Hence, 8% discount is given on it.

5. MP of a cooler = ₹ 1850

SP of a cooler = ₹ 1600

$$\text{So, Discount\%} = \left(\frac{\text{MP} - \text{SP}}{\text{MP}} \times 100\right)\%$$

$$= \left(\frac{1850 - 1600}{1850} \times 100\right)\%$$

$$= \frac{250 \times 100}{1850}\% = 13.51\%$$

6. MP of a computer table = ₹ 800

$$\text{Discount\%} = 10\%$$

$$\text{SP} = ?$$

$$\text{Discount\%} = \left(\frac{\text{Discount}}{\text{MP}} \times 100\right)\%$$

$$10 = \frac{\text{Discount}}{800} \times 100$$

$$\text{Discount} = ₹\ 8 \times 10 = ₹\ 80$$

Therefore, the SP = MP – Discount

$$= ₹\ (800 - 80)$$

$$= ₹\ 720$$

Hence, its selling price is ₹ 720.

7. MP of a microwave = ₹ 4500

$$\text{Discount\%} = 18\%$$

$$\text{SP} = ?$$

$$\text{Discount\%} = \left(\frac{\text{Discount}}{\text{MP}} \times 100\right)\%$$

$$18 = \frac{\text{Discount}}{4500} \times 100$$

$$\text{Discount} = ₹\ 18 \times 45 = ₹\ 810$$

Therefore, the SP = MP – Discount

$$= ₹\ (4500 - 810)$$

$$= ₹\ 3690$$

Hence, its selling price is ₹ 3690.

8. Discount% = 5%, SP = ₹ 1292

MP = ?

So, $$\text{MP} = \frac{100 \times \text{SP}}{(100 - \text{Discount\%})}$$

$$= ₹\ \frac{100 \times 1292}{(100 - 5)}$$

$$= ₹\ \frac{129200}{95}$$

$$= ₹\ 1360$$

Hence, its marked price is ₹ 1360.

9. Discount% = 12%, SP = ₹ 2040

MP = ?

So, $$\text{MP} = \frac{100 \times \text{SP}}{(100 - \text{Discount\%})}$$

$$= ₹\ \frac{100 \times 2040}{(100 - 12)}$$

$$= ₹\ \frac{204000}{88}$$

$$= ₹\ 2319$$

Hence, its marked price is ₹ 2319.

10. Suppose CP = ₹ 100

$$\text{Marked price} = ₹\left(100 + 30 \times \frac{100}{100}\right)$$

$$= ₹\ (100 + 30) = ₹\ 130$$

$$\text{Discount} = ₹\ \frac{15}{100} \times 130 = ₹\ 19.50$$

SP = ₹ 130 – ₹ 19.50 = ₹ 110.50

Gain = ₹ (110.50 – 100) = ₹ 10.50

$$\text{So gain\%} = \left(\frac{\text{gain}}{\text{CP}} \times 100\right)\%$$

$$= \left(\frac{10.50}{100} \times 100\right)\%$$

$$= 10.50\%$$

MCQs

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(b)	**5.**	(c)
6.	(c)	**7.**	(b)	**8.**	(a)	**9.**	(a)	**10.**	(a)
11.	(b)	**12.**	(c)						

CHAPTER 6 : PERCENTAGE

Exercise-6A

1. **(a)** $\frac{1}{8}$ $= \frac{1}{8} \times \frac{100}{100}$

$$= \frac{1}{8} \times 100\% = 12.5\%$$

(b) $\frac{3}{40}$ $= \frac{3}{40} \times \frac{100}{100}$

$$= \frac{3}{40} \times 100\% = 7.5\%$$

(c) $\frac{7}{8}$ $= \frac{7}{8} \times \frac{100}{100}$

$$= \frac{7}{8} \times 100\% = 87.5\%$$

(d) $\frac{16}{45}$ $= \frac{16}{45} \times \frac{100}{100}$

$$= \frac{16}{45} \times 100\% = 35.55\%$$

(e) $\frac{58}{125}$ $= \frac{58}{125} \times \frac{100}{100}$

$$= \frac{58}{125} \times 100\% = 464\%$$

(f) $\frac{5}{4}$ $= \frac{5}{4} \times \frac{100}{100}$

$$= \frac{5}{4} \times 100\% = 125\%$$

(g) $\frac{2}{7} = \frac{2}{7} \times \frac{100}{100}$

$= \frac{2}{7} \times 100\% = 28.57\%$

(h) **7 : 12** $= \frac{7}{12} \times \frac{100}{100}$

$= \frac{7}{12} \times 100\% = 58.33\%$

(i) **0.004** $= \frac{4}{1000} \times \frac{100}{100}$

$= \frac{4}{1000} \times 100\% = 0.4\%$

(j) **0.16** $= \frac{16}{100} \times \frac{100}{100}$

$= \frac{16}{100} \times 100\% = 16\%$

2. (a) **165%** $= \frac{165}{100} = \frac{33}{20}$

(b) **35%** $= \frac{35}{100} = \frac{7}{20}$

(c) **20%** $= \frac{20}{100} = \frac{1}{5}$

(d) **150%** $= \frac{150}{100} = \frac{3}{2}$

(e) $25\frac{1}{4}\%$ $= \frac{101}{4}\% = \frac{101}{4 \times 100} = \frac{101}{400}$

(f) **2.3%** $= \frac{23}{10}\% = \frac{23}{10} \times \frac{1}{100} = \frac{23}{1000}$

(g) **3.51%** $= \frac{351}{100}\% = \frac{351}{100} \times \frac{1}{100} = \frac{351}{10000}$

(h) **5%** $= \frac{5}{100} = \frac{1}{20}$

(i) **125%** $= \frac{125}{100} = \frac{5}{4}$

(j) $33\frac{1}{3}\%$ $= \frac{100}{3}\% = \frac{100}{3} \times \frac{1}{100} = \frac{1}{3}$

3. (a) **3% of 180**

$= \frac{3}{100} \times 180 = \frac{3 \times 18}{10}$

$= \frac{27}{5} = 5.4$

(b) **3% of 2 hours**

$= \frac{3}{100} \times 2 \times 60$

$= \frac{36}{10}\text{ min} = 3.6\text{ min}$

(c) **75% of 2 km**

$= \frac{75}{100} \times 2\text{ km}$

$= \frac{150}{100}\text{ km} = 1.5\text{ km}$

(d) **15% of ₹ 300**

$= \frac{15}{100} \times ₹\ 300$

$= ₹\ 15 \times 3 = ₹\ 45$

(e) **80% of 4 *l***

$= \frac{80}{100} \times 4\,l$

$= \frac{320}{100}\,l = 3.2\,l$

(f) **45% of 8 kg**

$= \frac{45}{100} \times 8\text{ kg}$

$= \frac{360}{100}\text{ kg} = 3.6\text{ kg}$

4. (a) **5% of x = ₹ 600**

$\frac{5}{100} \times x = ₹\ 600$

$x = \frac{₹\ 600 \times 100}{5}$

$x = ₹\ 600 \times 20$

$x = ₹\ 12000$

(b) **150% of x = 75**

$\frac{150}{100} \times x = 75$

$x = \frac{75 \times 10}{15}$

$x = 5 \times 10$

$x = 50$

(c) **12% of x = 1080 *l***

$\frac{12}{100} \times x = 1080\,l$

$x = \frac{1080 \times 100}{12}\,l$

$x = 9000\,l$

(d) **18% of x = 1 m**

$\frac{18}{100} \times x = 1\text{ m}$

$x = \frac{100}{18}\text{ m}$

$x = 5\frac{10}{8}\text{ m} = 5\frac{5}{9}\text{ m}$

(e) **70% of $x = 84$ minutes**

$$\frac{70}{100} \times x = 84 \text{ min}$$

$$x = \frac{84 \times 10}{7} \text{ min}$$

$$x = 12 \times 10 \text{ min}$$

$$x = 120 \text{ min}$$

(f) $\frac{15}{2}$**% of** $x = 75\ l$

$$\frac{15}{2 \times 100} \times x = 75\ l$$

$$x = \frac{75 \times 200}{15} l$$

$$x = 1000\ l$$

5. **(a)** **25% of** $x = 9$

$$\frac{25}{100} \times x = 9$$

$$x = 9 \times 4$$

$$x = 36$$

(b) **75% of** $x = 15$

$$\frac{75}{100} \times x = 15$$

$$x = \frac{15 \times 4}{3}$$

$$x = 5 \times 4$$

$$x = 20$$

(c) **30% of** $x = 24$

$$\frac{30}{100} \times x = 24$$

$$x = \frac{24 \times 100}{30}$$

$$x = 80$$

(d) **45% of** $x = 90$

$$\frac{45}{100} \times x = 90$$

$$x = \frac{90 \times 100}{45}$$

$$x = 2 \times 100 = 200$$

6. Let the monthly income be ₹ x.

Then, 32% of x = ₹ 960

$$\frac{32}{100} \times x = ₹\ 960$$

$$x = ₹\ \frac{960 \times 100}{32}$$

$$x = ₹\ 30 \times 100$$

$$x = ₹\ 3000$$

Hence, ₹ 3000 is his monthly income.

7. Let the monthly salary be ₹ x.

Then, 10% of x = ₹ 4000

$$\frac{10}{100} \times x = ₹\ 4000$$

$$x = ₹\ \frac{4000 \times 100}{10}$$

$$x = ₹\ 40{,}000$$

Hence, ₹ 40,000 is his salary.

8. Number of voters = voted present × total number of voters

$$= 60\% \times 20{,}000$$

$$= \frac{60}{100} \times 20000$$

$$= 12{,}000$$

Parentage of votes (which did not cost their votes)

$$= \frac{\text{Total number of votes} - \text{number of polled votes}}{\text{Total number of votes}} \times 100\%$$

$$= \left(\frac{20000 - 12000}{20000} \times 100\right)\%$$

$$= \left(\frac{8000}{20000} \times 100\right)\% = 40\%$$

9. Percentage of boys = 40%

So, percentage of girls = $(100 - 40)\% = 60\%$

So, the total strength the school = $\frac{\text{Number of girls}}{\text{Their persentage}}$

$$= \frac{540}{60\%} = \frac{540 \times 100}{60}$$

$$= 900 \text{ students}$$

Hence, the total strength of the school is 900.

10. Percentage of nitrogen = 60%

Percentage of sulphur = 15%

So, percentage of carbon = $(100 - 60 - 15)\%$

$$= 25\%$$

Therefore, the quantity of carbon = $(12 \times 25\%)$ kg

$$= \left(12 \times \frac{25}{100}\right) \text{kg}$$

$$= \left(12 \times \frac{1}{4}\right) \text{kg}$$

$$= 3 \text{ kg}$$

Hence, the quantity of carbon in 12 kg gunpowder is 3 kg.

11. Required passing percentage = 40%

Student got = 168 and failed by 32 marks

So, passing marks = $168 + 32 = 200$

Let maximum marks be x.

Then, 40% of $x = 200$

$\Rightarrow \quad \frac{40}{100} \times x = 200$

$$x = \frac{200 \times 100}{40} = 500$$

Hence, the maximum marks are 500.

12. Let the monthly salary be x.

Then, $(30+9)\%$ of $x = ₹\ 7800$

39% of $x = ₹\ 7800$

$$\frac{39}{100} \times x = ₹\ 7800$$

$$x = ₹\ \frac{7800 \times 100}{39}$$

$$x = ₹\ 200 \times 100$$

$$x = ₹\ 20000$$

Exercise-6B

1. Ratio of the angles $= 2:4:4$

Sum of the ratios $= 2+4+4 = 10$

So, value of first angle $= \left(\frac{2}{10} \times 180\right)° = 36°$

[Since, sum of angles of a triangle is 180°.]

Value of second angle $= \left(\frac{4}{10} \times 180\right)° = 72°$

and value of third angle $= \left(\frac{4}{10} \times 180\right)° = 72°$

Now, percentage of first angle of a triangle

$$= \left(\frac{2}{10} \times 100\right)\% = 20\%$$

Percentage of second angle of a triangle

$$= \left(\frac{4}{10} \times 100\right)\% = 40\%$$

and percentage of third angle of a triangle

$$= \left(\frac{4}{10} \times 100\right)\% = 40\%$$

Hence, value of three angle are 36°, 72° and 72° and value in percentage is 20%, 40% and 40% respectively.

2. Ratio of the angles $= 6:5:5:4$

Sum of the ratios $= 6+5+5+4 = 20$

So, value of first angle $= \left(\frac{6}{20} \times 360\right)° = 180°$

[Since, sum of angle of a quadrilateral is 360°.]

Value of second angle $= \left(\frac{5}{20} \times 360\right)° = 90°$

Value of third angle $= \left(\frac{5}{20} \times 360\right)° = 90°$

And value of fourth angle $= \left(\frac{4}{20} \times 360\right)° = 72°$

Now, percentage of first angle of a quadrilateral

$$= \left(\frac{6}{20} \times 100\right)\% = 30\%$$

Percentage of second angle of a quadrilateral

$$= \left(\frac{5}{20} \times 100\right)\% = 25\%$$

Percentage of third angle of a quadrilateral

$$= \left(\frac{5}{20} \times 100\right)\% = 25\%$$

And percentage of fourth angle of a quadrilateral

$$= \left(\frac{4}{20} \times 100\right)\% = 20\%$$

Hence, value of fourth angles are 108° , 90° , 90° and 72° and value in percentage are 30%, 25%, 25% and 20%.

3. Ratio of material $= 1:1:2:4$

Sum of the ratios $= 1+1+2+4 = 8$

Percentage of ghee $= \left(\frac{1}{8} \times 100\right)\% = 12.5\%$

Percentage of besan $= \left(\frac{1}{8} \times 100\right)\% = 12.5\%$

Percentage of sugar $= \left(\frac{2}{8} \times 100\right)\% = 25\%$

Percentage of water $= \left(\frac{4}{8} \times 100\right)\% = 50\%$

Hence, the percentage of each material in the halwa are 12.5%, 12.5%, 25% and 50% respectively.

4. Parts received by Rita, Manu and Pinku can be written in ratio as 2 : 3 : 5.

Sum of ratios $= 2+3+5 = 10$

So, Rita received $= ₹ \left(\frac{2}{10} \times 400\right) = ₹\ 80$

Manu received $= ₹ \left(\frac{3}{10} \times 400\right) = ₹\ 120$

and Pinku received $= ₹ \left(\frac{5}{10} \times 400\right) = ₹\ 200$

Now, Rita received as percentage $= \left(\frac{2}{10} \times 100\right)\% = 20\%$

Manu received as percentage $= \left(\frac{3}{10}\times 100\right)\% = 30\%$

And Pinku received as percentage $= \left(\frac{5}{10}\times 100\right)\% = 50\%$

Hence, Rita received ₹ 80 or 20% of total amount, Manu received ₹ 120 or 30% of total amount and Pinku received ₹ 200 or 50% of total amount.

5. Vibhor received the toffees = 25 of 40%

$$= 25\times\frac{40}{100}$$

$$= \frac{40}{4} = 10 \text{ toffees}$$

And Meeku received the toffees = 25 of 60%

$$= 25\times\frac{60}{100}$$

$$= \frac{60}{4} = 15 \text{ toffees}$$

Hence, Vibhor and Meeku got 10 and 15 toffees respectively.

6. Cricket team won the games this year = 10

Cricket team won the games last year = 8

So , the increase in the number of win $= 10-8 = 2$

So, the percentage of increase

$$= \frac{\text{increase in wins}}{\text{original number of wins in last year}}\times 100\%$$

$$= \left(\frac{2}{8}\times 100\right)\% = 25\%$$

Hence, 25% more matches won by that cricket team.

7. Hockey team won the matches this year = 18

Hockey team won the matches last year = 25

So, the decrease in the number of win $= 25-18 = 7$

So, the percentage of decrease

$$= \left(\frac{\text{decrease in win}}{\text{original number of wins in last year}}\times 100\right)\%$$

$$= \left(\frac{7}{25}\times 100\right)\%$$

$$= (7\times 4)\% = 28\%$$

8. Number of children before 2 years = 200

Number of children after 2 years = 300

So, the increase in the number of children

$$= 300-200 = 100$$

So, the percentage of increase

$$= \left(\frac{\text{Increase in children}}{\text{Original number of children before 2 years}}\times 100\right)\%$$

$$= \left(\frac{100}{200}\times 100\right)\% = \frac{100}{2}\% = 50\%$$

9. The population of a town before one year = 60,000

Increase percentage = 12%

Let the present population of a town be *x*.

Then, Present population of a town = population of a town before on year + 60000 of 12%

$$= 60000+60000\times\frac{12}{100}$$

$$= 60000+600\times 12$$

$$= 60000+7200$$

$$= 67200$$

Hence, the present population of a town is 67200.

10. Cost of petrol (in his childhood) = ₹ 2

Present cost of petrol = ₹ 48

Increase in ₹ = ₹ 48 – ₹ 2 = ₹ 46

Increase percentage of petrol $= \frac{\text{Increase amount}}{\text{Original amount}}\times 100\%$

$$= \left(\frac{46}{48}\times 100\right)\% = 2300\%$$

11. The price of a mobile before two months = ₹ 10000

Decrease amount = ₹ 2000

Decrease percentage $= \left(\frac{\text{Decrease amount}}{\text{Original amount}}\times 100\right)\%$

$$= \left(\frac{2000}{10000}\times 100\right)\%$$

$$= 20\%$$

12. Original amount of a shirt = ₹ 500

Increased value of a shirt = ₹ 540

Increasing value = ₹ $(540-500)$ = ₹ 40

Increase percentage $= \left(\frac{\text{Increasing value}}{\text{Original value}}\times 100\right)\%$

$$= \left(\frac{40}{500}\times 100\right)\%$$

$$= \frac{40}{5}\% = 8\%$$

Hence, 8% is percentage of increase in the price of shirt.

MCQs

1.	(a)	**2.**	(c)	**3.**	(b)	**4.**	(b)	**5.**	(b)
6.	(b)	**7.**	(a)	**8.**	(c)	**9.**	(a)	**10.**	(b)
11.	(c)	**12.**	(c)	**13.**	(b)	**14.**	(a)		

CHAPTER 7 : SIMPLE INTEREST

Exercise-7A

1. (a) **P = ₹ 1200, R = 5% p.a, T = 3 years**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$= \frac{1200 \times 5 \times 3}{100}$$

$$= ₹\ 180$$

(b) **P = ₹ 4500, R = $6\frac{1}{4}$% p.a. $\Rightarrow \frac{25}{4}$% p.a.**

T = 9 months = $\frac{9}{12}$ years

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$= \frac{4500 \times 25 \times 9}{100 \times 4 \times 12}$$

$$= ₹\ 210.94$$

(c) **P = ₹ 6050, R = 6.5% p.a., T= 4 years**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$= \frac{6050 \times 6.5 \times 4}{100}$$

$$= ₹\ 1573$$

(d) **P = ₹ 8250, R = 9% p.a., T = 18 months = $\frac{18}{12}$ years**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$= \frac{8250 \times 9 \times 18}{100 \times 12}$$

$$= ₹\ 1113.75$$

2. ***P*** **= ₹ 4200,** ***T*** **= 3 years** ***R*** **= 6.25% p.a.**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$= \frac{4200 \times 3 \times 6.25}{100}$$

$$= ₹\ 787.50$$

So, $\text{Amount} = P + \text{S.I.}$

$$= 4200 + 787.50$$

$$= ₹\ 4987.50$$

3. ***P*** **= ₹ 48000,** ***R*** **= 12%,** ***T*** **= 4 years**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$= \frac{48000 \times 12 \times 4}{100}$$

$$= ₹\ 23040$$

So, $\text{Amount} = P + \text{S.I.}$

$$= 48000 + 23040$$

$$= ₹\ 71040$$

4. **S.I = ₹ 594,** ***T*** **= $2\frac{1}{2}$ years = $\frac{5}{2}$ years,**

R **= 9% p.a.,** ***P*** **= ?**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$594 = \frac{P \times 9 \times 5}{100 \times 2}$$

or $$P = \frac{594 \times 2 \times 100}{9 \times 5}$$

$$= ₹\ 2640$$

So, Sushil borrowed ₹ 2640 as a loan.

5. ***P*** **= ₹ 56,000 ,** **S.I = ₹ 2800,** ***T*** **= 2 years,** ***R*** **= ?**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$2800 = \frac{56000 \times R \times 2}{100}$$

$$R = \frac{2800 \times 100}{56000 \times 2}$$

$$= \frac{280}{56 \times 2}$$

$$= 2.5\%$$

6. ***P*** **= ₹ 5000,** ***A*** **= ₹ 6200,** ***T*** **= 3 years**

S.I = ***A*** **–** ***P*** **= 6200 – 5000 = ₹ 1200**

R **= ?**

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$1200 = \frac{5000 \times R \times 3}{100}$$

$$R = \frac{1200 \times 100}{5000 \times 3}$$

$$R = 8\%$$

7. ***P*** **= ₹ 1500,** ***A*** **= ₹ 2040,** ***R*** **= 8%,** ***T*** **= ?**

$$\text{S.I} = A - P$$

$$= 2040 - 1500 = ₹\ 540$$

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$540 = \frac{1500 \times T \times 8}{100}$$

$$T = \frac{540 \times 100}{1500 \times 8}$$

$$= 4\frac{1}{2} \text{ years}$$

or 4 years and 6 months

8. $P = ₹\ 4800,\ A = ₹\ 7176,\ R = 9\%,\ T = ?$

$$\text{S.I} = A - P$$

$$= 7176 - 4800 = ₹\ 2376$$

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$2376 = \frac{4800 \times 9 \times T}{100}$$

$$T = \frac{2376 \times 100}{4800 \times 9}$$

$5\frac{1}{2}$ years $\Rightarrow$ 5 years 6 months

9. Let $P = x$

Then, $A = 2x$

$$R = 12\frac{1}{2}\% = \frac{25}{2}\%$$

$T = ?$

$$\text{S.I} = A - P$$

$$= 2x - x = x$$

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$x = \frac{x \times 25 \times T}{100 \times 2}$$

$$T = \frac{x \times 100 \times 2}{x \times 25}$$

$$T = 8 \text{ years}$$

10. Let $P = ₹\ x$

Then $A = ₹\ 3x$

$R = 15\%$

$T = ?$

$$\text{S.I} = A - P$$

$$= 3x - x = 2x$$

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$2x = \frac{x \times 15 \times T}{100}$$

$$T = \frac{2x \times 100}{15 \times x}$$

$$T = 13\frac{1}{3} \text{ years}$$

$$= 13 \text{ years } 4 \text{ month}$$

MCQs

1.	(a)	**2.**	(c)	**3.**	(b)	**4.**	(b)	**5.**	(b)
6.	(b)	**7.**	(a)	**8.**	(c)	**9.**	(a)	**10.**	(b)
11.	(c)	**12.**	(c)	**13.**	(b)	**14.**	(a)		

CHAPTER 8 : ALGEBRAIC EXPRESSIONS

Exercise-8A

1. **(a)** $y - 10$ **(b)** $m + 15$

(c) $\frac{mn}{3}$ **(d)** $x \times x = x^2$

(e) $z - 10x$ **(f)** $3xy + 6$

(g) $\frac{x+m}{4}$ **(h)** $ab - (a + b)$

(i) $m^2 - p^2$ **(j)** $\frac{x}{4} + 9z$

2. **(a)** $\mathbf{3xy - 5y^2 + 16 + 14m}$

variables $= 3xy, -5y^2, 14m$

constant $= 16$

(b) $\mathbf{-13 + 8x + 9y - 4y^2}$

variables $= 8x, 9y, -4y^2$

constant $= -13$

(c) $\mathbf{-9m^2 + 18 - 19p^2 + 16mn}$

variables $= -9m^2, -19p^2, 16mn$

constant $= +18$

(d) $\mathbf{13mn + 14mn^2 - 18p}$

variables $= 13mn, 14mn^2, -18p$

constant $= 0$

(e) $\mathbf{8x^2 - 17 + 4y^2 + 6xy}$

variables $= 8x^2, 4y^2, 6xy$

constant $= -17$

(f) $\mathbf{16l^2 + 4kl - 178mn + 4}$

variables $= 16l^2, 4\ kl, -17mn$

constant $= 4$

3. **(a)** $\mathbf{-5x + 6y^2 + 8}$

term $-5x = -5, x$

term $+6y^2 = 6,\ y^2$

term $8 = 8, 1$

(b) $\mathbf{5xy^2 + 4xy^2}$

term $5xy^2 = 5, x,\ y^2$

term $4xy^2 = 4, x,\ y^2$

(c) $-ab + 3b^2 - 8a^2$

term $-ab = -a, b$

term $3b^2 = 3, b^2$

term $-8a^2 = -8, a^2$

(d) $xy + 2x^2y^2$

term $xy = x, y$

term $2x^2y^2 = 2, x^2, y^2$

(e) $pq + q^2 - m^2$

term $pq = p, q$

term $q^2 = q^2$

term $-m^2 = -m^2$

(f) $1.6ab - 3.2b + 4a^2$

term $= 1.6ab = 1.6, a, b$

term $3.26 = -3.2, b$

term $4a^2 = 4, a^2$

(g) $y - y^3 + y^2$

term $y = y$

term $-y^3 = -y^3$

term $+y^2 = y^2$

(h) $mnp + n^2p - 6p^2$

term $mnp = m, n, p$

term $n^2p = n^2, p$

term $-6p^2 = -6, p^2$

(i) $\frac{3}{4}a^2 + \frac{1}{5}ab - 6$

term $\frac{3}{4}a^2 = \frac{3}{4}, a^2$

term $\frac{1}{5}ab = \frac{1}{5}, a, b$

term $-6 = -6$

4. (a) $-5xy + 4x^2 - 7y^2$

coefficient of $x^2 = 4$

(b) $2.4a^2 - 3.2b + 6a^2$

coefficient of $b = -3.2$

(c) $3x^2 - 5y + 7mn$

coefficient of $y = -5$

(d) $6x^2y - 4xy + 5$

coefficient of $xy = -4$

(e) $4y^2 - 3xy^2 + 14xy$

coefficient of $xy^2 = -3$

(f) $5y - 8y^2 + 7yx^2$

coefficient of $y^2 = -8$

(g) $-3m^2 + 6m + 4n^2$

coefficient of $m = 6$

(h) $-9m^2 + 6mn + 7n$

coefficient of $m^2 = -9$

5. (a) $-4x^2y, 9xyz, -13yx^2, 25x^2y, 16xyz, 7xzy$

Like terms $= -4x^2y, -13x^2y, 25x^2y$

Like terms $= 9xyz, 16xyz, 7xyz$

(b) $-3mn^2, 5n^2m, 15m^2n, 16nm^2, -9mn^2, 8n^2m$

Like terms $= -3mn^2, 5mn^2, -9mn^2, 8mn^2$

Like terms $= 15m^2n, 16nm^2$

(c) $10pq, 7pq^2r, -9qp, 13q^2pr, 18pq, 4q^2pr$

Like terms $= 10pq, -9pq, 18pq$

Like terms $= 7pq^2r, 13q^2pr, 4q^2pr$

(d) $-xy^2, -4yx^2, 8x^2, 2xy^2, 7y, -11x^2, 15x^2y, 18y$

Like terms $= -xy^2, 2xy^2$

Like terms $= -4yx^2, 15x^2y$

Like terms $= 8x^2, -11x^2$

Like terms $= 7y, 18y$

(e) $-9l^2m, 7p^2mn, 14ml^2, 10mp^2n, 21mnp^2, 3l^2m$

Like terms $= -9l^2m, 14ml^2, 3l^2m$

Like terms $= 7p^2mn, 10mp^2n, 21mnp^2$

(f) $-8yxz^2, 15xyz^2, 13y^2xz, 15xzy^2, -5xyz^2, xy^2z$

Like terms $= -8yxz^2, 15xyz^2, -5xyz^2$

Like terms $= 13y^2xz, 15xzy^2, xy^2z$

6. (a) $5m^2n - 16x^2y$ — Binomial

(b) $4\frac{x^2y}{z^2}$ — Monomial

(c) $19x^2y + 4xy - 9x^3y$ — Trinomial

(d) $17mn + 5m - 9n + 7p$ — Polynomial

(e) $4p^2q - 3py$ — Binomial

(f) $n^2 + l^2 + nl$ — Trinomial

(g) $ab - a^2 - b^2$ — Trinomial

(h) $5 - 3t$ — Binomial

(i) $15p^2 - 6 + 8a + 5b$ — Polynomial

(j) $a^2 + b^2$ — Binomial

(k) y^2z — Monomial

(l) $4t - 6t^2 + 7p$ — Trinomial

Exercise-8B

1. (a) $4mn, 6mn, -5mn$

$= 4mn + 6mn - 5mn$

$= 10mn - 5mn$

$= 5mn$

(b) $3np, -4np, 7np, 8pn$

$= 3np - 4np + 7np + 8np$

$= 18np - 4np$

$= 14np$

(c) $10x^2, -5x^2, 7x^2$

$= 10x^2 - 5x^2 + 7x^2$

$= 17x^2 - 5x^2$

$= 12x^2$

(d) $8m^2n, -6nm^2, 7mn, 4mn$

$= 8m^2n - 6m^2n + 7mn + 4mn$

$= 2m^2n + 11mn$

(e) $4x^2y, -3xy^{2,} -5xy^2, 3x^2y$

$= 4x^2y - 3xy^2 - 5xy^2 + 3x^2y$

$= 7x^2y - 8xy^2$

(f) $5m^2, -6m^2n^2, 4m^2n^{2,} 3m^2$

$= 5m^2 - 6m^2n^2 + 4m^2n^2 + 3m^2$

$= 8m^2 - 2m^2n^2$

2. (a) $3a^2b + 4b^2a - 6a^2b + 8ab^2 - 7ab^2$

$= 3a^2b - 6a^2b + 4ab^2 + 8ab^2 - 7ab^2$

$= -3a^2b + 5ab^2$

(b) $5m - 7n + 3n - 4m + 2 + 2m - 3mn + 7mn + 4$

$= 5m - 4m + 2m - 7n + 3n$

$\quad - 3mn + 7mn + 2 + 4$

$= 3m - 4n + 4mn + 6$

(c) $4x^2y - 6x^2y - 8yx^2 + 15xy + 7xy - 14yx$

$= 4x^2y - 6x^2y - 8x^2y + 15xy$

$\quad +7xy - 14xy$

$= 4x^2y - 14x^2y + 222xy - 14xy$

$= -10x^2y + 8xy$

(d) $14x + 10y - 12xy - 13 + 15 - 7x - 12y + 8xy$

$= 14x - 7x + 10y - 12y - 12xy$

$\quad + 8xy - 13 + 15$

$= 7x - 2y - 4xy + 2$

(e) $3y^2 + 5y - 4 - 8y + y^2 + 4 - 7y^2$

$= 3y^2 + y^2 - 7y^2 + 5y - 8y - 4 + 4$

$= -3y^2 - 3y + 0$

(f) $3a - 2b - ab + 2ab - 6b + 5a + 8ab$

$= 3a + 5a - 2b - 6b - ab + 2ab + 8ab$

$= 8a - 8b + 9ab$

3. (a) $5xyz + 3x^2y^2 - 15, 4xyz + 4x^2y^2 + 18$

$= 5xyz + 3x^2y^2 - 15 + 4xyz + 4x^2y^2 + 18$

$= 5xyz + 4xyz + 3x^2y^2 + 4x^2y^2 - 15 + 18$

$= 9xyz + 7x^2y^2 + 3$

(b) $-2x^2 + 4xy - 16, \ 3x^2 - 6xy + 18 + 13y^2$

$= -2x^2 + 4xy - 16 + 3x^2 - 6xy + 18 + 13y^2$

$= -2x^2 + 3x^2 + 4xy - 6xy + 13y^2 - 16 + 18$

$= x^2 - 2xy + 13y^2 + 2$

(c) $19mn^2 - 6mnp + 8n^2, \ 16n^2m + 8mnp - 6n^2$

$= 19mn^2 - 6mnp + 8n^2 + 16n^2m + 8mnp - 6n^2$

$= 19mn^2 + 16mn^2 - 6mnp + 8mnp + 8n^2 - 6n^2$

$= 35mn^2 + 2mnp + 2n^2$

(d) $5x^2y - 5x^2 + 3y^2, \ 6x^2 - 4y^2 - 10x^2y$

$= 5x^2y - 5x^2 + 3y^2 + 6x^2 - 4y^2 - 10x^2y$

$= 5x^2y - 10x^2y - 5x^2 + 6x^2 + 3y^2 - 4y^2$

$= 5x^2y - x^2 - y^2$

(e) $\frac{3}{7}m^2n - \frac{2}{5}mn + 10, \ \frac{4}{7}nm^2 + \frac{1}{5}mn - 5$

$= \frac{3}{7}m^2n - \frac{2}{5}mn + 10 + \frac{4}{7}nm^2 + \frac{1}{5}mn - 5$

$= \frac{3}{7}m^2n + \frac{4}{7}m^2n - \frac{2}{5}mn + \frac{1}{5}mn + 10 - 5$

$= m^2n\left(\frac{3}{7} + \frac{4}{7}\right) - mn\left(\frac{2}{5} - \frac{1}{5}\right) + 5$

$= m^2n - \frac{mn}{5} + 5$

(f) $\frac{4}{11}xy^2 - \frac{6}{13}y^2 + 18x^2, \ \frac{5}{11}xy^2 + \frac{5}{13}y^2 - 19x^2$

$= \frac{4}{11}xy^2 - \frac{6}{13}y^2 + 18x^2 + \frac{5}{11}xy^2$

$\quad + \frac{5}{13}y^2 - 19x^2$

$= \frac{4}{11}xy^2 + \frac{5}{11}xy^2 - \frac{6}{13}y^2 + \frac{5}{13}y^2$

$\quad + 18x^2 - 19x^2$

$= \frac{9}{11}xy^2 - \frac{1}{13}y^2 - x^2$

4. (a) $4y^2 + 7y - 16$ **from** $18y - 8y^2 + 19$

$= (18y - 8y^2 + 19) - (4y^2 + 7y - 16)$

$= 18y - 8y^2 + 19 - 4y^2 - 7y + 16$

$= 18y - 7y - 8y^2 - 4y^2 + 19 + 16$

$= 11y - 12y^2 + 35$

(b) $-m^2+6mn+10n^2$ **from** $7mn-5n^2+2m^2$

$=(7mn-5n^2+2m^2)-(-m^2+6mn+10n^2)$

$=7mn-5m^2+2m^2+m^2-6mn-10n^2$

$=mn-15n^2+3m^2$

(c) $-x^2+10x-5$ **from** $13-10x$

$=(13-10x)-(-x^2+10x-5)$

$=13-10x+x^2-10x+5$

$=x^2-20x+18$

(d) $5pq-4p^2+3q^2$ **from** $3p^2-2q^2-3pq$

$=(3p^2-2q^2-3pq)-(5pq-4p^2+3q^2)$

$=3p^2-2q^2-3pq-5pq+4p^2-3q^2$

$=3p^2+4p^2-2q^2-3q^2-3pq-5pq$

$=7p^2-5q^2-8pq$

(e) $5a^2-8ab+4b^2$ **from** $3ab-2a^2-5b^2$

$=(3ab-2a^2-5b^2)-(5a^2-8ab+4b^2)$

$=3ab-2a^2-5b^2-5a^2+8ab-4b^2$

$=3ab+8ab-2a^2-5a^2-5b^2-4b^2$

$=11ab-7a^2-9b^2$

(f) x^3-y^3-5xyz **from** $3x^3+2y^3+6xyz$

$=(3x^3+2y^3+6xyz)-(x^3-y^3-5xyz)$

$=3x^3+2y^3+6xyz-x^3+y^3+5xy^3z$

$=3x^3-x^3+2y^3+y^3+6zyz+5zyz$

$=2x^3+3y^3+11xyz$

5. What should be added to m^2+mn+n^2 to obtain $3m^2-5mn+6n^2$?

Sol. $(3m^2-5mn+6n^2)-(m^2+mn+n^2)$

$=3m^2-5mn+6n^2-m^2-mn-n^2$

$=3m^2-m^2-5mn-mn+6n^2-n^2$

$=2m^2-6mn+5n^2$

So, $2m^2-6mn+5n^2$ should be added to m^2+mn+n^2 to obtain $3m^2-5mn+6n^2$

6. What should be added to $3a^2-6ab+2b^2$ to obtain $-a^2+7ab-3b^2$?

Sol. $(-a^2+7ab-3b^2)-(3a^2-6ab+2b^2)$

$=-a^2+7ab-3b^2-3a^2+6ab-2b^2$

$=-a^2-3a^2+7ab+6ab-3b^2-2b^2$

$=-4a^2+13ab-5b^2$

So, $-4a^2+13ab-5b^2$ should be added to $x^2-6ab+2b^2$ to obtain $-a^2+7ab-3b^2$.

7. What should be subtracted from $2a+8b+10$ to get $-4b+8a-6$?

Sol. $(2a+8b+10)-(-4b+8a-6)$

$=2a+8b+10+4b-8a+6$

$=2a-8a+8b+4b+10+6$

$=-6a+12b+16$

So, $(-6a+12b+16)$ should be subtracted from $(2a+8b+10)$ to get $-4b+8a-6$.

8. What should be taken away from $-x^2+3xy+2y$ to obtain $4x^2-2xy-3y^2$?

Sol. $(-x^2+3xy+2y^2)-(4x^2-2xy-3y^2)$

$=-x^2+3xy+2y^2-4x^2+2xy+3y^2$

$=-x^2-4x^2+3xy+2xy+2y^2+3y^2$

$=-5x^2+5xy+5y^2$

So, $(-5x^2+5xy+5y^2)$ should be taken away from $(-x^2+3xy+2y^2)$ to obtain $(4x^2-2xy-3y^2)$.

9. Subtract the sum of $a^2+ab+6b^2$ and $-5a^2+3b^2$ from the sum of $-3a^2-6ab$ and $4a^2+5b^2-2ab$.

Sol. $(-3a^2-6ab+4a^2+5b^2-2ab)$

$-(a^2+ab+6b^2-5a^2+3b^2)$

$=(-3a^2+4a^2-6ab-2ab+5b^2)$

$-(a^2-5a^2+ab+6b^2+3b^2)$

$=(a^2-8ab+5b^2)-(-4a^2+ab+9b^2)$

$=a^2-8ab+5b^2+4a^2-ab-9b^2$

$=a^2+4a^2-8ab-ab+5b^2-9b^2$

$=5a^2-9ab-4b^2$

10. Subtract the sum of $m^2-mn+3n^2$ and $2m^2+2mn-7n^2$ from $8mn$.

Sol. $8mn-[m^2-mn+3n^2+2m^2+2mn-7n^2]$

$=8mn-[m^2+2m^2-mn+2mn+3n^2-7n^2]$

$=8mn-[3m^2+mn-4n^2]$

$=8mn-3m^2-mn+4n^2$

$=8mn-mn-3m^2+4n^2$

$=7mn-3m^2+4n^2$

Exercise-8C

1. Find the value of the following expressions for $x=-2$:

(a) x^2-3x

Putting the value of x

$=(-2)^2-3\times(-2)$

$=4+6$

$=10$

(b) $4x-3x^3$

Putting the value of x

$=4\times-2-3\times(-2)^3$

$=-8-3\times(-8)$

$=-8+24$

$=16$

(c) $x^3 + 4x^2 - 4$

Putting the value of x

$= (-2)^3 + 4 \times (-2)^2 - 4$

$= -8 + 4 \times 4 - 4$

$= -12 + 16$

$= 4$

(d) $4x^3 + 6x^2 + 4$

Putting the value of x

$= 4 \times (-2)^3 + 6 \times (-2)^2 + 4$

$= 4 \times (-8) + 6 \times 4 + 4$

$= -32 + 24 + 4$

$= -4$

(e) $9x - 7x^2 + 2$

Putting the value of x

$= 9 \times -2 - 7 \times (-2)^2 + 2$

$= -18 - 7 \times 4 + 2$

$= -18 - 28 + 2$

$= -44$

(f) $x^4 - x^3 + 7x$

Putting the value of x

$= (-2)^4 - (-2)^3 + 7 \times -2$

$= 16 - (-8) - 14$

$= 16 + 8 - 14$

$= 24 - 14 = 10$

2. Find the value of the following expressions for $p = -3$:

(a) $3p^2 - 7p + 6$

$= 3 \times (-3)^2 - 7 \times -3 + 6$

$= 3 \times 9 + 21 + 6$

$= 27 + 21 + 6$

$= 27 + 27$

$= 54$

(b) $2p^2 - 7p + 61$

$= 2 \times (-3)^2 - 7 \times -3 + 61$

$= 2 \times 9 + 21 + 61$

$= 18 + 21 + 61$

$= 100$

(c) $4p - 17p^2 + 2$

$= 4 \times -3 - 17 \times (-3)^2 + 2$

$= -12 - 17 \times 9 + 2$

$= -12 - 153 + 2$

$= -10 - 153$

$= -163$

(d) $p^2 + p + 16$

$= (-3)^2 + (-3) + 16$

$= 9 - 3 + 16$

$= 22$

(e) $7p + 4p^3 + 17$

$= 7 \times -3 + 4 \times (-3)^3 + 17$

$= -21 + 4 \times (-27) + 17$

$= -21 - 108 + 17$

$= -129 + 17$

$= -112$

(f) $2p^3 - 2p^2 + 4p$

$= 2 \times (-3)^3 - 2 \times (-3)^2 + 4 \times (-3)$

$= 2 \times -27 - 2 \times 9 - 12$

$= -54 - 18 - 12$

$= -54 - 30$

$= -84$

3. Find the value of the following expressions for $x = 1$, $y = -2$ and $z = 3$:

(a) $3x - 4x^2 + 3xyz$

$= 3 \times 1 - 4 \times (1)^2 + 3 \times 1 \times -2 \times 3$

$= 3 - 4 - 18$

$= 3 - 22$

$= -19$

(b) $x^3 + y^3 + z^3 - 3xzy$

$= (1)^3 + (-2)^3 + (3)^3 - 3 \times 1 \times -2 \times 3$

$= 1 - 8 + 27 + 18$

$= 46 - 8$

$= 38$

(c) $4x^3 - 3z^2 + y$

$= 4 \times (1)^3 - 3 \times (3)^2 + (-2)$

$= 4 - 3 \times 9 + (-2)$

$= 4 - 27 - 2$

$= 4 - 29$

$= -25$

(d) $4x^2 + 5y^3 - 6z$

$= 4 \times (1)^2 + 5 \times (-2)^3 - 6 \times 3$

$= 4 + 5 \times -8 - 18$

$= 4 - 40 - 18$

$= 4 - 58$

$= -54$

(e) $(x + y + z)^2 - 3xyz$

$= (1 - 2 + 3)^2 - 3 \times 1 \times -2 \times 3$

$= 4 + 18$

$= 22$

(f) $4y^3 + 3x^2 + 4$

$= 4\times(-2)^3 + 3\times(1)^2 + 4$

$= 4\times -8 + 3 + 4$

$= -32 + 7$

$= -25$

4. Find the value of the following expressions for $a = 2$, $b = 3$ and $c = 0$:

(a) $2a^2b + 3b^2 - ab$

$= 2\times(2)^2\times 3 + 3\times(3)^2 - 2\times 3$

$= 2\times 4\times 3 + 3\times 9 - 6$

$= 24 + 27 - 6$

$= 51 - 6$

$= 45$

(b) $2a - 7b\,(b + 2)$

$= 2\times 2 - 7\times 3(3 + 2)$

$= 4 - 21(5)$

$= 4 - 105$

$= -101$

(c) $4a + 2\,(b - c)$

$= 4\times 2 + 2(3 - 0)$

$= 8 + 6$

$= 14$

(d) $3a^3 - b^2 + 6ab$

$= 3\times(2)^3 - (3)^2 + 6\times 2\times 3$

$= 3\times 8 - 9 + 36$

$= 24 - 9 + 36$

$= 60 - 9$

$= 51$

(e) $2a^3b + 3c^2 - 2ab$

$= 2\times(2)^3\times 3 + 3\times(0)^2 - 2\times 2\times 3$

$= 2\times 8\times 3 + 3\times 0 - 12$

$= 48 + 0 - 12$

$= 48 - 12$

$= 36$

(f) $6c^2 - 4a + 3b^3$

$= 6\times(0)^2 - 4\times 2 + 3\times(3)^3$

$= 6\times 0 - 8 + 3\times 27$

$= 0 - 8 + 81$

$= 73$

5. Find the value of the following expressions for $m = 2$, $n = -3$ and $p = 1$:

(a) $m^2 + 3mn + p$

$= (2)^2 + 3\times 2\times -3 + 1$

$= 4 - 18 + 1$

$= -13$

(b) $m^2 + mn - 7p$

$= (2)^2 + 2\times -3 - 7\times 1$

$= 4 - 6 - 7$

$= 4 - 13$

$= -9$

(c) $16m - 17n + 10$

$= 16\times 2 - 17\times -3 + 10$

$= 32 + 51 + 10$

$= 93$

(d) $6m - 7p^2 + 4n^2$

$= 6\times 2 - 7\times(1)^2 + 4\times(-3)^2$

$= 12 - 7\times 1 + 4\times 9$

$= 12 - 7 + 36$

$= 48 - 7$

$= 41$

(e) $6m\,(m + n) + 10$

$= 6\times 2(2 - 3) + 10$

$= 12\times -1 + 10$

$= -12 + 10$

$= -2$

(f) $4\,(4m - 1) + 3n$

$= 4\,(4\times 2 - 1) + 3\times(-3)$

$= 4\,(8 - 1) + (-9)$

$= 4\times 7 - 9$

$= 28 - 9$

$= 19$

6. Find the value of the following expressions for $x = 1$, $y = -2$, $z = 2x$, $m = 2$, $n = 3m$ and $p = 2n$:s

(a) $3x^2 - 2y^3 + xz + 2m$

$= 3\times(1)^2 - 2\times(-2)^3 + 1\times 2x + 2\times 2$

$= 3\times 1 - 2\times -8 + 1\times 2\times 1 + 4$

$= 3 + 16 + 2 + 4$

$= 25$

(b) $4x^3 + z^2 - 10mn + p$

$= 4\times(1)^3 + (2x)^2 - 10\times 2\times 3m + 2n$

$= 4\times 1 + 4x^2 - 20\times 3\times 2 + 2\times 3m$

$= 4 + 4\times 1 - 120 + 2\times 3\times 2$

$= 4 + 4 - 120 + 12$

$= 20 - 120$

$= -100$

(c) $6m^2 - 2mn + 3n^2 + p$

$= 6\times(2)^2 - 2\times m\times 3m + 3\times(3m)^2 + 2n$

$= 6\times 4 - 6m^2 + 3\times 9m^2 + 2\times 3m$

$= 24 - 6\times(2)^2 + 3\times 9\times(2)^2 + 2\times 3\times 2$

$= 24 - 6\times 4 + 27\times 4 + 12$

$= 24 - 24 + 108 + 12$

$= 120$

(d) $17x^2 - 14y^3 + 2mnp$

$= 17\times(1)^2 - 14\times(-2)^3 + 2\times 2\times 3m\times 2n$

$= 17\times 1 - 14\times(-8) + 2\times 2\times 3\times 2\times 2\times 3m$

$= 17 + 112 + 4\times 6\times 6\times 2$

$= 17 + 112 + 24\times 12$

$= 17 + 112 + 288$

$= 417$

(e) $2(x^2 + xy) + 3 - 3n$

$= 2((1)^2 + 1\times -2) + 3 - 3\times 3m$

$= 2(1-2) + 3 - 3\times 3\times 2$

$= 2\times(-1) + 3 - 18$

$= -2 + 3 - 18$

$= -2 + 3 - 18$

$= -20 + 3$

$= -17$

(f) $n^3 - 3(n - 10p) + 15$

$= (3m)^3 - 3(3m - 10\times 2n) + 15$

$= 27\times(m)^3 - 3(3\times(2) - 10$

$\times 2\times 3\times m) + 15$

$= 27\times(2)^3 - 3(6 - 60\times 2) + 15$

$= 27\times 8 - 3(6 - 120) + 15$

$= 216 - 3\times -114 + 15$

$= 216 + 442 + 15$

$= 673$

MCQs

1.	(a)	**2.**	(c)	**3.**	(b)	**4.**	(b)	**5.**	(b)
6.	(b)	**7.**	(a)	**8.**	(c)	**9.**	(a)	**10.**	(b)
11.	(c)	**12.**	(c)	**13.**	(b)	**14.**	(a)		

CHAPTER 9 : THE TRIANGLE AND ITS PROPERTIES

Exercise-9A

1. Find the value of the unknown in the following figures :

(a) $\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$x° + 120° + 30° = 180°$

$x° + 150° = 180°$

$x = 180° - 150°$

$x = 30°$

(b) $\angle P + \angle Q + \angle R = 180°$

(Angle sum property in triangle)

$40° + 2x + 2x = 180°$

$4x = 180° - 40°$

$x = \frac{140°}{4}$

$x = 35°$

(c) $\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$x° + 90° + x° = 180°$

$2x° + 90° = 180°$

$2x° = 180° - 90°$

$2x° = 90°$

$x = \frac{90°}{2}$

$x = 45°$

(d) $\angle M + \angle N + \angle S = 180°$

(Angle sum property in triangle)

$2x° + 90° + x° = 180°$

$3x° + 90° = 180°$

$3x = 180° - 90°$

$3x° = 90°$

$x = \frac{90°}{3}$

$x = 30°$

(e) $\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$x° + 50° + 50° = 180°$

$x° + 100° = 180°$

$x = 180° - 100°$

$x° = 80°$

So, $\angle A = \frac{k}{3} = \frac{180°}{3} = 60°$

$\angle B = \frac{k}{6} = \frac{180°}{6} = 30°$

$\angle C = \frac{k}{2} = \frac{180°}{2} = 90°$

8. Let $2\angle P = 3\angle Q = 6\angle R = k$

Then, $2\angle P = k$

$\angle P = \frac{k}{2}$

$3\angle Q = k \Rightarrow Q = \frac{k}{3}$

$6\angle R = k$

$\angle R = \frac{k}{6}$

In ΔPQR

$\angle P + \angle Q + \angle R = 180°$

(Angle sum property in triangle)

$\frac{k}{2} + \frac{k}{3} + \frac{k}{6} = 180°$

$\frac{3k + 2k + k}{6} = 180°$

$\frac{6k}{6} = 180°$

So, $\angle P = \frac{k}{2} = \frac{180°}{2} = 90°$

$\angle Q = \frac{k}{3} = \frac{180°}{3} = 60°$

$\angle R = \frac{k}{6} = \frac{180°}{6} = 30°$

9. $PQ = PR$ (given)

So, $\angle Q = \angle R$ (Isosceles triangle)

So, $\angle R = 60°$

$\angle Q = 60°$ (given)

Now, In ΔPQR

$\angle P + \angle Q + \angle R = 180°$

(Angle sum property in triangle)

$y° + 60° + 60° = 180°$

$y + 120° = 180°$

$y = 180° - 120°$

$y = 60°$

$MN \parallel QR$

So, $\angle Q = \angle M = 60°$

and $\angle N = \angle R = 60°$

So, $x = 60°$ and $y = 60°$ **Ans**

10. In ΔADC,

$\angle A + \angle D + \angle C = 180°$

(Angle sum property in triangle)

$x° + 90° + 2x = 180°$

$3x + 90° = 180°$

$3x = 180° - 90°$

$3x = 90°$

$x = \frac{90°}{3}$

$x = 30°$

11. **(a)** equal **(b)** 60° **(c)** one **(d)** 180°

12. **(a)** Yes **(b)** Yes **(c)** No **(d)** Yes **(e)** No

Exercise-9B

1. **Find the value of the unknown angle *x* and *y* in the following figures :**

(a) $\angle C = \angle A + \angle B$

(Exterior angle equals to sum of opposite interior angles)

$120° = x + 70°$

$x = 120° - 70°$

$x = 50°$

(b) **In ΔPQR**

$\angle P + \angle Q + \angle R = 180°$

(Angle sum property in triangle)

$65° + 70° + x = 180°$

$135 + x = 180°$

$x = 180° - 135°$

$x = 45°$

Now, $\angle PRS = \angle RPQ + RQP$

(Exterior angle equals to sum of opposite interior angles

$y = 65° + 70°$

$y = 135°$

(c) In Isosceles triangle ABC

$\angle B = \angle C = 50°$ ($\because AC = AB$)

$\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$y + 50° + 50° = 180°$

$y + 100° = 180°$

$y = 180° - 100°$

$y = 80°$

and $\angle ACD = \angle CAB + \angle CBA$

(Exterior angle equals to sum of opposite interior angles

$x = 80° + 50°$

$x = 130°$

(d) $\angle MPQ + \angle MPN = 180°$ (Linear Pair)

$125° + \angle MPN = 180°$

$\angle MPN = 180° - 125°$

$\angle MPN = 55°$

or $\angle P = 55°$

Now $\angle MNQ + \angle MNP = 180°$ (Linear pair)

$120° + \angle MNP = 180°$

$\angle MNP = 180° - 120°$

$\angle MNP = 60°$

or $\angle N = 60°$

In ΔMPN

$\angle M + \angle P + \angle N = 180°$

(Angle sum property in triangle)

$y + 55° + 60° = 180°$

$x + 115° = 180°$

$x = 180° - 115°$

$x = 65°$

(e) $\angle x = \angle 90°$

($\because$ vertical opposite angles are equal)

$x = 90°$

In ΔABC

$\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$\angle 40° + Y + 90° = 180°$

$y + 130° = 180°$

$y = 180° - 130°$

$y = 50°$

(f) In ΔMNO

$MO = ON$

So, $\angle M = \angle N$

or $y = 50°$

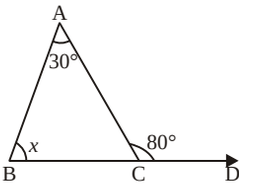
Now $\angle O = \angle M + \angle N$

(Exterior angle equals to sum of opposite interior angles

$x = 50° + 50°$

$x = 100°$

2. $\angle C = \angle A + \angle B$



(Exterior angle equals to sum of opposite interior angles

$80° = 8x + 30°$

$x = 50°$

Now, In ΔABC

$\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$30° + 50° + \angle C = 180°$

$80° + \angle C = 180°$

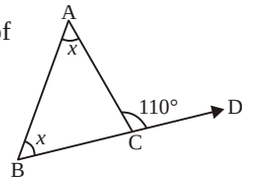
$\angle C = 180° - 80°$

$\angle C = 100°$

So, angles are 30° , 50° and 100° and it is obtuse triangle.

3. Let both opposite interior angles are x.

So, $\angle C = \angle A + \angle B$



(Exterior angle equals to sum of opposite interior angles)

$110° = x + x$

$2x = 110°$

$x = \frac{110°}{2}$

$x = 55°$

Now, In ΔABC

$\angle A + \angle B + \angle C = 180°$

(Angle sum property in triangle)

$55° + 55° + \angle C = 180°$

$\angle C + 110° = 180°$

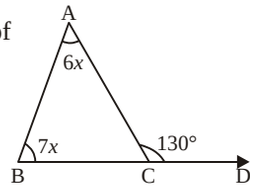
$\angle C = 180° - 110°$

$\angle C = 70°$

So, angles are 55° , 55° and 70° and it is acute angled triangle.

4. Let interior opposite angles are $6x$ and $7x$

So, $\angle C = \angle A + \angle B$



(Exterior angle equals to sum of opposite interior angles)

$130° = 6x + 7x$

$13x = 130°$

$x = \frac{130°}{13}$

$x = 10°$

So, $\angle A = 6 \times 10° = 60°$

$\angle B = 7 \times 10° = 70°$

Now, $\angle C + 130° = 180°$ (Linear pair)

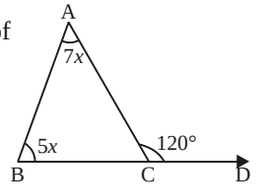
$\angle C = 50°$

So, Angles are 50° , 60° , 70°.

5. Let interior opposite angles are $7x$ and $5x$

So, $\angle C = \angle A + \angle B$

(Exterior angle equals to sum of opposite interior angles)



$$120° = 7x + 5x$$
$$12x = 120°$$
$$x = \frac{120°}{12}$$
$$x = 10°$$

So, $\angle A = 7 \times 10° = 70°$

$\angle B = 5 \times 10° = 50°$

Now, In ΔABC

$$\angle A + \angle B + \angle C = 180°$$
$$70° + 50° + \angle C = 180°$$
$$\angle C + 120° = 180°$$
$$\angle C = 180° - 120°$$
$$\angle C = 60°$$

So, angles are 70° , 50° and 60°.

6. In ΔEBD

$$\angle E = \angle B + \angle D$$

(Exterior angle equals to sum of opposite interior angles)

$$115° = x + 55°$$
$$x = 115° - 55°$$
$$x = 60°$$

Now In ΔABC

$$AB = AC$$

So, $\angle B = \angle C = 60°$

$\angle C + y = 180°$ (Linear pair)

$60° + y = 180°$

$y = 180° - 60°$

$y = 120°$

7. $\angle x = \angle P + \angle Q$

(Exterior angle equals to sum of opposite interior angles)

$$x = 40° + 58°$$
$$x = 98°$$

Now In ΔMRS

$$\angle M + \angle R + \angle S = 180°$$

(Angle sum property in triangle)

$$35° + 98° + y = 180°$$
$$y + 133° = 180°$$
$$y + 133° = 180°$$
$$y = 180° - 133°$$
$$y = 47°$$

8. $AB = AD$

So, $\angle B = \angle D$ (Isosceles angles)

So, $\angle D = 50°$

Now, $x + \angle D = 180°$ (Linear pair)

$x + 50° = 180°$

$x = 180° - 50°$

$x = 130°$

and $\angle y = \angle A + \angle D$

(Exterior angle equals to sum of opposite interior angles)

$y = 25° + 50°$

$y = 75°$ **Ans**

Exercise-9C

1. Is it possible to draw a triangle, if the lengths of whose sides are :

(a) 3 cm, 4 cm and 5 cm

3 cm + 4 cm > 5 cm

7 cm > 5 cm

So, It is possible to make triangle.

(b) 6 cm, 7 cm and 10 cm

6 cm + 7 cm > 10 cm

13 cm > 10 cm

So, yes It is possible to make triangle.

(c) 11 cm, 15 cm and 14 cm

11 cm + 14 cm > 15 cm

25 cm > 15 cm

So, yes It is possible to draw triangle.

(d) 9 cm, 10 cm and 20 cm

9 cm + 10 cm < 20 cm

19 cm < 20 cm

So, No, It is not possible to draw a triangle.

(e) 5 cm, 8 cm and 13 cm

5 cm + 8 cm = 13 cm

13 cm = 13 cm

So, No, Triangle is not possible.

(f) 7 cm, 6 cm and 12 cm

7 cm + 6 cm > 12 cm

13 cm > 12 cm

So, Yes, Triangle is possible.

(g) 10.5 cm, 4 cm, and 15 cm

10.5 cm + 4 cm < 15 cm

14.5 cm < 15 cm

No, Triangle is not possible.

(h) 8.5 cm, 6.2 cm and 3.8 cm

3.8 cm + 6.2 cm > 8.5 cm

10.00 cm > 8.5 cm

So, Yes, Triangle is possible.

2. In the given figure, *ABCD* is a quadrilateral and *BD* is a diagonal, then fill in the blanks :

(a) BD **(b)** CD **(c)** CD **(d)** BD

3. In the adjoining figure *ABC* is a triangle. Is :

(a) Yes **(b)** No **(c)** Yes

4. In quadrilateral *PQRS*. Is :

(a) Yes **(b)** Yes **(c)** No **(d)** Yes

5. Length of two sides = 5 cm and 8 cm

So third side will lie between = $8-5$ to $8+3$

= 3 cm to 13 cm

6. Length of two sides = 3.5 cm and 5.3 cm

So third side will lie between = 5.3 cm – 3.5 cm + 0

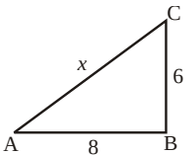
= 5.3 cm + 3.5 cm

= 1.8 cm to 8.8 cm

Exercise-9D

1. Find the unknown length y in the following figures :

(a) In ΔABC



By Phythagoras Theorem

$AC^2 = AB^2 + BC^2$

$x^2 = 8^2 + 6^2$

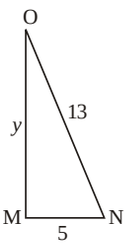
$x^2 = 64 + 36$

$x^2 = 100$

$x = \sqrt{100}$

$x = 10$ **Ans**

(b) In ΔMNO



By Phythagoras Theorem

$ON^2 = OM^2 + MN^2$

$13^2 = y^2 + 5^2$

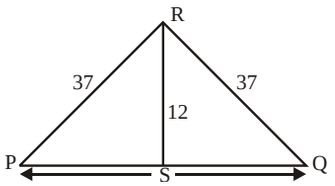
$169 = y^2 + 25$

$y^2 = 169 - 25$

$y^2 = 144$

$y = 12$ **Ans**

(c)



In ΔRPS

By Phythagoras theorem

$PR^2 = RS^2 + PS^2$

$(37)^2 = 12^2 + PS^2$

$1369 = 144 + PS^2$

$PS^2 = 1369 - 144$

$PS^2 = 1225$

$PS = \sqrt{1225}$

$PS = 35$

In ΔRQS

By Pythagors theorem

$PQ^2 = RS^2 + SQ^2$

$37^2 = 12^2 + SQ^2$

$1369 = 144 + SQ^2$

$SQ^2 = 1369 - 144$

$SQ^2 = 1225$

$SQ = \sqrt{1225}$

$SQ = 35$

$PQ = PS + SQ$

$= 35 + 35 = 70$ **Ans**

2. (a) 8 cm, 15 cm and 17 cm

In Right angle triangle.

$H^2 = P^2 + B^2$

$17^2 = 8^2 + 15^2$

$289 = 64 + 225$

$289 = 289$

So, It is Right angle triangle. **Ans**

(b) 12 cm, 15 cm, 17 cm

In Right angle triangle.

$H^2 = P^2 + B^2$

$17^2 = 5^2 + 12^2$

$284 = 225 + 144$

$289 \neq 379$

So, It is not right angle triangle. **Ans**

(c) 6 cm, 11 cm and 15 cm

In Right angle triangle.

$H^2 = P^2 + B^2$

$15^2 = b^2 + 11^2$

$225 = 36 + 121$

$225 \neq 157$

So, It is not right angle triangle. **Ans**

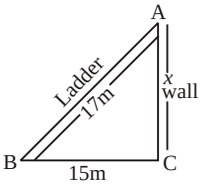
(d) 5 cm, 24 cm and 25 cm

In Right angle triangle.

$$H^2 = P^2 + B^2$$
$$25^2 = 5^2 + 24^2$$
$$625 = 25 + 576$$
$$625 \neq 601$$

So, It is not right angle triangle. **Ans**

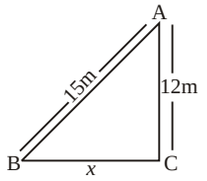
3. In ΔABC



$$AB^2 = BC^2 + AC^2$$
$$17^2 = x^2 + 15^2$$
$$289 = x^2 + 225$$
$$x^2 = 64$$
$$x = \sqrt{64}$$
$$x = 8\text{ m}$$

So height of wall = 8 m. **Ans**

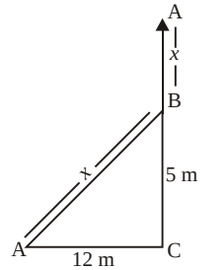
4. In ΔABC



$$AB^2 = BC^2 + AC^2$$
$$15^2 = x^2 + 12^2$$
$$225 = x^2 + 144$$
$$x^2 = 225 - 144$$
$$x^2 = 81$$
$$x = \sqrt{81}$$
$$x = 9\text{ m}$$ **Ans**

The distance of the fort of the ladder from the wall is 9 m.

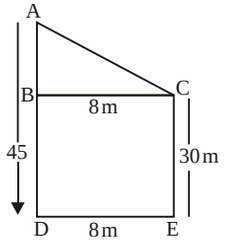
5. In ΔABC



$$AB^2 = BC^2 + AC^2$$
$$x^2 = 5^2 + 12^2$$
$$x^2 = 25 + 144$$
$$x^2 = 169$$
$$x = \sqrt{169}$$
$$x = 13$$

So height of tree $13 + 5 = 18$ m. **Ans**

6. In ΔABC



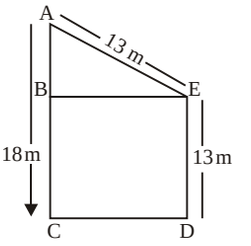
$AB = 15$ m

$BC = 8$ m

$AC = ?$

$$AC^2 = AB^2 + BC^2$$
$$AC^2 = 15^2 + 8^2$$
$$AC^2 = 225 + 64$$
$$AC^2 = 289$$
$$AC = \sqrt{289}$$
$$AC = 17\text{ m}$$ **Ans**

7. In ΔABE



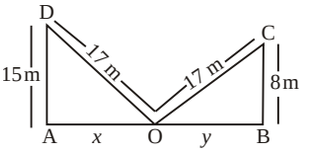
$AB = 5$ m

$AE = 13$ m

$BE = ?$

$$AE^2 = AB^2 + BE^2$$
$$13^2 = 5^2 + BE^2$$
$$169 = 25 + BE^2$$
$$BE^2 = 144$$
$$BE = \sqrt{144}$$
$$BE = 12\text{ m}$$ **Ans**

8. In ΔBOC



$OB = y$

$BC = 8$ m

$CO = 17$ m

$$OC^2 = OB^2 + BC^2$$
$$17^2 = y^2 + 8^2$$
$$289 = y^2 + 64$$
$$y^2 = 289 - 64$$
$$y^2 = 225$$
$$y = \sqrt{225}$$
$$y = 15\text{ m}$$

Now, In ΔAOD

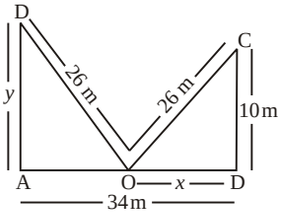
$AO = x$, $AD = 15$ m, $OD = 17$ m

$$OD = AO^2 + AD^2$$
$$(17)^2 = x^2 + 15^2$$
$$289 = x^2 + 225$$
$$x^2 = 289 - 225$$
$$x^2 = 64$$
$$x = \sqrt{64}$$
$$x = 8\text{ m}$$

Now, width of the street = AB

$$= AO + OB$$
$$= x + y$$
$$= 8 + 15$$
$$= 23\text{ m}$$ **Ans**

9. In ΔOBC



$OB = x$ m

$BC = 10$ m

$OC = 26$ m

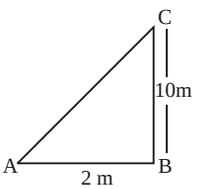
$$OC^2 = OB^2 + BC^2$$
$$26^2 = x^2 + 10^2$$
$$676 = x^2 + 100$$
$$x^2 = 676 - 100$$
$$x^2 = 576$$
$$x = \sqrt{576}$$
$$x = 24\text{ m}$$

Now $AO = AB - OB$
$$= 34 - 24$$
$$= 10\text{ m}$$

In ΔAOD
$$OD^2 = AD^2 + AO^2$$
$$26^2 = y^2 + 10^2$$
$$676 = y^2 + 100$$
$$y^2 = 576$$
$$y = \sqrt{576}$$
$$y = 24\text{ m}$$

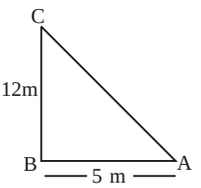
So, the height of roof = 24 m **Ans**

10. In ΔABC



$$AC^2 = BC^2 + AB^2$$
$$AC^2 = (10)^2 + (24)^2$$
$$AC^2 = 100 + 576$$
$$AC^2 = 676$$
$$AC = \sqrt{676}$$
$$AC = 26\text{ m}$$ **Ans**

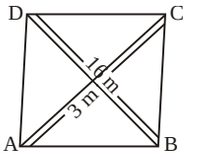
11. In ΔABC



$$AC^2 = BA^2 + BC^2$$
$$AC^2 = 5^2 + 12^2$$
$$AC^2 = 25 + 144$$
$$AC^2 = 169$$
$$AC = \sqrt{169}$$
$$AC = 13\text{ m}$$ **Ans**

12. $AC = 30\text{ m}$

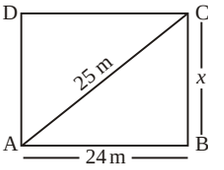
$$OA = \frac{30}{2} = 15\text{ m}$$
$$BD = 16\text{ m}$$
$$BD = 16\text{ m}$$
$$OB = \frac{16}{2}\text{ m}$$
$$= 8\text{ m}$$



In ΔAOB
$$AB^2 = AO^2 + OB^2$$
$$AB^2 = 15^2 + 8^2$$
$$AB^2 = 225 + 64$$
$$AB^2 = 289$$
$$AB^2 = \sqrt{289}$$
$$AB = 17\text{ m}$$

Perimeter of rhombus = $4 \times 7\text{ m} = 68\text{ m}$ **Ans**

13. In ΔABC



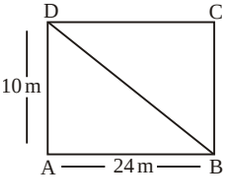
$$AC^2 = AB^2 + BC^2$$
$$25^2 = 24^2 + DC^2$$
$$625 = 576 = x^2$$
$$x^2 = 625 - 576$$
$$x^2 = 49$$
$$x = \sqrt{49}$$
$$x = 7\text{ m}$$

So, the breadth of rectangle = 7 m

Now Perimeter = $2(l + b)$
$$= 2(24 + 7)$$
$$= 2 \times 31$$
$$= 62\text{ m}$$ **Ans**

14. In ΔABD

$$BD^2 = AD^2 + AB^2$$
$$BD^2 = 10^2 + 24^2$$
$$= 100 + 576$$
$$BD^2 = 676$$
$$BD = \sqrt{676}$$
$$BD = 26\text{ m}$$



So, length of its diagonal = 26 m **Ans**

MCQs

1. (a) **2.** (c) **3.** (b) **4.** (b) **5.** (b)
6. (b) **7.** (a) **8.** (c) **9.** (a) **10.** (b)
11. (c) **12.** (c) **13.** (b) **14.** (a)

CHAPTER 10 : LINES AND ANGLES

Exercise-10A

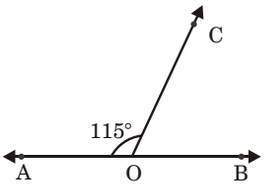
1. **(a)** $\angle AOC$ and $\angle DOB$

(b) $\angle COA$ and $\angle AOE$; $\angle EOD$; $\angle EOD$ and $\angle DOB$

(c) $\angle AOC$ and $\angle AOD$; $\angle COE$ and $\angle EOD$; $\angle ADE$ and $\angle EOB$; $\angle AOD$ and $\angle DOB$

2. **(a)** Yes **(b)** No **(c)** Yes **(d)** No **(e)** Yes

3. We have,



AOB is straight line

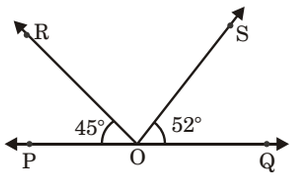
$\angle AOC + \angle BOC = 180°$ (linear pair)

$115° + \angle BOC = 180°$

$\angle BOC = 180° - 115°$

$= 65°$ **Ans**

4. We have,



PQ is a straight line

$\angle PQR + \angle ROS + \angle SOQ = 180°$

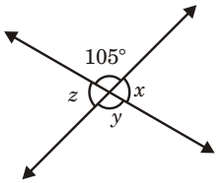
$45° + \angle ROS + 52° = 180°$

$\angle ROS + 97° = 180°$

$\angle ROS = 180° - 97°$

$\angle ROS = 83°$ **Ans**

5.



$y = 105°$ (vertical opposite angles)

$x + 105° = 180°$ (linear pair)

$x = 180° - 105°$

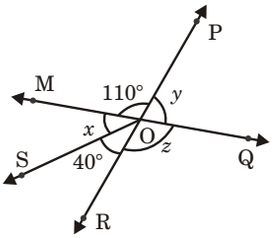
$x = 75°$

$\angle z = \angle x$ (vertical opposite angles)

$\angle z = 75°$

So, $x = 75°$, $y = 105°$ and $z = 75°$ **Ans**

6. In the given figure :



$z = 110°$ (vertical opposite angles)

PR is a straight line

So, $110° + \angle x + 40° = 180°$ (angle on same line)

$\angle x + 150° = 180°$

$\angle x = 180° - 150°$

$\angle x = 30°$

Now $\angle y = \angle x + 40°$

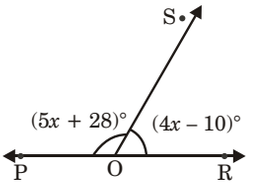
(vertical opposite angle)

$\angle y = 40° + 30°$

$\angle y = 70°$

So, $x = 30°$, $y = 70°$ and $z = 110°$ **Ans**

7.



$\angle POS + \angle ROS = 180°$ (Linear pair)

$5x + 28° + 4x - 10° = 180°$

$9x + 18° = 180°$

$9x = 162°$

$x = \dfrac{162°}{9}$

$x = 18°$

So, $\angle POS = 5x + 28°$

$= 5 \times 18° + 28$

$= 90° + 28$

$= 118°$ **Ans**

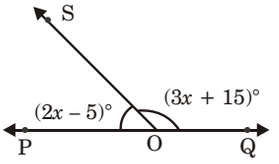
and $\angle ROS = 4x - 10°$

$= 4 \times 18° - 10°$

$= 72° - 10°$

$= 62°$

8.



Since, POQ is a straight line.

So, $\angle POS + \angle QOS = 180°$ (Linear pair)

$2x - 5 + 3x + 15 = 180°$

$5x + 10 = 180°$

$5x = 180° - 10$

$5x = 170°$

$x = \frac{170°}{5}$

$x = 34°$

So, $\angle POS = 2x - 5$

$= 2 \times 34 - 5$

$= 68 - 5 = 63°$ **Ans**

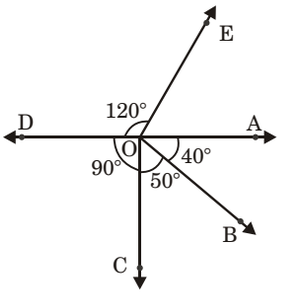
and $\angle QOS = 3x + 15$

$= 3 \times 34 + 15$

$= 102 + 15$

$= 117°$ **Ans**

9. We have,



$\angle AOE + \angle AOB + \angle BOC + \angle COD + \angle DOC = 360°$

$\angle AOE + 40° + 50° + 90° + 120° = 360°$

$\angle AOE + 300° = 360°$

$\angle AOE = 360° - 300°$

$= 60°$ **Ans**

10. **(a)** No **(b)** Yes **(c)** No

(d) No **(e)** Yes

Exercise-10B

1. **(a)** Complementary **(b)** Supplementary

(c) Supplementary **(d)** Complementary

(e) Supplementary **(f)** Complementary

(g) Supplementary **(h)** Complementary

2. **(a)** 70°

Complement angle $= 90° - 70°$

$= 20°$ **Ans**

(b) **80°**

Complement angle $= 90° - 80°$

$= 10°$ **Ans**

(c) **55°**

Complement angle $= 90° - 55°$

$= 35°$ **Ans**

(d) **25°**

Complement angle $= 90° - 25°$

$= 65°$ **Ans**

(e) **85°**

Complement angle $= 90° - 85°$

$= 5°$ **Ans**

(f) **18°**

Complement angle $= 90° - 18°$

$= 72°$ **Ans**

(g) **43°**

Complement angle $= 90° - 43°$

$= 47°$ **Ans**

(h) **64°**

Complement angle $= 90° - 64°$

$= 26°$ **Ans**

(i) **59°**

Complement angle $= 90° - 59°$

$= 31°$ **Ans**

(j) $x°$

Complement angle $= 90° - x°$

$= 90° - x°$ **Ans**

3. **(a)** **135°**

Supplement angle $= 180° - 135°$

$= 45°$ **Ans**

(b) **90°**

Supplement angle $= 180° - 90°$

$= 90°$ **Ans**

(c) **145°**

Supplement angle $= 180° - 145°$

$= 35°$ **Ans**

(d) **108°**

Supplement angle $= 180° - 108°$

$= 72°$ **Ans**

(e) **168°**

Supplement angle $= 180° - 168°$

$= 12°$ **Ans**

(f) **175°**

Supplement angle $= 180° - 175°$

$= 5°$ **Ans**

(g) **69°**

Supplement angle $= 180° - 69°$

$= 111°$ **Ans**

(h) **75°**

Supplement angle $= 180° - 75°$

$= 105°$ **Ans**

(i) **153°**

Supplement angle $= 180° - 153°$

$= 27°$ **Ans**

(j) $y°$

Supplement angle $= 180° - y°$

$= 180° - y°$ **Ans**

4. Let angle $= x$

and its supplements angle $= x$

Then, $x + x = 180°$

$2x = 180°$

$x = \frac{180°}{2}$

$x = 90°$

So, angle $= 90°$ **Ans**

5. Lets complement angle $= 3x$

and angle $= x$

$x + 3x = 90°$

$4x = 90°$

$x = \frac{90°}{4}$

$x = 22.5°$

So, angle $= 22.5°$ **Ans**

6. Let supplement angle $= 4x$

and angle $= x$

Now, $x + 4x = 180°$

$5x = 180°$

$x = \frac{180°}{5}$

$x = 36°$

So, angle $= 36°$ **Ans**

7. Let smaller angle $= x°$

and greater angle $= x + 36°$

Now, $x + x + 36° = 180°$

$2x + 36° = 180°$

$2x = 180° - 36°$

$2x = 144°$

$x = \frac{144°}{2}$

$x = 72°$

So, smaller angle $= 72°$

and greater angle $= 72 + 36$

$= 108°$ **Ans**

8. If an angle is less than 90° then is supplementary angle will be greater than 90° . **Ans**

9. **(a)** No **(b)** No **(c)** Yes

(d) Yes **(e)** No

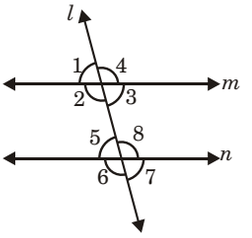
10. **(a)** 90° **(b)** 180°

(c) Supplementary angles **(d)** linear pair

(e) equal

Exercise-10C

1. In the adjoining figure, Name



(a) The pair of corresponding angles

$(\angle 4, \angle 8), (\angle 3, \angle 7), (\angle 1, \angle 5)$ and

$(\angle 2, \angle 6)$ **Ans**

(b) The pair of alternate interior angles

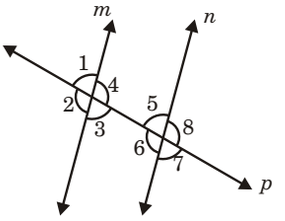
$(\angle 3, \angle 5)$ and $(\angle 2, \angle 8)$ **Ans**

(c) The pair of vertically opposite angles

$(\angle 1, \angle 3), (\angle 2, \angle 4), (\angle 5, \angle 3)$ and

$(\angle 6, \angle 8)$ **Ans**

2.



$\angle 1 = 70°$

So, $\angle 3 = \angle 1$ (vertical opposite angle)

$\angle 3 = 70°$ **Ans**

$\angle 5 = \angle 1$ (corresponding angle)

$\angle 5 = 70°$ **Ans**

$\angle 7 = \angle 5 = 70°$ (vertical opposite angles)

$\angle 4 + \angle 5 = 180°$ (co-interior angles)

$\angle 4 + 70° = 180°$

$\angle 4 = 180° - 70°$

$\angle 4 = 110°$ **Ans**

$\angle 4 = \angle 2 = 110°$ (vertical opposite angles)

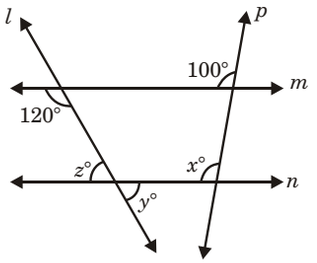
$\angle 4 = \angle 6 = 110°$ (Alternate interior angles)

$\angle 6 = \angle 8 = 110°$ (vertical opposite angles)

So, $\angle 1 = 70°, \angle 2 = 110°, \angle 3 = 70°, \angle 4 = 110°$

$\angle 5 = 70°, \angle 6 = 110°, \angle 7 = 70°, \angle 8 = 110°$

3.



Now

$\angle 1 = 100°$ (vertical opposite angles)

Now

$\angle x = \angle 1$ (Alternate interior angles)

$\angle x = 100°$ **Ans**

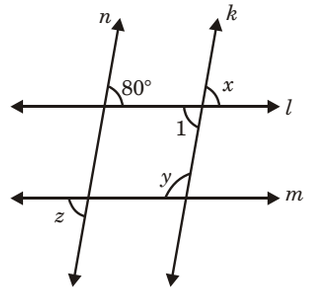
$\angle z + 120° = 180°$ (co-interior angles)

$\angle z = 180° - 120°$

$= 60°$ **Ans**

$\angle y = \angle 2 = 60°$ (vertical opposite angles)

4.



$\angle z = \angle 80°$ (alternate exterior angles)

$\angle x = \angle 80°$

(angle on some line and with parallel lines)

$\angle 1 = \angle x = 80°$ (vertical opposite angles)

Now,

$\angle 1 + \angle y = 180°$ (co-interior angles)

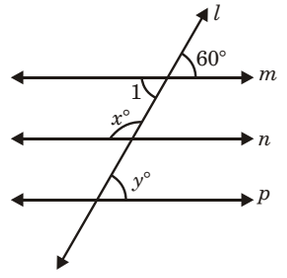
$80° + \angle y = 180°$

$\angle y = 180° - 80°$

$\angle y = 100°$

So, $\angle x = 80°$, $z = 80°$ and $y = 100°$. **Ans**

5.



$\angle 1 = 60°$ (vertical opposite angles)

$\angle 1 + \angle x = 180°$ (co-interior angles)

$60° + \angle x = 180°$

$\angle x = 180° - 60°$

$= 120°$ **Ans**

$\angle 2 = \angle x$ (vertical opposite angles)

$\angle 2 = 120°$

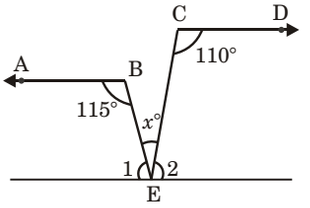
$\angle 2 + \angle y = 180°$ (co-interior angles)

$\angle y = 180° - 120°$

$\angle y = 60°$ **Ans**

So, $x = 120°$ and $y = 60°$ **Ans**

6.



$\angle 1 + 115° = 180°$ (co-interior angles)

$\angle 1 = 180° - 115°$

$\angle 1 = 65°$

Now $\angle 2 + \angle 110° = 180°$ (co-interior angles)

$\angle 2 = 180° - 110°$

$\angle 2 = 70°$

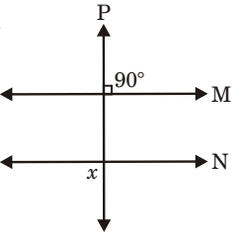
Now $\angle 1 + \angle x + \angle 2 = 180°$ (Linear pair)

$65° + \angle x + 70° = 180°$

$\angle 2 = 180° - 135°$

$\angle x = 45°$ **Ans**

7. Let one line is M. and its transversal line P is perpendicular-line M.



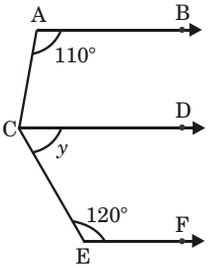
So, $\angle POM = 90°$

But we have $\overleftrightarrow{M} \parallel \overleftrightarrow{N}$

So, $\overleftrightarrow{P}$ will be perpendicular N too.

or $\angle PxN = 90°$ Hence, **Proved**

8.



$\angle x + \angle 110° = 180°$ (co-interior angles)

$\angle x + 110° = 180°$

$\angle x = 70°$

Now, $\angle y + \angle 120° = 180°$ (co-interior angles)

$\angle y = 180° - 120°$

$\angle y = 60°$

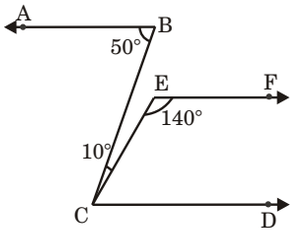
So, $\angle ACE = x + y$

$= \angle 70° + 60°$

$= 130°$ **Ans**

9. **(a)** No, **(b)** 90 **(c)** Yes
(d) Yes

10.



$\angle ABC = \angle BCD$

(Alternate exterior angles)

$50° = \angle BCD$

$\angle BCD = 50°$

Now $\angle ECD = 50° - 10°$

$\angle ECD = 40°$

Then, $\angle ECD + \angle CEF = 180°$ (co-interior angles)

$40° + 140° = 180°$

$180° = 180°$

So, $CD \parallel EF$ **Proved**

MCQS

1.	(a)	**2.**	(b)	**3.**	(c)	**4.**	(a)	**5.**	(b)
6.	(a)	**7.**	(b)	**8.**	(b)	**9.**	(c)	**10.**	(a)
11.	(c)	**12.**	(c)	**13.**	(c)	**14.**	(c)		

CHAPTER 11 :

Exercise-11A

1. Area $= 440\ m^2$

$l = 22$ m

$b = ?$

$\text{Area} = l \times b$

$440 = 22 \times b$

$b = \frac{440}{22}$

$b = 20$ m

Perimeter $= 2(l + b)$

$= 2(22 + 20)$

$= 2 \times 42$

$= 84$ m

$\therefore$ Cost of fencing wire $= ₹\ 84 \times 2.20$

$= ₹\ 184.80$ **Ans**

2. Perimeter of square $= 500$ m

$4 \times \text{side} = 500$

$\text{Side} = \frac{500}{4}$

$\text{Side} = 125$ m

$\text{Area of square} = \text{side} \times \text{side}$

$= 125 \times 125$

$= 15625\ m^2$

$\therefore$ Cost of levelling the park $= ₹\ 1.85 \times 15625$

$= ₹\ 28906.25$ **Ans**

3. Let length $= 4x$

and breadth $= 3x$

Area $= 8112\ m^2$

$l \times b = 8112$

$4x \times 3x = 8112$

$12x^2 = 8112$

$x^2 = \frac{8112}{12}$

$x^2 = 676$

$x = \sqrt{676}$

$x = 26$

So, length $= 4 \times 26 = 104$ m

and breadth $= 3 \times 26 = 78$ m

Perimeter $= 2(l + b) = 2(104 + 78)$

$= 2 \times 182 = 364$ m

Length of wire in fencing 5 times $= 364 \times 5$ m

$= 1820$ m

So, cost of wire $= ₹\ 1820 \times 2.85$

$= ₹\ 5187$ **Ans**

4. Let length $= 7x$

and breadth $= 6x$

Area $= 2688\ m^2$

$\text{Area} = l \times b$

$l \times b = 2688$

$7x \times 6x = 2688$

$42x^2 = 2688$

$x^2 = \frac{2688}{42}$

$x^2 = 64$

$x = \sqrt{64}$

$x = 8$

So, length $= 7 \times 8 = 56$ m

breadth $= 6 \times 8 = 48$ m

Perimeter $= 2(l + b) = 2 \times (56 + 48)$

$= 2 \times 104 = 208$ m

Cost of painting $= ₹\ 4.45 \times 208$

$= ₹\ 925.60$ **Ans**

5. $L = 40\,\text{cm}$

$B = 32\,\text{cm}$

$$\text{Perimeter} = 2(l+b)$$
$$= 2(40+32)$$
$$= 2\times 72$$
$$= 144\,\text{cm}$$
$$\text{Area} = l\times b$$
$$= 40\times 32$$
$$= 1280\,\text{cm}^2$$

It is rebent in to the shape of square

Then perimeter of square = Perimeter of rectangle

$$4\times \text{side} = 144\,\text{cm}$$
$$\text{side} = \frac{144}{4}$$
$$\text{side} = 36\,\text{cm}$$
$$\text{Area} = \text{side}\times\text{side}$$
$$= 36\times 36$$
$$= 1296\,\text{cm}^2$$

So, square has more area. **Ans**

6. Side of square = 22 cm

Perimeter of square = $4\times$ side

$$= 4\times 22 = 88\,\text{cm}$$

Area of square = side $\times$ side

$$= 22\times 22$$
$$= 484\,\text{cm}^2$$

Now, It is rebent in to rectangle of length 24 cm.

So, perimeter of square = perimeter of rectangle

$$88 = 2(l+b)$$
$$l+b = 44$$
$$b = 44-24$$
$$b = 20\,\text{cm}$$
$$\text{Area} = l\times b$$
$$= 24\times 20$$
$$= 480\,\text{cm}^2$$

So, square has more area by $(484-480)$

$$= 4\,\text{cm}^2$$ **Ans**

7. Side of square = 80 m

$\therefore$ Area of square = side $\times$ side

$$= 80\times 80$$
$$= 6400\,\text{m}^2$$

breadth of rectangular park = 50 m

Given,

Area of rectangle is equal to Area of square

$$l\times b = 6400$$
$$50\times l = 6400$$
$$l = \frac{6400}{50}$$
$$l = 128\,\text{m}$$

Now perimeter of rectangular park $= 2(l+b)$

$$= 2(128+50)$$
$$= 2\times(178)$$
$$= 356\,\text{m}$$ **Ans**

8. Length of room = 15 m $\Rightarrow$ 1500 cm

Breadth of room = 12 m $\Rightarrow$ 1200 cm

Width of carpet = 80 cm

$\therefore$ $\text{Length of carpet} = \frac{\text{Area of room}}{\text{Width of carpet}}$

$$= \frac{1500\times 1200}{80}$$
$$= 22500\,\text{cm}$$

or $= 225\,\text{m}$

Cost of carpet = ₹ 90×225

$$= ₹\ 20250$$ **Ans**

9. Rate of fencing = ₹ 1.20 per m

Cost of fencing = ₹ 3600

So, $\text{Perimeter} = \frac{\text{Cost of fencing}}{\text{fencing rate}}$

$$= \frac{3600}{1.20} = 3000\,\text{m}$$

So, $\text{side} = \frac{3000\,\text{m}}{4}$

$$\text{Side} = 750\,\text{m}$$
$$\text{Area} = \text{side}\times\text{side}$$
$$= 750\times 750$$
$$= 562500\,\text{m}^2$$

Cost of grazing = ₹ $\frac{60\times 562500}{100}$

$$= ₹\ 337500$$

10. Length = 24 m

Diagonal = 26 m

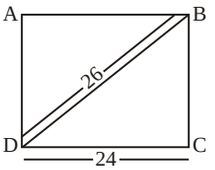
So, breadth $BC = \sqrt{BD^2 - CD^2}$

$$b = \sqrt{26^2 - 24^2}$$
$$b = \sqrt{676-576}$$
$$b = \sqrt{100}$$
$$b = 10\,\text{m}$$

Area $= l \times b$

$= 24 \times 10$

$= 240\ \text{m}^2$



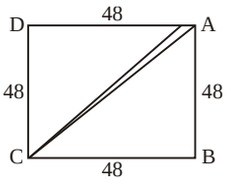
Perimeter $= 2(l + b)$

$= 2(24 + 10)$

$= 2 \times 34$

$= 68\ \text{m}$ **Ans**

11. Area of square $= 2304\ \text{m}^2$



$\therefore$ $(\text{side})^2 = 2304$

$\text{side} = \sqrt{2304}$

$\text{side} = 48\ \text{m}$

Perimeter $= 4 \times \text{side}$

$= 4 \times 48\ \text{m}$

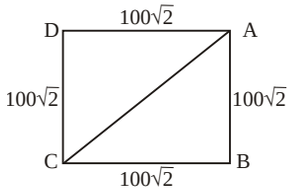
$= 192\ \text{m}$

Diagonal $= \sqrt{l^2 + b^2}$

$= \sqrt{48^2 + 48^2}$

$= 48\sqrt{1+1} \Rightarrow 48\sqrt{2}$ **Ans**

12.



Area of square $= 2$ hectare

$= 20000\ \text{m}^2$

$(\text{side})^2 = 20000\ \text{m}^2$

$\text{side} = \sqrt{20000}$

$\text{side} = 100\sqrt{2}$

Length of diagonal $= \sqrt{(100\sqrt{2})^2 + (100\sqrt{2})^2}$

$= \sqrt{20000 + 20000}$

$= \sqrt{40000}$

$= 200\ \text{m}$ **Ans**

13. Length of tile $= 10\ \text{cm}$

Breadth of tile $= 8\ \text{cm}$

Length of room $= 8\ \text{m} = 800\ \text{cm}$

Breadth of room $= 5\ \text{m} = 500\ \text{cm}$

$$\text{No. of tiles} = \frac{\text{Area of room}}{\text{Area of one tile}}$$

$$= \frac{800 \times 500}{8 \times 10}$$

$= 5000$ tiles **Ans**

14. Length of verandah $= 12\ \text{m} = 1200\ \text{cm}$

Breadth of verandah $= 9\ \text{m} = 900\ \text{cm}$

Length of tile $= 25\ \text{cm}$

Breadth of tile $= 18\ \text{cm}$

$$\text{No. of tiles required} = \frac{\text{Area of verandah}}{\text{Area of one tile}}$$

$$= \frac{1200 \times 900}{25 \times 18}$$

$= 2400$ tiles **Ans**

Cost tiles $= ₹\ 15 \times 2400$

$= ₹\ 36000$ **Ans**

15. Area of four wales $= 336\ \text{m}^2$, $b = 18\ \text{m}$, $h = 4\ \text{m}$

$= 2(l + b) \times h = 336$

$= 2(l + 18) \times 4 = 336$

$= (l + 18) \times 8 = 336$

$$= l + 18 = \frac{336}{8}$$

$= l + 18 = 42$

$l = 42 - 18$

$l = 24\ \text{m}$ **Ans**

16. Area of four wales $= 280\ \text{m}^2$

$l = 22\ \text{m}$, $h = 3.5$, $b = ?$

$= 2(l + b) \times h = 280$

$= 2(22 + b) \times 3.5 = 280$

$= (22 + b) \times 7 = 280$

$$= 22 + b = \frac{280}{7}$$

$= 22 + b = 40$

$b = 40 - 22$

$b = 18\ \text{m}$ **Ans**

17. $l = 5\ \text{m}$, $b = 4.4\ \text{m}$ and $h = 2.5\ \text{m}$

Area of four walls $= 2(l + b) \times h$

$= 2(5 + 4.4) \times 2.5$

$= 5 \times (9.4)$

$= 47.0\ \text{m}^2$

Cost of white washing $= ₹\ 3.80 \times 47.0$

$= ₹\ 178.60$ **Ans**

18. $l = 10\ \text{m}$, $b = 8\ \text{m}$, $h = 4.5\ \text{m}$

Area of four walls $= 2(l + b) \times h$

$= 2(10 + 8) \times 4.5$

$= 162\ \text{m}^2$

Area of two doors $= 2 \times 1.2 \times 2$

$= 4.8\ \text{m}^2$

Area of three windows $= 3 \times 2.5 \times 1.8$

$= 13.5\ \text{m}^2$

Area to be white washed = $162 - 4.8 - 73.5$

$= 143.7\ m^2$

Cost of white washing = ₹ 4.40×143.7

= ₹ 632.28 **Ans**

19. $l = 15$ m, $b = 12$ m, $h = 5$ m

Area of four walls = $2(l + b) \times h$

$= 2(15 + 12) \times 5$

$= 10 \times 27$

$= 270\ m^2$

Area of ceiling = $l \times b$

$= 15 \times 12 = 180\ m^2$

Total area $= 270 + 180$

$= 450\ m^2$

Now, Area of 3 doors = $3 \times 2 \times 1.5$

$= 9\ m^2$

Area of four windows = $4 \times 2.2 \times 1.8$

$= 15.84\ m^2$

Area to be white washed = $450 - 9 - 15.84$

$= 425.16\ m^2$

Cost of painting = ₹ 5.30×425.16

= ₹ 2253.35 **Ans**

20. $l = 14$ m, $b = 8$ m, $h = ?$

Cost of white washing = ₹ 990

Rate of white washing = ₹ 7.50

So, white washed Area = $\frac{990}{7.50}$

$= 132\ m^2$

Area of 2 doors = $2 \times 2 \times 1.5$

$= 6\ m^2$

Area of one window = 1.5×1.2

$= 1.80\ m^2$

So, Area of four walls = $132 + 6 + 1.80$

$= 139.80\ m^2$

$= 2(l + b) \times h = 139.80$

$= 2(14 + 8) \times h = 139.80$

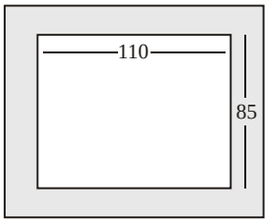
$= 2 \times 22 \times h = 139.80$

$h = \frac{139.80}{44}$

$h = 3.17$ m **Ans**

Exercise-11-B

1.



Length of garden = 110 m

Breadth of garden = 85 m

Area of garden = 110×85

$= 9350\ m^2$

or .9350 hectare

Length of garden including path = $110 + 4 + 4$

$= 118$ m

Breadth of garden including path = $85 + 4 + 4$

$= 93$ m

Area of garden with path = 118×93

$= 10974\ m^2$

So, Area of path = $10974 - 9350$

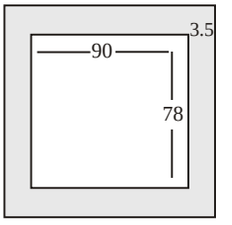
$= 1624\ m^2$ **Ans**

2. Length = 90 m

Breadth = 78 m

Area = 90×78

$= 7020\ m^2$



Length with path = $90 + 3.5 + 3.5$

$= 97$ m

Breadth with path = $78 + 3.5 + 3.5$

$= 85$ m

Area with path = 97×85

$= 8245\ m^2$

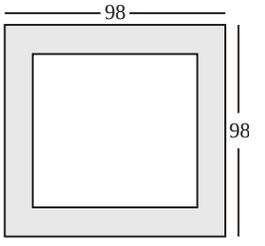
Area of path = $8245 - 7020$

$= 1225\ m^2$

Cost of gravelling = ₹ 1.40×1225

= ₹ 1715

3. Side of square = 98 m



Area of square = 98×98

$= 9604\ m^2$

Now, side of square without path

$= 98 - 2.8 - 2.8$

$= 92.4$

Area of square without path = 92.4×92.4

$= 8537.76\ m^2$

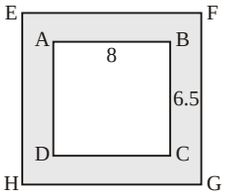
So, Area of path = $9604 - 8537.76$

$= 1066.24\ m^2$

Cost of levelling path = ₹ 2.25×1066.24

= ₹ 2399.04 **Ans**

4. Length of room = 8 m



Breadth of room = 6.5 m

Area of room = $l \times b$

= 8×6.5

= 52 m^2

Length of room with verandah = 8+1.5+1.5

= 11 m

Breadth of room with verandah = 6.5+1.5+1.5

= 9.5 m

Area of room with verandah = 11×9.5

= 104.5 m^2

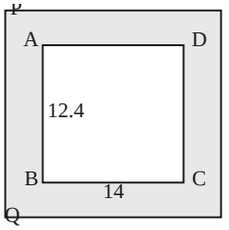
So, Area of verandah = 104.5 – 52

= 52.5 m^2

Cost of floring tiles = ₹ 25×52.5

= ₹ 1312.50 **Ans**

5.



Length of room BC = 14 m

Breadth of room AB = 12.4 m

Area of room = 14×12.4

= 173.6 m^2

Length of room + verandah 'QR' = 14 + 2.2 + 2.2

= 18.4 m

Breadth of room + verandah 'PQ' = 12.4 + 2.2 + 2.2

= 16.8 m

Area of room + verandah = 18.4×16.8

= 309.12 m^2 **Ans**

So, Area of verandah = 309.12 – 173.6

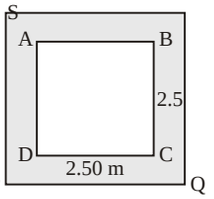
= 135.52 m^2

Cost of cementing the floor of verandah

= ₹ 32×135.52

= ₹ 4336.64 **Ans**

6. Side = 2m 50 cm ⇒ 250 cm



Area = side × side

= 62500 cm^2

Side PQ = 250 + 20 + 20

= 290 cm

So, Area = side × side

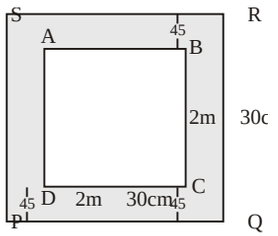
= 290×290

= 84100 cm^2

Increased area = 84100 – 62500

= 21600 cm^2 **Ans**

7.



Side = 2 m 30 cm

= 230 cm

Area = 230×230

= 52900 cm^2

Side PQ = 230 cm + 45 cm + 45 cm

= 320 cm

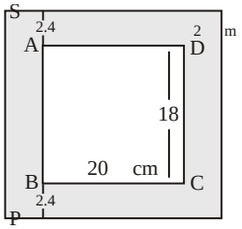
Area of $PQRS$ = 320×320

= 102400 cm^2

Increased Area = 102400 – 52900

= 49500 cm^2 **Ans**

8.



Length of pester = 20 cm

Breadth of poster = 18 cm

Area of poster '$ABCD$' = 20×18 = 360 cm^2

Length of PQ = 20 + 2.4 + 2.4

= 24.8 cm

Breadth QR = 18 + 2.4 + 2.4

= 22.8 cm

Area = 24.8×22.8

= 565.44 cm^2

Area of Margin = 565.44 – 360

= 205.44 cm^2

Cost of cardboard = ₹ 4.50×565.44

= ₹ 2544.48

9. Length of photo = 14 cm

Breadth of photo = 10 cm

Area of photo = 14×10

$= 140\,cm^2$

Length of frame = $14 + 1 + 1$

$= 16$ cm

Breadth of frame = $10 + 1 + 1$

$= 12$ cm

Area of frame = 16×12

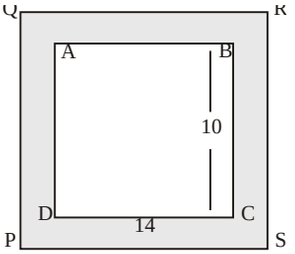
$= 192\,cm^2$

Area of margin = $192 - 140$

$= 52\,cm^2$

Cost of framing = 192×8.80

$= 1689.6\,cm^2$ **Ans**



10. Length of 30 m

Breadth = 24.6 m

Area of park = 30×24.6

$= 738\,m^2$

Area of path (1) = 24.6×1.8

$= 44.28\,m^2$

Area of path (2) = 30×2.2

$= 66\,m^2$

Area of square = 1.8×2.2

$= 3.96$

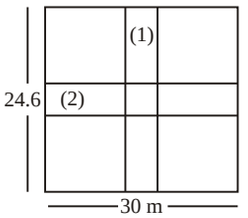
So, Area of path = $66 + 44.28 - 3.96$

$= 106.32\,m^2$

Area of the remaining portion of the field

$= 738 - 106.32$

$= 631.68\,m^2$ **Ans**



11. Length of garden = 92 m

Breadth of garden = 68 m

Area of the garden = 92×68

$= 6256\,m^2$

Area of road (1) = 92×2.5

$= 230\,m^2$

Area of road (2) = 68×2.5

$= 170\,m^2$

Area of road (3) = 68×2.5

$= 170\,m^2$

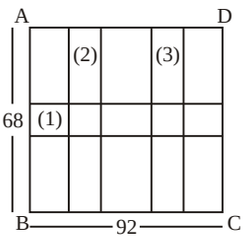
Area of two square = $2.5 \times 2.5 + 2.5 \times 2.5$

$= 6.25 + 6.25$

$= 12.50\,m^2$

So, total area of path = $230 + 170 + 170 - 12.50$

$= 557.5\,m^2$ **Ans**



Remaining Area of garden = $6256 - 557.5$

$= 5698.5\,m^2$ **Ans**

12. Length of field = 800 m

Breadth of field = 750 m

Area of field = 800×750

$= 600000\,m^2$

Area of road (1) = 800×8

$= 6400\,m^2$

Area of road (2) = 750×8

$= 6000\,m^2$

Area of square = 8×8

$= 64\,m^2$

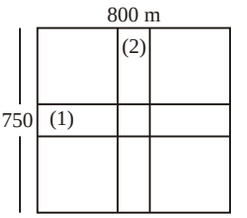
So, total Area of roads = $6400 + 6000 - 64$

$= 12336\,m^2$

Area of field excluding cross roads = $600000 - 12336$

$= 587664\,m^2$

$= 58.7664$ hectare



13. Length of garden = 120 m

Breadth of garden = 90 m

Area of garden = 120×90

$= 10800\,m^2$

Area of road (1) = $90 \times 2.2 = 198\,m^2$

Area of road (2) = $90 \times 2.2 = 198\,m^2$

Area of road (3) = $120 \times 1.8 = 216\,m^2$

Area of road (4) = $120 \times 1.8 = 216\,m^2$

Area of 4 squares = $4 \times 1.8 \times 2.2$

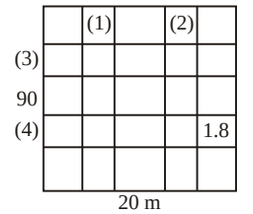
$= 15.84\,m^2$

So, total Area of path = $198 + 198 + 216 + 216 - 15.84$

$= 812.16\,m^2$

Area of remaining garden = $10800 - 812.16$

$= 9987.84\,m^2$ **Ans**



Exercise-11C

1. **(a)** base = 5 cm

height = 4 cm

Area of triangle = $\frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 5 \times 4$

$= 10\,cm^2$

(b) base = 7 cm

height = 5.4 cm

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 7 \times 5.4$$

$$= 18.9\,\text{cm}^2$$

(c) base = 3.4 cm

height = 4.8 cm

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 4.8 \times 3.4$$

$$= 8.16\,\text{cm}^2$$

(d) base = 5.4 cm

height = 3.4 cm

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 5.4 \times 3.4$$

$$= 9.18\,\text{cm}^2$$

(e) base = 8 cm

height = 4 cm

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 8 \times 4$$

$$= 16\,\text{cm}^2$$

(f) base = 4 cm

height = 3.5 cm

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 4 \times 3.5$$

$$= 7\,\text{cm}^2$$

2. $\text{Area of triangle} = 180\,\text{cm}^2$

$\text{base} = 15\,\text{cm}$

$\text{altitude} = ?$

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{Altitude}$$

$$180 = \frac{1}{2} \times 15 \times \text{Altitude}$$

$$\text{Altitude} = \frac{180 \times 2}{15}$$

$\text{Altitude} = 24\,\text{cm}$ **Ans**

3. $\text{Area of triangle} = 36\,\text{dm}^2$

$\text{base} = 6\,\text{dm}^2$

$\text{Altitude} = ?$

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{Altitude}$$

$$36 = \frac{1}{2} \times 6 \times \text{Altitude}$$

$$\text{Altitude} = \frac{36 \times 2}{6}$$

$= 12\,\text{dm}$ **Ans**

4. $\text{Area of triangle} = 148\,\text{cm}^2$

$\text{base} = 1.6\,\text{dm} \Rightarrow 16\,\text{cm}$

$\text{Altitude} = ?$

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{Altitude}$$

$$148 = \frac{1}{2} \times 16 \times \text{Altitude}$$

$$\text{Altitude} = \frac{148 \times 2}{16}$$

$= 18.5\,\text{cm}$ **Ans**

5. Base $AB = 5\,\text{cm}$

Altitude $EC = 6\,\text{cm}$

$$\text{Area of triangle } ABC = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 5 \times 6$$

$$= 15\,\text{cm}^2$$

Now base $= AC = 4.8\,\text{cm}$

Altitude $BD = ?$

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{Altitude}$$

$$15 = \frac{1}{2} \times 4.8 \times BD$$

$$BD = \frac{15 \times 2}{4.8}$$

$BD = 6.25\,\text{cm}$ **Ans**

6. Base $AB = 5\,\text{cm}$

Altitude $AC = 12\,\text{cm}$

$$\text{Area of triangle } ABC = \frac{1}{2} \times \text{base} \times \text{Altitude}$$

$$= \frac{1}{2} \times 5 \times 12$$

$$= 30\,\text{cm}^2$$

Now, Base $BC = 13\,\text{cm}$

Altitude $AD = ?$

Area of triangle $= \frac{1}{2} \times \text{base} \times \text{Altitude}$

$$30 = \frac{1}{2} \times 13 \times AD$$

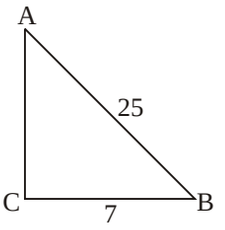
$$AD = \frac{30 \times 2}{13}$$

$$AD = \frac{60}{13}$$

$$AD = 4\frac{8}{13}\,\text{cm}$$ **Ans**

7. In ΔABC

$AB = 25\,\text{cm}$, $BC = 7\,\text{cm}$, $AC = ?$



Pythagoras theorem

$$AB^2 = AC^2 + BC^2$$

$$25^2 = AC^2 + 7^2$$

$$625 = AC^2 + 49$$

$$AC^2 = 625 - 49$$

$$AC^2 = 576$$

$$AC = \sqrt{576}$$

$$= 24\,\text{cm}$$

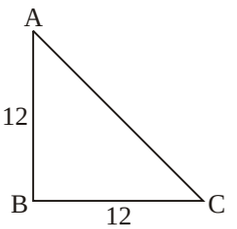
So, Area of $\Delta ABC = \frac{1}{2} \times \text{base} \times \text{Altitude}$

$$= \frac{1}{2} \times 24 \times 7$$

$$= 84\,\text{cm}^2$$

8. Base $= 12\,\text{cm}$

Altitude $= 12\,\text{cm}$



Area of $\Delta ABC = \frac{1}{2} \times \text{base} \times \text{Altitude}$

$$= \frac{1}{2} \times 12 \times 12$$

$$= 72\,\text{cm}^2$$ **Ans**

9. Let base of triangle $= 3x\,\text{dm}$

and height of triangle $= 5x\,\text{dm}$

Area of triangle $= 750\,\text{dm}^2$

Area of triangle $= \frac{1}{2} \times \text{base} \times \text{height}$

$$750 = \frac{1}{2} \times 3x \times 5x$$

$$x^2 = \frac{750 \times 2}{15}$$

$$x^2 = 100$$

$$x = \sqrt{100}$$

$$x = 10$$

So, base $= 3 \times 10 = 30\,\text{dm}$

height $= 5 \times 10 = 50\,\text{dm}$ **Ans**

10. Length of rectangle $= 14\,\text{cm}$

Breadth of rectangle $= 12\,\text{cm}$

Area of rectangle $= 14 \times 12$

$$= 168\,\text{cm}^2$$

Base $= 14\,\text{cm}$

height $= 12\,\text{cm}$

Area of triangle $= \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 14 \times 12$$

$$= 84\,\text{cm}^2$$

So, Area of shaded region $= 168 - 84$

$$= 84\,\text{cm}^2$$ **Ans**

11. **(a)** Base 'BC' $= 4\,\text{cm}$

height 'AE' $= 3\,\text{cm}$

Area of triangle $ABC = \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 4 \times 3$$

$$= 6\,\text{cm}^2$$ **Ans**

(b) Now, Base $BC = 8\,\text{cm}$

height 'BD' $= ?$

Area of triangle $ABC = \frac{1}{2} \times \text{base} \times \text{height}$

$$6 = \frac{1}{2} \times 8 \times BD$$

$$BD = \frac{6 \times 2}{8}$$

$$BD = 1.5\,\text{cm}$$ **Ans**

12. Area of triangular fields $= \frac{337.50}{25}$ hectare

$$= 13.5 \text{ hectare}$$

$$= 135000\,\text{m}^2$$

Let altitude = ?

and Base = $3x$

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$135000 = \frac{1}{2} \times 3x \times x$$

$$x^2 = \frac{135000 \times 2}{3}$$

$$x^2 = 90000$$

$$x = \sqrt{90000}$$

$$x = 300$$

So, Altitude = 300 m

and base = $3 \times 300 = 900$ m **Ans**

Exercise-11D

1. **(a)** base = 4 cm

height = 4.4 cm

Area of parallelogram = base × height

$= 4 \times 4.4$

$= 17.6\,\text{cm}^2$ **Ans**

(b) base = 6 cm

height = 3.6 cm

Area of parallelogram = base × height

$= 6 \times 3.6$

$= 21.6\,\text{cm}^2$ **Ans**

(c) base = 2.5 cm

height = 3 cm

Area of parallelogram = base × height

$= 2.5 \times 3$

$= 7.5\,\text{cm}^2$ **Ans**

(d) base = 8 cm

height = 6 cm

Area of parallelogram = base × height

$= 8 \times 6$

$= 48\,\text{cm}^2$ **Ans**

(e) base = 7 cm

height = 4.8 cm

Area of parallelogram = base × height

$= 7 \times 4.8$

$= 33.6\,\text{cm}^2$ **Ans**

(f) base = 4 cm

height = 5 cm

Area of parallelogram = base × height

$= 4 \times 5$

$= 20\,\text{cm}^2$ **Ans**

2. Area of parallelogram = $350\,\text{cm}^2$

One side = 12 cm

Let corresponding altitude = x cm

Area of parallelogram = base × altitude

$350\,\text{cm}^2 = 12 \times x$

$$x = \frac{350}{12}$$

$x = 29.16$ cm **Ans**

3. Area of parallelogram = $300\,\text{cm}^2$

base = 18 cm

Let altitude = x cm

Area of parallelogram = base × height

$300 = 18 \times x$

$$x = \frac{300}{18}$$

$= 16.67$ cm **Ans**

4. Let height = x cm

and base = $2x$ cm

Area of parallelogram = $288\,\text{cm}^2$

Area of parallelogram = base × height

$2x \times x = 288$

$2x^2 = 288$

$$x^2 = \frac{288}{2}$$

$x^2 = 144$

$x = \sqrt{144}$

$x = 12$

So, height = 12 cm and base = $2 \times 12 = 24$ cm

5. **(a)** Base DC = 12 cm

Corresponding altitude AK = 6 cm

Area of parallelogram = base × height

$= 12$ cm $\times 6$ cm

$= 72\ \text{cm}^2$

(b) Base 'AD' $= 8\,\text{cm}$

Corresponding altitude $CL = ?$

Area of parallelogram = base $\times$ altitude

$$72 = 8 \times CL$$

$$CL = \frac{72}{8}$$

$$CL = 9 \text{ cm}$$ **Ans**

6. base $= 20\,\text{cm}$

height $= 15\,\text{cm}$

Area of parallelogram = base $\times$ height

$$= 20 \times 15$$

$$= 300\,\text{cm}^2$$

Now, let altitude on shorter side $= x$

base $= 16\,\text{cm}$

Area of parallelogram = base $\times$ height

$$300 = 16 \times x$$

$$x = \frac{300}{16}$$

$$x = 18.75\,\text{cm}$$ **Ans**

7. $d_1 = 24\,\text{cm}$

$d_2 = 20\,\text{cm}$

$$\text{Area of rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 24 \times 20$$

$$= 240\,\text{cm}^2$$ **Ans**

8. $d_1 = 18.4\,\text{cm}$

$d_2 = 16.8\,\text{cm}$

$$\text{Area of rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 16.8 \times 18.4$$

$$= 154.56\,\text{cm}^2$$ **Ans**

9. Area of rhombus $= 207\,\text{cm}^2$

Perimeter of rhombus $= 60\,\text{cm}$

$$4 \times \text{side} = 60\,\text{cm}$$

$$\text{side} = \frac{60}{4}$$

$$\text{side} = 15\,\text{cm}$$

So, base $= 15\,\text{cm}$

and corresponding altitude $= x\,\text{cm}$

Area of rhombus = base $\times$ altitude

$$207 = 15 \times x$$

$$x = \frac{207}{15}$$

$$x = 13.8\,\text{cm}$$ **Ans**

10. Area of rhombus $= 96\,\text{cm}^2$

$$d_1 = 12\,\text{cm}$$

$$d_2 = ?$$

$$\text{Area of rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$96 = \frac{1}{2} \times 12 \times d_2$$

$$d_2 = \frac{96 \times 2}{12}$$

$$d_2 = 16 \text{ cm}$$

In $\Delta\, ABO$

$$AB^2 = AO^2 + BO^2$$

$$AB^2 = 8^2 + 6^2$$

$$AB^2 = 64 + 36$$

$$AB^2 = 100$$

$$AB = \sqrt{100}$$

$$AB = 10$$

So, perimeter of rhombus $= 4 \times 10$

$$= 40 \text{ cm}$$

11. Area of rhombus $= 216\,\text{cm}^2$

$$d_1 = 18\,\text{cm}$$

$$d_2 = ?$$

$$\text{Area of rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$216 = \frac{1}{2} \times 18 \times d_2$$

$$d_2 = \frac{216 \times 2}{18}$$

$$d_2 = 24\text{cm}$$

In $\Delta\, AOB$

$$AB^2 = AO^2 + BO^2$$

$$AB^2 = 9^2 + 12^2$$

$$AB^2 = 81 + 144$$

$$AB^2 = 225$$

$$AB = \sqrt{225}$$

$$AB = 15\,\text{cm}$$

So, Perimeter $= 4 \times 15\,\text{cm}$

$= 60$ cm **Ans**

12. $BD\,(d_1) = 24\,\text{cm}$

In $\Delta\, AOB$

$$AB^2 = AO^2 + BO^2$$

$$13^2 = AO^2 + 12^2$$

$$AO^2 = 169 - 144$$

$$AO^2 = 25$$

$$AO = \sqrt{25}$$

$$AO = 25$$

So, diagonal $d_2 = 5 \times 2 = 10\,\text{cm}$

Now, Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$

$$= \frac{1}{2} \times 24 \times 10$$

$= 120\,\text{cm}^2$ **Ans**

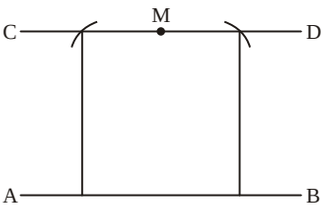
MCQS

1.	(a)	**2.**	(b)	**3.**	(c)	**4.**	(a)	**5.**	(b)
6.	(a)	**7.**	(b)	**8.**	(b)	**9.**	(c)	**10.**	(a)
11.	(c)	**12.**	(c)	**13.**	(c)	**14.**	(c)		

CHAPTER 12 : PRACTICAL GEOMETRY

Exercise-12A

1.



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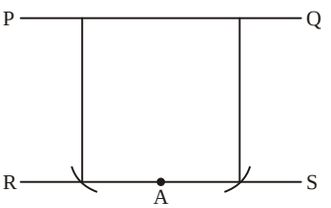

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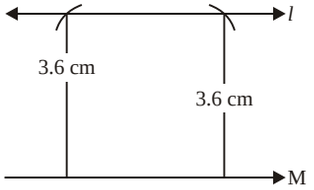

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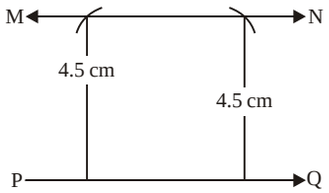
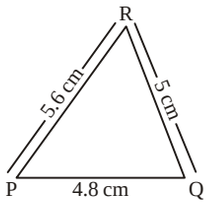


Exercise-12-B

1.



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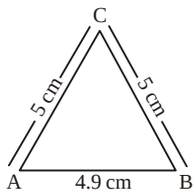

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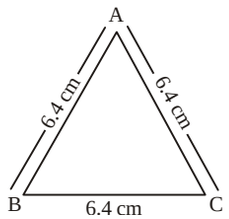

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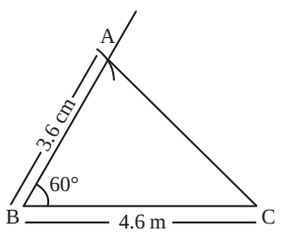

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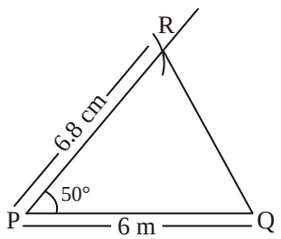

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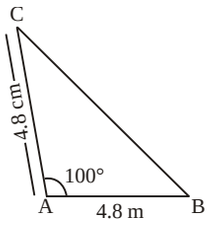

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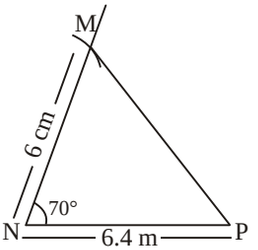
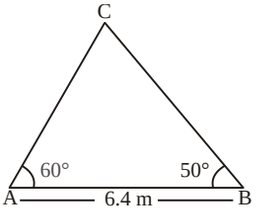


Exercise-12-C

1.



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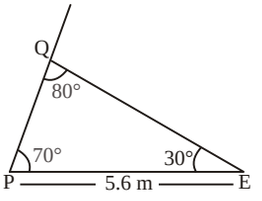

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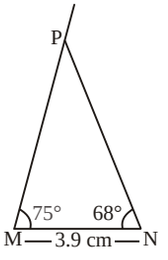

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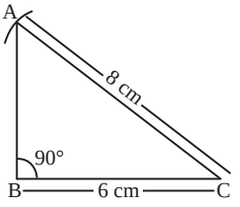

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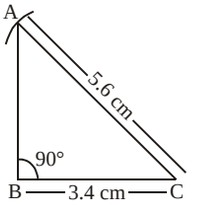
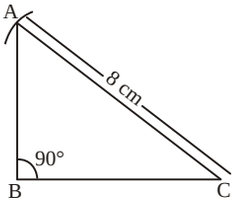
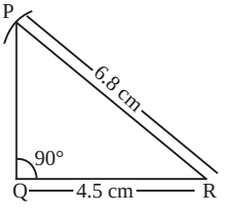


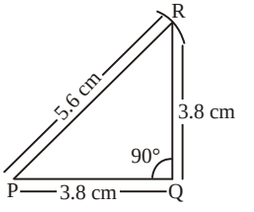
6.



7.



8.



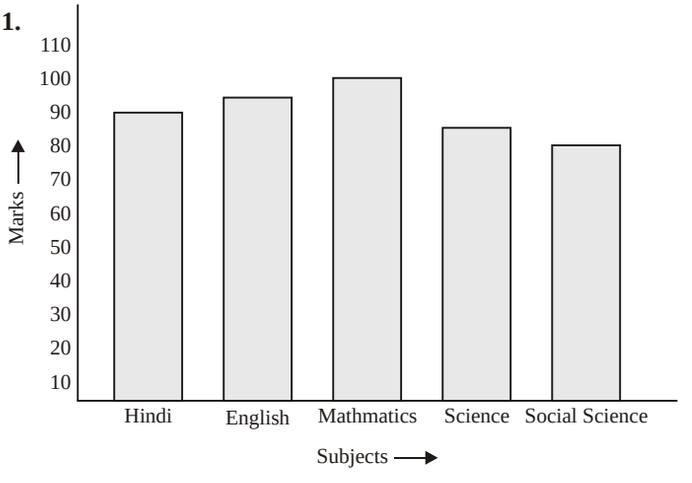
MCQS

1.	(a)	**2.**	(b)	**3.**	(c)	**4.**	(a)	**5.**	(b)
6.	(a)	**7.**	(b)	**8.**	(b)	**9.**	(c)	**10.**	(a)
11.	(c)	**12.**	(c)	**13.**	(c)	**14.**	(c)		

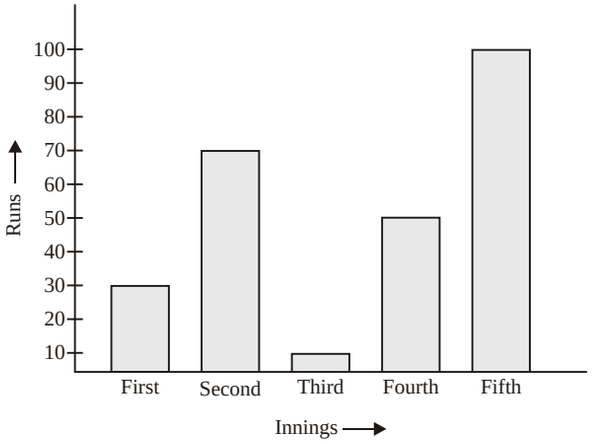
CHAPTER 13 : BAR GRAPH

Exercise-13A

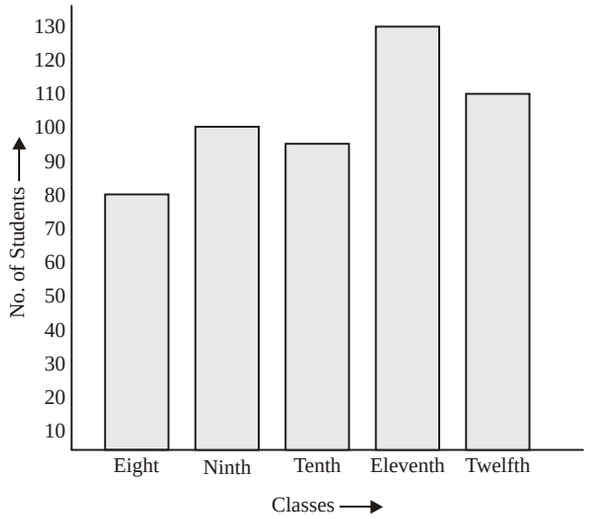
1.



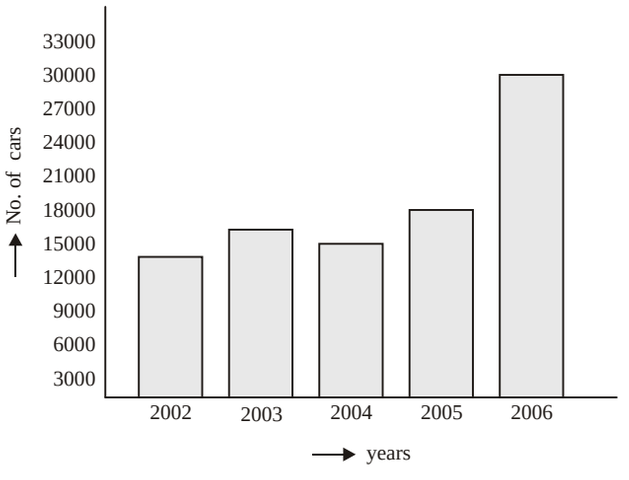
2.


Runs
100
90
80
70
60
50
40
30
20
10
First
Second
Third
Fourth
Fifth
Innings

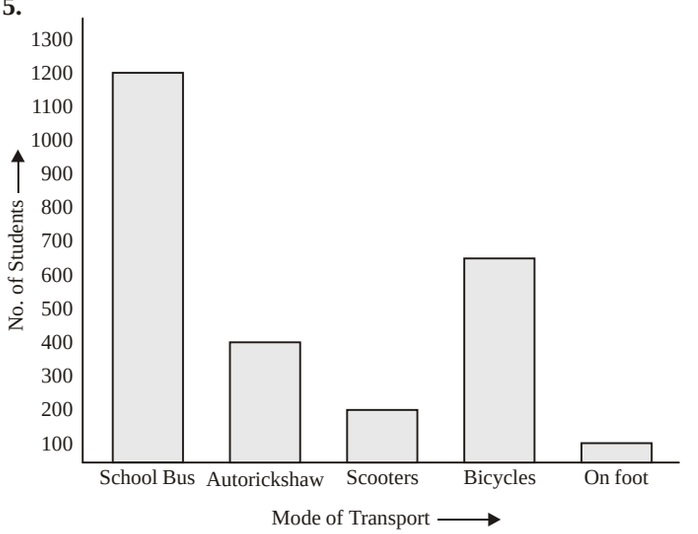
3.


No. of Students
130
120
110
100
90
80
70
60
50
40
30
20
10
Eight
Ninth
Tenth
Eleventh
Twelfth
Classes

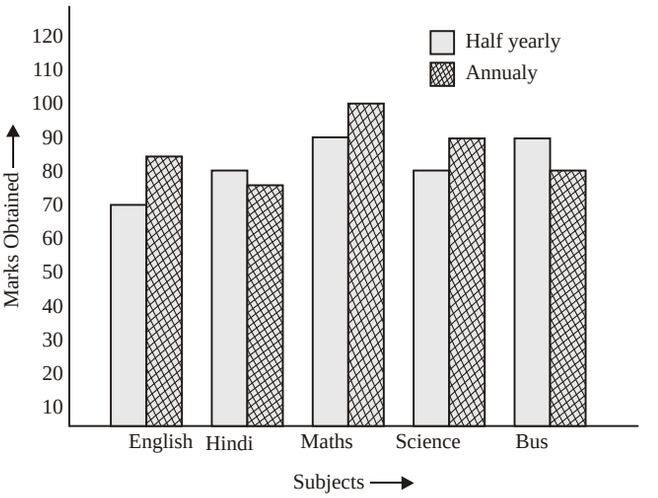
4.


No. of cars
33000
30000
27000
24000
21000
18000
15000
12000
9000
6000
3000
2002
2003
2004
2005
2006
years

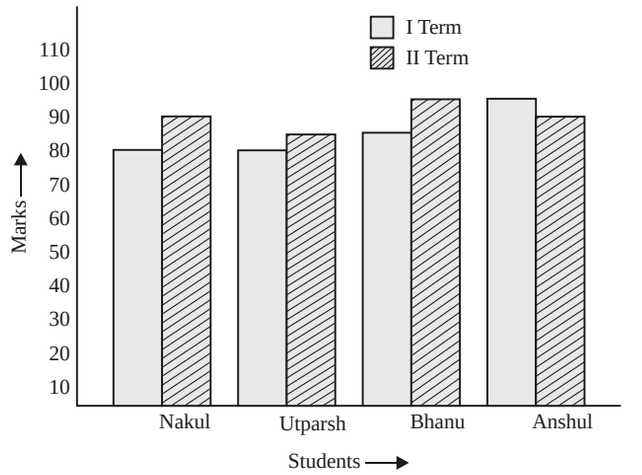
5.


No. of Students
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
School Bus
Autorickshaw
Scooters
Bicycles
On foot
Mode of Transport

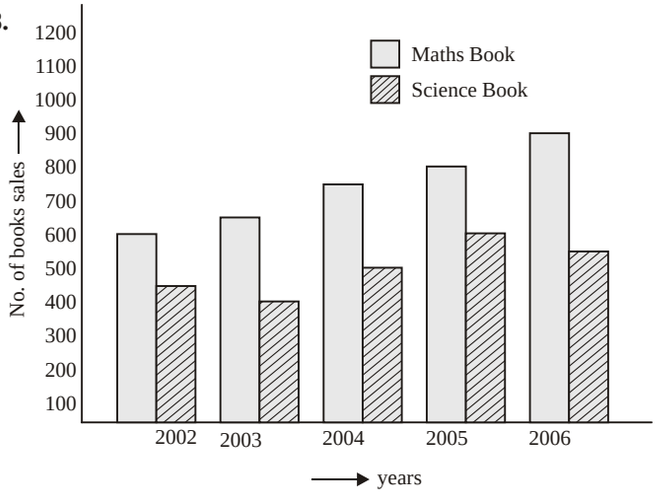
6.


Half yearly
Annualy
Marks Obtained
120
110
100
90
80
70
60
50
40
30
20
10
English
Hindi
Maths
Science
Bus
Subjects

7.


I Term
II Term
Marks
110
100
90
80
70
60
50
40
30
20
10
Nakul
Utparsh
Bhanu
Anshul
Students

8.



MCQS

1. (a) **2.** (b) **3.** (c) **4.** (a) **5.** (b)

6. (a) **7.** (b) **8.** (b) **9.** (c) **10.** (a)

CHAPTER 14 : PROBABILITY

Exercise-14A

1. **(a)** May happen but not certain

(b) Impossible

(c) May happen but not certain

(d) May happen but not certain

(e) May happen but not certain

2. Probability of coming head $= \frac{1}{2}$ **Ans**

3. Probability of even no. on dice

$$= \frac{\text{No. of favorite outcomes}}{\text{total outcomes}}$$

$$= \frac{3}{6} = \frac{1}{2}$$ **Ans**

4. Probability of a composite no. on dice

$$= \frac{\text{No. of favorite outcomes}}{\text{total outcomes}}$$

$$= \frac{2}{6} = \frac{1}{3}$$ **Ans**

5. Probability of getting head $= \frac{1}{2}$ **Ans**

6. Probability of getting $6 = \frac{1}{6}$ **Ans**

7. **(a)** The probability of a green ball

$$= \frac{\text{No. of green ball}}{\text{total no. of balls}}$$

$$= \frac{6}{15} = \frac{2}{5}$$ **Ans**

(b) Probability of drawing black or a yellow ball

$$= \frac{\text{total no. of black and yellow ball}}{\text{total no. of ball}}$$

$$= \frac{4+5}{15} = \frac{9}{15}$$

$$= \frac{3}{5}$$ **Ans**

8. **(a)** The probability of drawing a marble with no. 5.

$$= \frac{1}{10}$$ **Ans**

(b) The probability of drawing a marble with prime number $= \frac{\text{total prime no.}}{\text{total no.}}$

$$= \frac{5}{10} = \frac{1}{2}$$ **Ans**

9. Cricket = 70

hockey = 60

basketball = 50

total boy = 180

Probability of a boy who played hockey

$$= \frac{\text{no. of boys played hockeys}}{\text{total boys}}$$

$$= \frac{60}{180} = \frac{1}{3}$$ **Ans**

10. Families with 2 children = 45

Families with 1 child = 20

Families with 3 children = 35

Probability of a family which has 3 children

$$= \frac{\text{No. of families with 3 children}}{\text{total families}}$$

$$= \frac{35}{100} = \frac{7}{20}$$ **Ans**

MCQS

1. (a) **2.** (b) **3.** (c) **4.** (a) **5.** (b)

6. (a) **7.** (b) **8.** (b) **9.** (c) **10.** (a)

CHAPTER 1 : RATIONAL NUMBER

Exercise-1A

1. Express each of the following rational numbers into standard form :

(a) $\frac{-35}{98}$

HCF of 35 and 98 = 7

$$\frac{-35 \div 7}{98 \div 7} = \frac{-5}{14}$$ **Ans**

(b) $\frac{-36}{64}$

HCF of 36 and 64 = 4

$$= \frac{-9}{16}$$ **Ans**

(c) $\frac{27}{-84}$

HCF of 27 and 84 = 3

$$= \frac{9}{-28} \text{ or } \frac{-9}{28}$$ **Ans**

(d) $\frac{-48}{72}$

HCF of 48 and 72 = 24

$$= \frac{27 \div 3}{-84 \div 3}$$

$$= \frac{-48 \div 24}{72 \div 24}$$

$$= \frac{-2}{3}$$ **Ans**

(e) $\frac{46}{-94}$

HCF of 46 and 94 = 2

$$= \frac{46 \div 2}{-94 \div 2}$$

$$= \frac{23}{-47} \text{ or } \frac{-23}{47}$$ **Ans**

(f) $\frac{-125}{340}$

HCF of 125 and 340 = 5

$$= \frac{-125 \div 5}{340 \div 5}$$

$$= \frac{-25}{68}$$ **Ans**

(g) $\frac{-27}{108}$

HCF 27 and 108 = 27

$$= \frac{-27 \div 27}{108 \div 27}$$

$$= \frac{-1}{4}$$ **Ans**

(h) $\frac{26}{78}$

HCF of 26 and 78 = 26

$$= \frac{26 \div 26}{78 \div 26}$$

$$= \frac{1}{3}$$ **Ans**

2. Which is greater in each of the following pairs ?

(a) $\frac{-4}{5}$ **or** $\frac{6}{-7}$

On cross multiplication

$$\frac{-4}{5} \times \frac{-6}{7}$$

$$-28, -30$$

$\because$ $-28 > -30$

$\therefore$ $\frac{-4}{5} > \frac{-6}{7}$

So, $\frac{-4}{5}$ is greater.

(b) $\frac{-1}{2}$ **or** -1

On cross multiplication

$$\frac{-1}{2} \times \frac{-1}{1}$$

$$-1, -2$$

$\because$ $-1 > -2$

$\therefore$ $\frac{-1}{2} > -1$

So, $\frac{-1}{2}$ is greater.

(c) $\frac{4}{11}$ **or** $\frac{-3}{8}$

On cross multiplication

$\frac{4}{11} \times \frac{-3}{8}$

$32, -33$

$\because \quad 32 > -33$

$\therefore \quad \frac{4}{11} > \frac{-3}{8}$

So, $\frac{4}{11}$ is greater.

(d) $\frac{5}{6}$ **or** $\frac{6}{9}$

On cross multiplication

$\frac{5}{6} \times \frac{6}{9}$

$45, 36$

$\because \quad 45 > 36$

$\therefore \quad \frac{5}{6} > \frac{6}{9}$

So, $\frac{5}{6}$ is greater.

3. Which is smaller in each of the following pairs ?

(a) $\frac{-6}{7}$ **or** $\frac{-9}{7}$

$\frac{-6}{7} \times \frac{-9}{7}$

since $\quad -9 < -6$

so, $\quad \frac{-6}{7} > \frac{-9}{7}$

or $\frac{-9}{7}$ is smaller.

(b) $\frac{-6}{7}$ **or** $\frac{4}{7}$

$\frac{-6}{7} \times \frac{4}{7}$

since $\quad -6 < 4$

so, $\quad \frac{-6}{7} < \frac{4}{7}$

or $\frac{-6}{7}$ is smaller.

(c) **0 or** $\frac{-6}{13}$

$\frac{0}{13} \times \frac{-6}{13}$

since $\quad 0 > -6$

so, $\quad 0 > -6$

or $\frac{-6}{13}$ is smaller.

(d) $\frac{-5}{9}$ **or** $\frac{2}{6}$

On cross multiplication

$\frac{-5}{9} \times \frac{2}{6}$

$-30, 18$

since $\quad 18 > -30$

so, $\quad \frac{2}{6} > \frac{-5}{9}$

or $\frac{-5}{9}$ is smaller.

4. Fill in the blanks with >, < or = :

(a) $\frac{-4}{5} \square \frac{-6}{5}$

On cross multiplication

$\frac{-4}{5} \times \frac{-6}{5}$

$-20, -30$

since $\quad -20 > -30$

so, $\quad \frac{-4}{5} \boxed{>} \frac{-6}{5}$ **Ans**

(b) $-2 \square \frac{-11}{5}$

On cross multiplication

$\frac{-2}{1} \times \frac{-11}{5}$

$-10, -11$

since $\quad -10 > -11$

so, $\quad -2 \boxed{>} \frac{-11}{5}$ **Ans**

(c) $\frac{75}{100} \square \frac{150}{200}$

On cross multiplication

$\frac{75}{100} \times \frac{150}{200}$

$15000, 15000$

since $\quad 15000 = 15000$

so $\quad \frac{75}{100} \boxed{=} \frac{150}{200}$ **Ans**

(d) $\frac{-11}{8} \square \frac{33}{-24}$

On cross multiplication

$-264, -264$

since $-264 = -264$

so $\frac{-11}{8} \boxed{=} \frac{33}{-24}$ **Ans**

(e) $\frac{3}{-8} \square \frac{-8}{12}$

On cross multiplication

$\frac{-3}{8} \times \frac{-8}{12}$

$-36, -64$

since $-36 > -64$

so, $\frac{3}{-8} \boxed{>} \frac{-8}{12}$

(f) $\frac{3}{4} \square \frac{5}{7}$

On cross multiplication

$\frac{3}{4} \times \frac{5}{7}$

$21, 30$

since $21 > 20$

so, $\frac{3}{4} \boxed{>} \frac{5}{7}$

5. Arrange the following numbers in ascending order :

(a) $\frac{-3}{5}, \frac{-13}{15}, \frac{-9}{10}, \frac{17}{-20}$

First we rewrite each rational number with a positive denominator so, $\frac{-3}{5}, \frac{-13}{15}, \frac{-9}{10}, \frac{17}{-20}$ is same as $\frac{-3}{5}, \frac{-13}{15}, \frac{-9}{10}, \frac{-17}{20}$

LCM of 5, 15, 10, 20

5	5, 15, 10, 20
2	1, 3, 2, 4
2	1, 3, 1, 2
3	1, 3, 1, 1
	1, 1, 1, 1

$= 5 \times 2 \times 2 \times 3 = 60$

Now, $\frac{-3}{5} = \frac{-3 \times 12}{5 \times 12} = \frac{-36}{60}$

$\frac{-13}{15} = \frac{-13 \times 4}{15 \times 4} = \frac{-52}{60}$

$\frac{-9}{10} = \frac{-9 \times 6}{10 \times 6} = \frac{-54}{60}$

$\frac{-17}{20} = \frac{-17 \times 3}{20 \times 3} = \frac{-51}{60}$

$\because$ $-54 < -52 < -51 < -36$

$\therefore$ $\frac{-54}{60} < \frac{-52}{60} < \frac{-51}{60} < \frac{-36}{60}$

$\therefore$ $\frac{-9}{10} < \frac{-13}{15} < \frac{-17}{20} < \frac{-3}{5}$ **Ans**

(b) $\frac{-3}{10}, \frac{7}{-15}, \frac{-11}{20}, \frac{-17}{30}$

First, we rewrite each rational number with a positive denominator, so $\frac{-3}{10}, \frac{7}{-15}, \frac{-11}{20}, \frac{-17}{30}$ is same as $\frac{-3}{10}, \frac{-7}{15}, \frac{-11}{20}, \frac{-17}{30}$

LCM of 10, 15, 20 and 30

5	10, 15, 20, 30
2	2, 3, 4, 6
2	1, 3, 2, 3
3	1, 3, 1, 3
	1, 1, 1, 1

$= 5 \times 2 \times 2 \times 3 = 60$

Now, $\frac{-3}{10} = \frac{-3 \times 6}{10 \times 6} = \frac{-18}{60}$

$\frac{-7}{15} = \frac{-7 \times 4}{15 \times 4} = \frac{-28}{60}$

$\frac{-11}{20} = \frac{-11 \times 3}{20 \times 3} = \frac{-33}{60}$

$\frac{-17}{30} = \frac{-17 \times 2}{30 \times 2} = \frac{-34}{60}$

$\because$ $-34 < -33 < -28 < -18$

$\therefore$ $\frac{-34}{60} < \frac{-33}{60} < \frac{-28}{60} < \frac{-18}{60}$

$\therefore$ $\frac{-17}{30} < \frac{-11}{20} < \frac{-7}{15} < \frac{-3}{10}$ **Ans**

(c) $\frac{2}{9}, \frac{-2}{9}, \frac{4}{-7}, \frac{5}{63}$

First, we rewrite each rational number with a positive denominator, so $\frac{2}{9}, \frac{-2}{9}, \frac{4}{-7}, \frac{5}{63}$ is same as $\frac{2}{9}, \frac{-2}{9}, \frac{-4}{7}, \frac{5}{63}$

LCM of 9, 9, and 63

3	9, 9, 7, 63
3	3, 3, 7, 21
7	1, 1, 7, 7
	1 1 1 1

$= 3 \times 3 \times 7 = 63$

Now, $\frac{2}{9} = \frac{2 \times 7}{9 \times 7} = \frac{14}{63}$

$\frac{-2}{9} = \frac{-2 \times 7}{9 \times 7} = \frac{-14}{63}$

$\frac{-4}{7} = \frac{-4 \times 9}{7 \times 9} = \frac{-36}{63}$

$\frac{5}{63} = \frac{5 \times 1}{63 \times 1} = \frac{5}{63}$

$\because$ $-36 < -14 < 5 < 14$

$\therefore$ $\frac{-36}{63} < \frac{-14}{63} < \frac{5}{63} < \frac{14}{63}$

$\therefore$ $\frac{-4}{7} < \frac{-2}{9} < \frac{5}{63} < \frac{2}{9}$ **Ans**

(d) $\frac{-5}{6}, \frac{-13}{18}, \frac{17}{-24}, \frac{-7}{12}$

First, we rewrite each rational number with a positive denominator, so $\frac{-5}{6}, \frac{-13}{18}, \frac{17}{-24}, \frac{-7}{12}$ is same as $\frac{-5}{6}, \frac{-13}{18}, \frac{-17}{24}, \frac{-7}{12}$

2	6, 18, 24, 12
2	3, 9, 12, 6
2	3, 9, 6, 3
3	3, 9, 3, 3
3	1, 3, 1, 1
	1, 1, 1, 1

LCM of 6, 18, 24 and 12

$= 2\times2\times2\times3\times3$

$= 72$

Now, $\frac{-5}{6} = \frac{-5\times12}{6\times12} = \frac{-60}{72}$

$\frac{-13}{18} = \frac{-13\times4}{18\times4} = \frac{-52}{72}$

$\frac{-17}{24} = \frac{-17\times3}{24\times3} = \frac{-51}{72}$

$\frac{-7}{12} = \frac{-7\times6}{12\times6} = \frac{-42}{72}$

$\because$ $-60 < -52, < -51 < -42$

$\therefore$ $\frac{-60}{72} < \frac{-52}{72} < \frac{-51}{72} < \frac{-42}{72}$

$\therefore$ $\frac{-5}{6} < \frac{-13}{18} < \frac{-17}{24} < \frac{-7}{12}$ **Ans**

6. Arrange the following numbers in descending order :

(a) $\frac{-10}{11}, \frac{-11}{22}, \frac{-35}{44}, \frac{-17}{33}$

LCM of 11, 22, 44 and 33

$= 11\times2\times2\times3 = 132$

11	11, 22, 44, 33
2	2, 2, 4, 3
2	1, 1, 2, 3
3	1, 1, 1, 3
	1, 1, 1, 1

Now, $\frac{-10}{11} = \frac{-10\times12}{11\times12} = \frac{-120}{132}$

$\frac{-11}{22} = \frac{-11\times6}{22\times6} = \frac{-66}{132}$

$\frac{-35}{44} = \frac{-35\times3}{44\times3} = \frac{-105}{132}$

$\frac{-17}{33} = \frac{-17\times4}{33\times4} = \frac{-68}{132}$

$\because$ $-66 > -68 > -105 > -120$

$\therefore$ $\frac{-66}{132} > \frac{-68}{132} > \frac{-105}{132} > \frac{-120}{132}$

$\therefore$ $\frac{-11}{22} > \frac{-17}{33} > \frac{-35}{44} > \frac{-10}{11}$ **Ans**

(b) $\frac{-3}{4}, \frac{5}{-12}, \frac{-7}{16}, \frac{-9}{24}$

First, we rewrite each rational number with a positive denominator, so $\frac{-3}{4}, \frac{-5}{12}, \frac{-7}{16}, \frac{-9}{24}$ is same as $\frac{-3}{4}, \frac{-5}{12}, \frac{-7}{16}, \frac{-9}{24}$

4	4, 12, 16, 24
3	1, 3, 4, 6
2	1, 1, 4, 2
2	1, 1, 2, 1
	1, 1, 1, 1

LCM of 4, 12, 16 and 24

$= 4\times3\times2\times2 = 48$

Now, $\frac{-3}{4} = \frac{-3\times12}{4\times12} = \frac{-36}{48}$

$\frac{-5}{12} = \frac{-5\times4}{12\times4} = \frac{-20}{48}$

$\frac{-7}{16} = \frac{-7\times3}{16\times3} = \frac{-21}{48}$

$\frac{-9}{24} = \frac{-9\times2}{24\times2} = \frac{-18}{48}$

$\because$ $-18 > -20 > -21 > -36$

$\therefore$ $\frac{-18}{48} > \frac{-20}{48} > \frac{21}{48} > \frac{-36}{48}$

$\therefore$ $\frac{-9}{24} > \frac{-5}{12} > \frac{-7}{16} > \frac{-3}{4}$

(c) $\frac{4}{5}, \frac{-2}{3}, \frac{-1}{2}, \frac{-4}{7}$

LCM of 5, 3, 2 and 7

$= 5\times3\times2\times7 = 210$

Now, $\frac{4}{5} = \frac{4\times42}{5\times42} = \frac{168}{210}$

$\frac{-2}{3} = \frac{-2\times70}{3\times70} = \frac{-140}{210}$

$\frac{-1}{2} = \frac{-1\times105}{2\times105} = \frac{-105}{210}$

$\frac{-4}{7} = \frac{-4\times30}{7\times30} = \frac{-120}{210}$

$\because$ $168 > -105 > -120 > -140$

$\therefore$ $\frac{168}{210} > \frac{-105}{210} > \frac{-120}{210} > \frac{-140}{210}$

$\therefore$ $\frac{4}{5} > \frac{-1}{2} > \frac{-4}{7} > \frac{-2}{3}$ **Ans**

(d) $\frac{6}{-7}, \frac{-4}{21}, \frac{-23}{42}, \frac{-9}{14}$

First, we rewrite each rational number with a positive denominator, so $\frac{6}{-7}, \frac{-4}{21}, \frac{-23}{42}, \frac{-9}{14}$ is same as $\frac{-6}{7}, \frac{-4}{21}, \frac{-23}{42}, \frac{-9}{14}$

7	7, 21, 42, 14
2	1, 3, 6, 2
3	1, 3, 3, 1
	1 1 1 1

LCM of 7, 21, 42 and 14

$= 7\times2\times3 = 42$

Now, $\frac{-6}{7}=\frac{-6\times 6}{7\times 6}=\frac{-36}{42}$

$\frac{-4}{21}=\frac{-4\times 2}{21\times 2}=\frac{-8}{42}$

$\frac{-23}{42}=\frac{-23\times 1}{42\times 1}=\frac{-23}{42}$

$\frac{-9}{14}=\frac{-9\times 3}{14\times 3}=\frac{-27}{42}$

$\because \quad -8>-23>-27>-36$

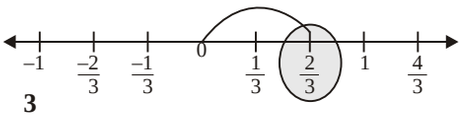
$\therefore \quad \frac{-8}{42}>\frac{-23}{42}>\frac{-27}{42}>\frac{-36}{42}$

$\therefore \quad \frac{-4}{21}>\frac{-23}{42}>\frac{-9}{14}>\frac{-6}{7}$ **Ans**

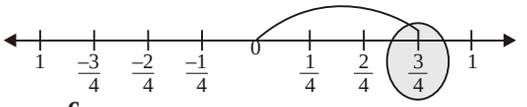
Exercise-1B

1. Represent the following rational numbers on number-line :

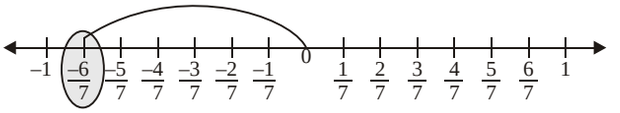
(a) $\frac{2}{3}$



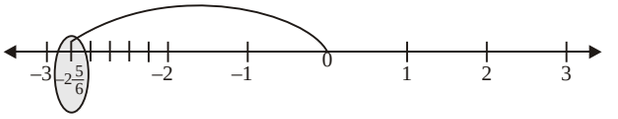
(b) $\frac{3}{4}$



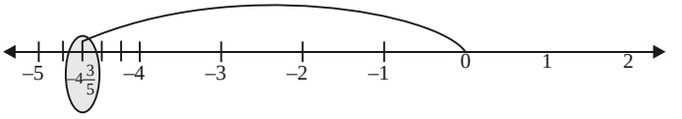
(c) $\frac{-6}{7}$



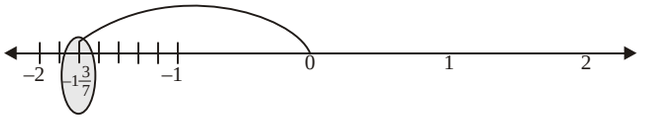
(d) $-2\frac{5}{6}$



(e) $-4\frac{3}{5}$



(f) $-1\frac{3}{7}$



2. Find seven rational numbers between −5 and −2.

−5 and −2

Multiply and divide both number by 5

$\frac{-5\times 5}{1\times 5},\frac{-2\times 5}{1\times 5}$

$\frac{-25}{5},\frac{-10}{5}$

So, 7 rational number between $\frac{-25}{5}$ and $\frac{-10}{5}$ are $\frac{-24}{5}$, $\frac{-23}{5},\frac{-22}{5},\frac{-21}{5},-4,\frac{-19}{5},\frac{-18}{5}$ **Ans**

3. Find ten rational numbers between $\frac{-3}{2}$ and $\frac{5}{3}$.

$\frac{-3}{2}$ and $\frac{5}{3}$

By doing same denominator, we have

$\frac{-3\times 3}{2\times 3}$ and $\frac{5\times 2}{3\times 2}$

$\frac{-9}{6},\frac{10}{6}$

So, ten rational number between $\frac{-9}{6}$ and $\frac{10}{6}$ are $\frac{-8}{6}$, $\frac{-7}{6},-1,\frac{-5}{6},\frac{-4}{6},\frac{-3}{6},\frac{-2}{6},\frac{-1}{6},\frac{1}{6},\frac{2}{6}$ **Ans**

4. Find three rational numbers between −2 and 0.

−2 and 0

Multiplying and divide both numbers by 3, we have

$\frac{-2\times 3}{1\times 3}$ and $\frac{0\times 3}{1\times 3}$

$\frac{-6}{3}$ and $\frac{0}{3}$

So, 3 rational number between $\frac{-6}{3}$ and $\frac{0}{3}$ are $\frac{-5}{3},\frac{-4}{3}-1$.

5. Find six rational numbers between 0 and 3.

0 and 3

Multiply and divide both numbers by 3, we have

$\frac{0\times 3}{1\times 3},\frac{3\times 3}{1\times 3}$

$\frac{0}{3},\frac{9}{3}$

So, 6 rational number between $\frac{0}{3}$ and $\frac{9}{3}$ are $\frac{1}{3},\frac{2}{3},1,\frac{4}{3},\frac{5}{6},2$.

6. Find eight rational numbers between $\frac{2}{3}$ and $\frac{3}{4}$.

$\frac{2}{3}$ and $\frac{3}{4}$

By doing same denominator, we have

$$\frac{2\times4}{3\times4} \text{ and } \frac{3\times3}{4\times3}$$

$$\frac{8}{12} \text{ and } \frac{9}{12}$$

On multiplying and divide both number by 9, we have

$$\frac{72}{108} \text{ and } \frac{81}{108}$$

So, 8 rational number between $\frac{72}{108}$ and $\frac{81}{108}$ are $\frac{73}{108}, \frac{74}{108}, \frac{75}{108}, \frac{76}{108}, \frac{77}{108}, \frac{78}{108}, \frac{79}{108}, \frac{80}{108}$ **Ans**

7. Find fourteen rational numbers between $\frac{-6}{7}$ and $\frac{1}{2}$.

$\frac{-6}{7}$ and $\frac{1}{2}$

By doing same denominator, we have

$$\frac{-6\times2}{7\times2} \text{ and } \frac{1\times7}{2\times7}$$

$$\frac{-12}{14} \text{ and } \frac{7}{14}$$

So, 14 rational number between $\frac{-12}{14}$ and $\frac{7}{14}$ are $\frac{-11}{14}, \frac{-10}{14}, \frac{-9}{14}, \frac{-8}{14}, \frac{-7}{14}, \frac{-6}{14}, \frac{-5}{14}, \frac{-4}{14}, \frac{-3}{14}, \frac{-2}{14}, \frac{-1}{14}, 0, \frac{1}{14}, \frac{2}{14}$

8. State true or false for the following statements:

(a) $\frac{3}{4}$ lies to right of 0 on the number-line.

(b) $\frac{-1}{4}$ lies to left of 0 on the number-line.

(c) $\frac{-1}{8}$ lies to right of $\frac{1}{8}$ on the number-line.

(d) $\frac{-5}{6}$ and $\frac{5}{6}$ are on the opposite side of 0 on the number-line.

Sol : (a) True **(b)** True **(c)** False **(d)** True

Exercise-1C

1. Fill in the blanks and write the name of the used property also :

(a) $\frac{-3}{4}+\frac{6}{7}=\frac{6}{7}+\frac{-3}{4}$ (commutative property)

(b) $\frac{4}{9}+\frac{-8}{11}=\frac{-8}{11}+\frac{4}{9}$ (commutative property)

(c) $\left(\frac{3}{4}+\frac{4}{7}\right)+\frac{-6}{7}=\frac{3}{4}+\left(\frac{4}{7}+\left(\frac{-6}{7}\right)\right)$

(Associative property)

(d) $\frac{3}{7}+\frac{-3}{7}=\frac{-3}{7}+\frac{3}{7}=0$ (Additive Inverse)

(e) $\frac{5}{23}+0=\frac{5}{23}$ (Property of zero)

(f) $\frac{4}{15}+\left(\frac{-4}{15}\right)=0$ (Additive Inverse)

2. Verify the property $\left(\frac{a}{b}+\frac{c}{d}\right)=\left(\frac{c}{d}+\frac{a}{b}\right)$ for :

(a) $\frac{6}{13}$ and $\frac{-5}{26}$

$$\frac{a}{b}=\frac{6}{13}, \frac{c}{d}=\frac{-5}{26}$$

Now, $\frac{a}{b}+\frac{c}{d}=\frac{c}{d}+\frac{a}{b}$

$$\frac{6}{13}+\frac{-5}{26}=\frac{-5}{26}+\frac{6}{13}$$

$$\frac{12+(-5)}{26}=\frac{-5+12}{26}$$

$$\frac{12-5}{26}=\frac{7}{26}$$

$$\frac{7}{26}=\frac{7}{26}$$

Hence, verified

(b) $\frac{5}{12}$ and $\frac{-7}{18}$

$$\frac{a}{b}=\frac{5}{12}, \frac{c}{d}=\frac{-7}{18}$$

Now, $\frac{a}{b}+\frac{c}{d}=\frac{c}{d}+\frac{a}{b}$

$$\frac{5}{12}+\left(\frac{-7}{18}\right)=\frac{-7}{18}+\frac{5}{12}$$

$$\frac{15+(-14)}{36}=\frac{-14+15}{36}$$

$$\frac{15-14}{36}=\frac{1}{36}$$

$$\frac{1}{36}=\frac{1}{36}$$

Hence, verified

(c) $\frac{3}{10}$ and $\frac{-7}{15}$

$$\frac{a}{b}=\frac{3}{10}, \frac{c}{d}=\frac{-7}{15}$$

Now, $\frac{a}{b}+\frac{c}{d}=\frac{c}{d}+\frac{a}{b}$

$$\frac{3}{10}+\left(\frac{-7}{15}\right)=\frac{-7}{15}+\frac{3}{10}$$

$$\frac{9+(-14)}{30}=\frac{-14+9}{30}$$

$$\frac{9-14}{30}=\frac{-5}{30}$$

$$\frac{-5}{30}=\frac{-5}{30}$$

Hence verified

3. Verify the property

$\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}=\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)$ **for :**

(a) $\frac{6}{17}, \frac{5}{17}$ **and** $\frac{-7}{17}$

$$\frac{a}{b}=\frac{6}{17}, \frac{c}{d}=\frac{5}{17}, \frac{e}{d}=\frac{-7}{17}$$

Now, $\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}=\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)$

$$\left(\frac{6}{17}+\frac{5}{17}\right)+\left(\frac{-7}{17}\right)=\frac{6}{17}+\left[\frac{5}{17}+\left(\frac{-7}{17}\right)\right]$$

$$\left(\frac{6+5}{17}\right)+\left(\frac{-7}{17}\right)=\frac{6}{17}+\left(\frac{5-7}{17}\right)$$

$$\frac{11}{17}+\left(\frac{-7}{17}\right)=\frac{6}{17}+\left(\frac{-2}{17}\right)$$

$$\frac{11-7}{17}=\frac{6-2}{17}$$

$$\frac{4}{17}=\frac{4}{17}$$

Hence, verified

(b) $\frac{-5}{22}, \frac{6}{11}$ **and** $\frac{10}{33}$

$$\frac{a}{b}=\frac{-5}{22}, \frac{c}{d}=\frac{6}{11}, \frac{e}{f}=\frac{10}{33}$$

Now, $\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}=\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)$

$$\left(\frac{-5}{22}+\frac{6}{11}\right)+\frac{10}{33}=\frac{-5}{22}+\left(\frac{6}{11}+\frac{10}{33}\right)$$

$$\left(\frac{-5+12}{22}\right)+\frac{10}{33}=\frac{-5}{22}+\left(\frac{18+10}{33}\right)$$

$$\frac{7}{22}+\frac{10}{33}=\frac{-5}{22}+\frac{28}{33}$$

$$\frac{21+20}{66}=\frac{-15+56}{66}$$

$$\frac{41}{66}=\frac{41}{66}$$

Hence, verified

(c) $\frac{7}{8}, \frac{3}{4}$ **and** $\frac{-11}{16}$

$$\frac{a}{b}=\frac{7}{8}, b=\frac{3}{4}, c=\frac{-11}{16}$$

Now, $\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}=\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)$

$$\left(\frac{7}{8}+\frac{3}{4}\right)+\left(\frac{-11}{16}\right)=\frac{7}{8}+\left(\frac{3}{4}+\left(\frac{-11}{16}\right)\right)$$

$$\left(\frac{7+6}{8}\right)+\left(\frac{-11}{16}\right)=\frac{7}{8}+\left(\frac{12+(-11)}{16}\right)$$

$$\frac{13}{8}+\left(\frac{-11}{16}\right)=\frac{7}{8}+\frac{1}{16}$$

$$\frac{26+(-11)}{16}=\frac{14+1}{16}$$

$$\frac{15}{16}=\frac{15}{16}$$

Hence, verified

4. Find the additive inverse of each of the following :

(a) $\frac{-6}{13}$

additive inverse of $\frac{-6}{13}$

$$=-\left(\frac{-6}{13}\right)=\frac{6}{13}$$ **Ans**

(b) $\frac{17}{8}$

additive inverse of $=\frac{17}{8}$

$$=\frac{-17}{8}$$ **Ans**

(c) $\frac{-3}{-5}$

additive inverse of $\frac{-3}{-5}$

$$=-\left(\frac{-3}{-5}\right)=\left(\frac{-3}{5}\right)$$ **Ans**

(d) -17

additive inverse of -17

$$=-(-17)=17$$ **Ans**

(e) $\frac{-3}{8}$

additive inverse of $\frac{-3}{8}$

$$=-\left(\frac{-3}{8}\right)=\frac{3}{8}$$ **Ans**

(f) $\frac{-19}{-16}$

additive inverse of $\frac{-19}{-16}$

$= -\left(\frac{-19}{-16}\right) = \frac{-19}{16}$ **Ans**

5. Find the sum :

(a) $\frac{-4}{23} + \frac{6}{23}$

$= \frac{-4+6}{23} = \frac{2}{23}$ **Ans**

(b) $\frac{7}{18} + \frac{-5}{18}$

$= \frac{7+(-5)}{18}$

$= \frac{7-5}{18}$

$\frac{2}{18} = \frac{1}{9}$ **Ans**

(c) $\frac{-5}{26} + \frac{-3}{26}$

$= \frac{(-5)+(-3)}{26}$

$= \frac{-5-3}{26}$

$= \frac{-8}{26} = \frac{-4}{13}$ **Ans**

(d) $\frac{3}{20} + \frac{-41}{20} + \frac{7}{20}$

$= \frac{3+(-41)+7}{20}$

$= \frac{3-41+7}{20}$

$= \frac{10-41}{20}$

$= \frac{-31}{20}$

$= -1\frac{11}{20}$ **Ans**

(e) $\frac{1}{27} + \frac{-11}{27} + \frac{8}{27}$

$= \frac{1+(-11)+8}{27}$

$= \frac{1-11+8}{27}$

$= \frac{9-11}{27}$

$= \frac{-2}{27}$ **Ans**

(f) $\frac{-5}{16} + \frac{3}{16} + \frac{7}{16}$

$= \frac{-5+3+7}{16}$

$= \frac{-5+10}{16} = \frac{5}{16}$ **Ans**

6. Find the sum :

(a) $\frac{-10}{57} + \frac{16}{19}$

$= \frac{-10+48}{57}$

$= \frac{38}{57} = \frac{2}{3}$ **Ans**

(b) $\frac{10}{51} + \frac{5}{17}$

$= \frac{10+15}{51}$

$= \frac{25}{51}$ **Ans**

(c) $\frac{-8}{21} + \frac{3}{14}$

$= \frac{-16+9}{42}$

$= \frac{-7}{42} = \frac{-1}{6}$ **Ans**

(d) $\frac{5}{13} + \frac{15}{26} + \frac{-10}{39}$

$= \frac{30+45+(-20)}{78}$

$= \frac{75-20}{78}$

$= \frac{55}{78}$ **Ans**

(e) $\frac{-13}{20} + \frac{7}{10} + \frac{3}{5}$

$= \frac{-13+14+12}{20}$

$= \frac{13}{20}$ **Ans**

(f) $\frac{5}{21} + \frac{-3}{14} + \frac{17}{42}$

$= \frac{10+(-9)+17}{42}$

$= \frac{27-9}{42}$

$= \frac{18}{42} = \frac{3}{7}$ **Ans**

7. Subtract :

(a) $\frac{5}{8}$ **from** $\frac{3}{8}$

$$= \frac{3}{8} - \frac{5}{8}$$
$$= \frac{3-5}{8}$$
$$= \frac{-2}{8} = \frac{-1}{4}$$ **Ans**

(b) $\frac{11}{18}$ **from** $\frac{-5}{18}$

$$= \frac{-5}{18} - \frac{11}{18}$$
$$= \frac{-5-11}{18}$$
$$= \frac{-16}{18} \Rightarrow \frac{-8}{9}$$ **Ans**

(c) $\frac{-13}{19}$ **from** $\frac{5}{19}$

$$= \frac{5}{19} - \left(\frac{-13}{19}\right)$$
$$= \frac{5-(-13)}{19}$$
$$= \frac{5+13}{19}$$
$$= \frac{18}{19}$$ **Ans**

(d) $\frac{9}{11}$ **from** $\frac{-1}{11}$

$$= \frac{-1}{11} - \frac{9}{11}$$
$$= \frac{-1-9}{11} = \frac{-10}{11}$$ **Ans**

(e) $\frac{-21}{19}$ **from 0**

$$= 0 - \left(\frac{-21}{19}\right)$$
$$= 0 + \frac{21}{19}$$
$$= \frac{21}{19} = 1\frac{2}{19}$$ **Ans**

(f) $\frac{-13}{25}$ **from** $\frac{12}{25}$

$$= \frac{12}{25} - \left(\frac{-13}{25}\right)$$
$$= \frac{12-(-13)}{25}$$
$$= \frac{12+13}{25} = \frac{25}{25} = 1$$ **Ans**

8. Subtract :

(a) $\frac{-4}{5}$ **from** $\frac{1}{3}$

$$= \frac{1}{3} - \left(\frac{-4}{5}\right)$$
$$= \frac{1}{3} + \frac{4}{5}$$
$$= \frac{5+12}{15} = \frac{17}{15} = 1\frac{2}{15}$$ **Ans**

(b) $\frac{-81}{16}$ **from 0**

$$= 0 - \left(\frac{-81}{16}\right)$$
$$= 0 + \frac{81}{16}$$
$$= \frac{81}{16} = 5\frac{1}{16}$$ **Ans**

(c) $\frac{-32}{13}$ **from** $\frac{-6}{5}$

$$= \frac{-6}{5} - \left(\frac{-32}{13}\right)$$
$$= \frac{-6}{5} + \frac{32}{13}$$
$$= \frac{-78+160}{65}$$
$$= \frac{82}{65} = 1\frac{17}{65}$$ **Ans**

(d) **–17 from** $\frac{-4}{7}$

$$= \frac{-4}{7} - (-17)$$
$$= \frac{-4}{7} + \frac{17}{1}$$
$$= \frac{-4+119}{7}$$
$$= \frac{115}{7} = 16\frac{3}{7}$$ **Ans**

(e) **–7 from** $\frac{-4}{7}$

$$= \frac{-4}{7} - (-7)$$
$$= \frac{-4}{7} + 7$$
$$= \frac{-4+49}{7}$$
$$= \frac{45}{7} = 6\frac{3}{7}$$ **Ans**

(f) $\frac{-8}{9}$ from $\frac{-3}{5}$

$$= \frac{-3}{5} - \left(\frac{-8}{9}\right)$$

$$= \frac{-3}{5} + \frac{8}{9}$$

$$= \frac{-27+40}{45}$$

$$= \frac{13}{45}$$ **Ans**

9. Simplify :

(a) $\frac{7}{8} - \frac{11}{16} + \frac{1}{4} + \left(\frac{-3}{4}\right)$

$$= \frac{14-11+4+(-12)}{16}$$

$$= \frac{14-11+4-12}{16}$$

$$= \frac{18-23}{16}$$

$$= \frac{-5}{16}$$ **Ans**

(b) $\frac{-1}{4} + \frac{-11}{6} + \frac{-3}{8} + \frac{9}{10}$

$$= \frac{-30+(-220)+(-45)+108}{120}$$

$$= \frac{-30-220-45+108}{120}$$

$$= \frac{-295+103}{120}$$

$$= \frac{-187}{120}$$ **Ans**

(c) $\frac{-5}{16} + \frac{7}{20} + \frac{-3}{10} + \frac{-7}{12}$

$$= \frac{-75+84+(-72)+(-140)}{240}$$

$$= \frac{-75+84-72-140}{240}$$

$$= \frac{-287+84}{240}$$

$$= \frac{-203}{240}$$ **Ans**

(d) $\frac{3}{14} + \frac{-5}{7} - \frac{-8}{21} + \frac{5}{3}$

$$= \frac{9+(-30)-(-16)+70}{42}$$

$$= \frac{9-30+16+70}{42}$$

$$= \frac{95-30}{42}$$

$$= \frac{65}{42} = 1\frac{23}{42}$$ **Ans**

(e) $\frac{3}{11} + \frac{5}{22} - \frac{4}{33} + \frac{5}{44}$

$$= \frac{36+30-16+15}{132}$$

$$= \frac{81-16}{132}$$

$$= \frac{65}{132}$$ **Ans**

(f) $\frac{3}{5} - \frac{2}{15} + \frac{1}{6} + \frac{4}{3}$

$$= \frac{18-4+5+40}{30}$$

$$= \frac{63-4}{30}$$

$$= \frac{59}{30}$$

$$= 1\frac{29}{30}$$ **Ans**

10. The sum of two rational numbers is –8. If one of them is $\frac{5}{9}$, find the other.

The sum of two rational number = –8

One number = $\frac{5}{4}$

$\therefore$ Other number $= \frac{-8}{1} - \frac{5}{9}$

$$= \frac{-72-5}{9}$$

$$= \frac{-77}{9} = -8\frac{5}{9}$$ **Ans**

11. What rational number should be added to $\frac{-3}{7}$ to get $\frac{5}{14}$?

Sol : Let x should be added to $\frac{-3}{7}$ to get $\frac{5}{14}$

So, $\frac{-3}{7} + x = \frac{5}{14}$

$$x = \frac{5}{14} + \frac{3}{7}$$

$$x = \frac{5+6}{14}$$

$$x = \frac{11}{14}$$ **Ans**

Exercise-1D

1. Fill in the blanks and name the used property also :

(a) $\frac{-6}{17}\times\frac{8}{19}=\frac{8}{19}\times\frac{-6}{17}$ (Commutative Property)

(b) $\frac{5}{9}\times\left(\frac{-6}{17}+\frac{8}{19}\right)=\left(\frac{5}{9}\times\frac{-6}{17}\right)+\left(\frac{5}{9}\times\frac{8}{19}\right)$ (Distributive)

(c) $\left(\frac{6}{7}\times\frac{8}{9}\right)\times\frac{-5}{13}=\frac{6}{7}\times\left(\frac{8}{9}\times\left(\frac{-5}{13}\right)\right)$ (Associative)

(d) $\frac{3}{7}\times\left(\frac{-5}{9}+\frac{1}{4}\right)=\left(\frac{3}{7}\times\frac{-5}{9}\right)+\left(\frac{3}{7}\times\frac{1}{4}\right)$ (Distributive)

(e) $\frac{3}{5}\times 0=0\times\frac{3}{5}=0$ (Property of zero)

(f) $\frac{-15}{17}\times 1=1\times\frac{-15}{15}=\frac{-15}{17}$ (Multiplicative identity)

2. Verify the property $\left(\frac{a}{b}\times\frac{c}{d}\right)=\left(\frac{c}{d}\times\frac{a}{b}\right)$ for the following rational numbers :

(a) $\frac{3}{4}$ **and** $\frac{5}{7}$

$$\frac{a}{b}=\frac{3}{4},\frac{c}{d}=\frac{5}{7}$$

Now,

$$\frac{a}{b}\times\frac{c}{d}=\frac{c}{d}\times\frac{a}{b}$$

$$\frac{3}{4}\times\frac{5}{7}=\frac{5}{7}\times\frac{3}{4}$$

$$\frac{15}{28}=\frac{15}{28}$$

Hence verified

(b) $\frac{-9}{17}$ **and** $\frac{8}{17}$

$$\frac{a}{b}=\frac{-9}{17},\frac{c}{d}=\frac{8}{17}$$

Now,

$$\frac{a}{b}\times\frac{c}{d}=\frac{c}{d}\times\frac{a}{b}$$

$$\frac{-9}{17}\times\frac{8}{17}=\frac{8}{17}\times\frac{-9}{17}$$

$$\frac{-72}{289}=\frac{-72}{289}$$

Hence, verified

(c) $\frac{-7}{9}$ **and** $\frac{3}{-5}$

$$\frac{a}{b}=\frac{-7}{9},\frac{c}{d}=\frac{-3}{5}$$

Now,

$$\frac{a}{b}\times\frac{c}{d}=\frac{c}{d}\times\frac{a}{b}$$

$$\frac{-7}{9}\times\frac{-3}{5}=\frac{-3}{5}\times\frac{-7}{9}$$

$$\frac{7}{15}=\frac{7}{15}$$

Hence, verified

(d) $\frac{4}{9}$ **and** $\frac{-3}{5}$

$$\frac{a}{b}=\frac{4}{9},\frac{c}{d}=\frac{-3}{5}$$

Now,

$$\frac{a}{b}\times\frac{c}{d}=\frac{c}{d}\times\frac{a}{b}$$

$$\frac{4}{9}\times\frac{-3}{5}=\frac{-3}{5}\times\frac{4}{9}$$

$$\frac{-4}{15}=\frac{-4}{15}$$

Hence verified

(e) **0 and** $\frac{-5}{9}$

$$\frac{a}{b}=0;\frac{c}{d}=\frac{-5}{9}$$

Now,

$$\frac{a}{b}\times\frac{c}{d}=\frac{c}{d}\times\frac{a}{b}$$

$$0\times\frac{-5}{9}=\frac{-5}{9}\times 0$$

$$0=0$$

Hence, verified

(f) $\frac{1}{7}$ **and** $\frac{-5}{9}$

$$\frac{a}{b}=\frac{1}{7};\frac{c}{d}=\frac{-5}{9}$$

Now,

$$\frac{a}{b}\times\frac{c}{d}=\frac{c}{d}\times\frac{a}{b}$$

$$\frac{1}{7}\times\frac{-5}{9}=\frac{-5}{9}\times\frac{1}{7}$$

$$\frac{-5}{63}=\frac{-5}{63}$$

Hence, verified

3. Verify the property

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

for the following rational numbers :

(a) $\frac{1}{3},\frac{5}{6}$ **and** $\frac{-8}{9}$

$$\frac{a}{b}=\frac{1}{3};\frac{c}{d}=\frac{5}{6};\frac{c}{f}=\frac{-8}{9}$$

Now,

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

$$\left(\frac{1}{3}\times\frac{5}{6}\right)\times\frac{-8}{9}=\frac{1}{3}\times\left(\frac{5}{6}\times\frac{-8}{9}\right)$$

$$\frac{5}{18}\times\frac{-8}{9}=\frac{1}{3}\times\frac{-20}{27}$$

$$\frac{-20}{81}=\frac{-20}{81}$$ **Hence verified**

(b) $\frac{7}{5}, \frac{-9}{4}$ **and** $\frac{1}{2}$

$$\frac{a}{b}=\frac{7}{5};\ \frac{c}{d}=\frac{-9}{4};\ \frac{e}{f}=\frac{1}{2}$$

Now,

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

$$\left(\frac{7}{5}\times\frac{-9}{4}\right)\times\frac{1}{2}=\frac{7}{5}\times\left(\frac{-9}{4}\times\frac{1}{2}\right)$$

$$\frac{-63}{20}\times\frac{1}{2}=\frac{7}{5}\times\frac{-9}{8}$$

$$\frac{-63}{40}=\frac{-63}{40}$$ **Hence verified**

(c) $\frac{3}{5}, -\frac{4}{5}$ **and** $\frac{-7}{10}$

$$\frac{a}{b}=\frac{3}{5};\ \frac{c}{d}=\frac{-4}{5};\ \frac{e}{f}=\frac{-7}{10}$$

Now,

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

$$\left(\frac{3}{5}\times\frac{-4}{5}\right)\times\frac{-7}{10}=\frac{3}{5}\times\left(\frac{-4}{5}\times\frac{-7}{10}\right)$$

$$\frac{-12}{25}\times\frac{-7}{10}=\frac{3}{5}\times\frac{14}{25}$$

$$\frac{42}{125}=\frac{42}{125}$$ **Hence verified**

(d) $\frac{8}{21}, \frac{1}{4}$ **and** $\frac{-3}{4}$

$$\frac{a}{b}=\frac{8}{21};\ \frac{c}{d}=\frac{1}{4};\ \frac{e}{f}=\frac{-3}{4}$$

Now,

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

$$\left(\frac{8}{21}\times\frac{1}{4}\right)\times\frac{-3}{4}=\frac{8}{21}\times\left(\frac{1}{4}\times\frac{-3}{4}\right)$$

$$\frac{2}{21}\times\frac{-3}{4}=\frac{8}{21}\times\frac{-3}{16}$$

$$\frac{-3}{42}=\frac{-3}{42}$$ **Hence, verified**

(e) $\frac{-5}{2}, \frac{16}{3}$ **and** -1

$$\frac{a}{b}=\frac{-5}{2};\ \frac{c}{d}=\frac{16}{3};\ \frac{e}{f}=-1$$

Now,

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

$$\left(\frac{-5}{2}\times\frac{16}{3}\right)\times-1=\frac{-5}{2}\times\left(\frac{16}{3}\times-1\right)$$

$$\frac{-40}{3}\times-1=\frac{-5}{2}\times\frac{-16}{3}$$

$$\frac{+40}{3}=\frac{+40}{3}$$ **Hence verified**

(f) $\frac{-9}{11}, \frac{3}{22}$ **and** $\frac{-1}{4}$

$$\frac{a}{b}=\frac{-9}{11};\ \frac{c}{d}=\frac{3}{22};\ \frac{e}{f}=\frac{-1}{4}$$

Now,

$$\left(\frac{a}{b}\times\frac{c}{d}\right)\times\frac{e}{f}=\frac{a}{b}\times\left(\frac{c}{d}\times\frac{e}{f}\right)$$

$$\left(\frac{-9}{11}\times\frac{3}{22}\right)\times\frac{-1}{4}=\frac{-9}{11}\times\left(\frac{3}{22}\times\frac{-1}{4}\right)$$

$$\frac{-27}{242}\times\frac{-1}{4}=\frac{-9}{11}\times\frac{-3}{88}$$

$$\frac{27}{968}=\frac{27}{968}$$ **Hence verified**

4. Verify the property

$$\frac{a}{b}\times\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}\times\frac{c}{d}\right)+\left(\frac{a}{b}\times\frac{e}{f}\right)$$

for the following rational numbers :

(a) $\frac{-3}{4}, \frac{-2}{3}$ **and** $\frac{-5}{6}$

$$\frac{a}{b}=\frac{-3}{4};\ \frac{c}{d}=\frac{-2}{3};\ \frac{e}{f}=\frac{-5}{6}$$

Now,

$$\frac{a}{b}\times\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}\times\frac{c}{d}\right)+\left(\frac{a}{b}\times\frac{e}{f}\right)$$

$$\frac{-3}{4}\times\left(\frac{-2}{3}+\frac{-5}{6}\right)=\left(\frac{-3}{4}\times\frac{-2}{3}\right)+\left(\frac{-3}{4}\times\frac{-5}{6}\right)$$

$$\frac{-3}{4}\times\left(\frac{-4+(-5)}{6}\right)=\left(\frac{1}{2}\right)+\frac{5}{8}$$

$$\frac{-5}{4}\times\left(\frac{-9}{6}\right)=\frac{4+5}{8}$$

$$\frac{9}{8}=\frac{9}{8}$$ **Hence verified**

(b) $\frac{4}{5}, \frac{6}{7}$ **and** $\frac{3}{8}$

$$\frac{a}{b}=\frac{4}{5}, \frac{c}{d}=\frac{6}{7}, \frac{e}{f}=\frac{3}{8}$$

Now,

$$\frac{a}{b}\times\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}\times\frac{c}{d}\right)+\left(\frac{a}{b}\times\frac{e}{f}\right)$$

$$\frac{4}{5}\times\left(\frac{6}{7}+\frac{3}{8}\right)=\left(\frac{4}{5}\times\frac{6}{7}\right)+\left(\frac{4}{5}\times\frac{3}{8}\right)$$

$$\frac{4}{5}\times\left(\frac{48+21}{56}\right)=\left(\frac{24}{35}\right)+\left(\frac{3}{10}\right)$$

$$\frac{4}{5}\times\left(\frac{69}{56}\right)=\frac{24}{35}+\frac{3}{10}$$

$$\frac{69}{70}=\frac{48+21}{70}$$

$$\frac{69}{70}=\frac{69}{70}$$ **Hence verified**

(c) $\frac{1}{4}, \frac{-2}{7}$ **and** $\frac{-1}{6}$

$$\frac{a}{b}=\frac{1}{4}, \frac{c}{d}=\frac{-2}{7}, \frac{e}{f}=\frac{-1}{6}$$

Now,

$$\frac{a}{b}\times\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}\times\frac{c}{d}\right)+\left(\frac{a}{b}\times\frac{e}{f}\right)$$

$$\frac{1}{4}\times\left(\frac{-2}{7}+\frac{(-1)}{6}\right)=\left(\frac{1}{4}\times\frac{-2}{7}\right)+\left(\frac{1}{4}\times\frac{-1}{6}\right)$$

$$\frac{1}{4}\times\left(\frac{-12-7}{42}\right)=\left(\frac{-1}{14}\right)+\left(\frac{-1}{24}\right)$$

$$\frac{1}{4}\times\left(\frac{-19}{42}\right)=\left(\frac{-1}{14}-\frac{1}{24}\right)$$

$$\frac{-19}{168}=\frac{-12-7}{168}$$

$$\frac{-19}{168}=\frac{-19}{168}$$ **Hence verified**

(d) $\frac{2}{3}, \frac{-4}{5}$ **and** $\frac{1}{5}$

$$\frac{a}{b}=\frac{2}{3}, \frac{c}{d}=\frac{-4}{5}, \frac{e}{f}=\frac{1}{5}$$

Now,

$$\frac{a}{b}\times\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}\times\frac{c}{d}\right)+\left(\frac{a}{b}\times\frac{e}{f}\right)$$

$$\frac{2}{3}\times\left(\frac{-4}{5}+\frac{1}{5}\right)=\left(\frac{2}{3}\times\frac{-4}{5}\right)+\left(\frac{2}{3}\times\frac{1}{5}\right)$$

$$\frac{2}{3}\times\left(\frac{-4+1}{5}\right)=\left(\frac{-8}{15}\right)+\left(\frac{2}{15}\right)$$

$$\frac{2}{3}\times\frac{-3}{5}=\frac{-8}{15}+\frac{2}{15}$$

$$\frac{-2}{5}=\frac{-8+2}{15}$$

$$\frac{-2}{5}=\frac{-6}{15}$$

$$\frac{-2}{5}=\frac{-2}{15}$$ **Hence verified**

5. Find the multiplicative inverse (reciprocal) of each of the following numbers :

(a) $\frac{-3}{4}$

Multiplicative inverse of $\frac{-3}{4}$

$$=\frac{-4}{3}$$ **Ans**

(b) -25

Multiplicative inverse of -25

$$=\frac{-1}{25}$$ **Ans**

(c) $\frac{-14}{19}$

Multiplicative inverse of $\frac{-14}{19}$

$$=\frac{-19}{14}$$ **Ans**

(d) $\frac{8}{-19}$

Multiplicative inverse of $\frac{8}{-19}$

$$=\frac{-19}{8}$$ **Ans**

(e) $\frac{1}{5}$

Multiplicative inverse of $\frac{1}{5}$

$$=5$$ **Ans**

(f) $\frac{-4}{-5}$

Multiplicative inverse of $\frac{-4}{-5}$

$$=\frac{-5}{-4} \text{ or } \frac{5}{4}$$ **Ans**

(g) $\frac{13}{15}$

Multiplicative inverse of $\frac{13}{15}$

$= \frac{15}{13}$ **Ans**

(h) $\frac{-1}{7}$

Multiplicative inverse of $\frac{-7}{1}$

$= \frac{-7}{1} = -7$ **Ans**

6. Find the product :

(a) $\frac{5}{13}$ **and** $\frac{26}{35}$

$= \frac{5}{13} \times \frac{26}{35}$

$= \frac{2}{7}$ **Ans**

(b) $\frac{4}{11}$ **and** $\frac{22}{33}$

$= \frac{4}{11} \times \frac{22}{33}$

$= \frac{8}{33}$ **Ans**

(c) $\frac{14}{19}$ **and** $\frac{-38}{35}$

$= \frac{14}{19} \times \frac{-38}{35}$

$= \frac{-4}{5}$ **Ans**

(d) $\frac{-7}{10}$ **and** $\frac{15}{28}$

$= \frac{-7}{10} \times \frac{15}{28}$

$= \frac{-3}{8}$ **Ans**

(e) $\frac{25}{46}$ **and** $\frac{-23}{35}$

$= \frac{25}{46} \times \frac{-23}{35}$

$= \frac{-5}{14}$ **Ans**

(f) $\frac{5}{16}$ **and** $\frac{32}{45}$

$= \frac{5}{16} \times \frac{32}{45}$

$= \frac{2}{9}$ **Ans**

7. Simplify :

(a) $\frac{8}{15} \times \frac{33}{40} \times \frac{-6}{11}$

$= \frac{8 \times 33 \times -6}{15 \times 40 \times 11}$

$= \frac{-6}{25}$ **Ans**

(b) $\frac{-16}{25} \times \frac{5}{32} \times \frac{-8}{15}$

$= \frac{-16 \times 5 \times -8}{25 \times 32 \times 15}$

$= \frac{4}{75}$ **Ans**

(c) $\frac{4}{15} \times \frac{10}{11} \times \frac{-3}{8}$

$= \frac{4 \times 10 \times -3}{15 \times 11 \times 8}$

$= \frac{-1}{11}$ **Ans**

(d) $\frac{9}{16} \times \frac{4}{-25} \times \frac{10}{27}$

$= \frac{9 \times 4 \times 10}{16 \times -25 \times 27}$

$= \frac{-1}{30}$ **Ans**

(e) $\frac{34}{35} \times \frac{9}{17} \times \frac{-6}{7}$

$= \frac{34 \times 9 \times -6}{35 \times 17 \times 7}$

$= \frac{-108}{245}$ **Ans**

(f) $\frac{-7}{12} \times \frac{24}{35} \times \frac{-1}{3}$

$= \frac{-7 \times 24 \times -1}{12 \times 35 \times 3}$

$= \frac{2}{15}$ **Ans**

8. Simplify, by using properties :

(a) $\frac{2}{5} \times \frac{-3}{7} - \frac{1}{14} - \frac{3}{7} \times \frac{3}{5}$

$= \frac{2}{5} \times \frac{-3}{7} - \frac{3}{7} \times \frac{3}{5} - \frac{1}{14}$

$= \frac{-3}{7}\left(\frac{2}{5} + \frac{3}{5}\right) - \frac{1}{14}$

$= \frac{-3}{7}\left(\frac{5}{5}\right) - \frac{1}{14}$

$= \frac{-3}{7} \times \left(\frac{1}{1}\right) - \frac{1}{14}$

$$= \frac{-3}{7} - \frac{1}{14}$$

$$= \frac{-6-1}{14}$$

$$= \frac{-7}{14} \Rightarrow \frac{-1}{2}$$ **Ans**

(b) $\frac{2}{5} \times \frac{-3}{7} - \frac{1}{6} \times \frac{3}{2} + \frac{1}{14} \times \frac{3}{7}$

$$= \frac{2}{5} \times \frac{-3}{7} + \frac{1}{14} \times \frac{3}{7} - \frac{1}{6} \times \frac{3}{2}$$

$$= \frac{-3}{7}\left(\frac{2}{5} - \frac{1}{14}\right) - \frac{1}{4}$$

$$= \frac{-3}{7}\left(\frac{28-5}{70}\right) - \frac{1}{4}$$

$$= \frac{-3}{7} \times \frac{23}{70} - \frac{1}{4}$$

$$= \frac{-69}{490} - \frac{1}{4}$$

$$= \frac{-138-245}{980}$$

$$= \frac{-383}{980}$$ **Ans**

(c) $\frac{-5}{7} \times \frac{2}{3} + \frac{1}{15} - \frac{2}{3} \times \frac{1}{7}$

$$= \frac{-5}{7} \times \frac{2}{3} - \frac{2}{3} \times \frac{1}{7} + \frac{1}{15}$$

$$= \frac{-2}{3}\left(\frac{5}{7} + \frac{1}{7}\right) + \frac{1}{15}$$

$$= \frac{-2}{3} \times \left(\frac{5}{7} + \frac{1}{7}\right) + \frac{1}{15}$$

$$= \frac{-2}{3} \times \frac{6}{7} + \frac{1}{15}$$

$$= \frac{-4}{7} + \frac{1}{15}$$

$$= \frac{-60+7}{105}$$

$$= \frac{-53}{105}$$ **Ans**

9. Multiply $\frac{5}{13}$ by the reciprocal of $\frac{-10}{39}$.

$\frac{5}{13} \times$ reciprocal of $\frac{-10}{39}$

$$= \frac{5}{13} \times \frac{-39}{10}$$

$$= \frac{-3}{2} = -1\frac{1}{2}$$ **Ans**

10. Multiply $\frac{-3}{22}$ by the reciprocal of $\frac{9}{44}$.

$\frac{-3}{22} \times$ reciprocal of $\frac{9}{44}$

$$= \frac{-3}{22} \times \frac{44}{9}$$

$$= \frac{-2}{3}$$ **Ans**

11. Is 0.7 the multiplicative inverse of $1\frac{3}{7}$?

Multiplicative inverse of $1\frac{3}{7}$ or $\frac{10}{7}$

$$= \frac{7}{10} = 0.7$$

So, yes, 0.7 is the multiplicative inverse of $1\frac{3}{7}$

12. Fill in the blanks :

(a) The product of a rational number and 1 is **rational number itself.**

(b) The product of a rational number and 0 is **0.**

(c) Zero has **no** reciprocal.

(d) The reciprocal of -8 is $\frac{-1}{8}$.

(e) The product of a rational number and its reciprocal is **1.**

(f) The reciprocal of a negative rational number is **negative rational number.**

Exercise-1E

1. Divide :

(a) $\frac{-5}{18}$ **by** $\frac{10}{27}$

$$= \frac{-5}{18} \div \frac{10}{27}$$

$$= \frac{-5}{18} \times \frac{27}{10} = \frac{-3}{4}$$ **Ans**

(b) $\frac{-8}{19}$ **by** $\frac{4}{57}$

$$= \frac{-8}{19} \div \frac{4}{57}$$

$$= \frac{-8}{19} \times \frac{57}{4} = -6$$ **Ans**

(c) $\frac{-6}{25}$ **by** $\frac{9}{10}$

$$= \frac{-6}{25} \div \frac{9}{10}$$

$$= \frac{-6}{25} \times \frac{10}{9} = \frac{-4}{15}$$ **Ans**

(d) $\frac{13}{14}$ **by** $\frac{-65}{28}$

$$= \frac{13}{14} \div \frac{-65}{28}$$

$$= \frac{13}{14} \times \frac{28}{-65} = \frac{-2}{5}$$ **Ans**

(e) $\frac{-12}{7}$ **by** -16

$$= \frac{-12}{7} \div \frac{-16}{1}$$

$$= \frac{-12}{7} \times \frac{1}{-16} = \frac{3}{28}$$ **Ans**

(f) $\frac{-65}{21}$ **by** $\frac{13}{18}$

$$= \frac{-65}{21} \div \frac{13}{18}$$

$$= \frac{-65}{21} \times \frac{18}{13}$$

$$= \frac{-30}{7} = -4\frac{2}{7}$$ **Ans**

2. Verify, whether the following statement is true or false :

(a) $\frac{13}{18} \div \frac{5}{9} = \frac{5}{9} \div \frac{13}{18}$

$$\frac{13}{18} \times \frac{9}{5} = \frac{5}{9} \times \frac{18}{13}$$

$$\frac{13}{10} = \frac{5}{9} \times \frac{18}{13}$$

$$\frac{13}{10} \neq \frac{10}{13}$$

So, It is false.

(b) $\frac{-9}{11} \div \frac{5}{16} = \frac{5}{16} \div \frac{-9}{11}$

$$\frac{-9}{11} \times \frac{16}{5} = \frac{5}{16} \times \frac{11}{-9}$$

$$\frac{-144}{55} \neq \frac{-55}{144}$$

So, It is false.

(c) $\frac{11}{35} \div \frac{1}{5} = \frac{1}{5} \div \frac{11}{35}$

$$\frac{11}{35} \times \frac{5}{1} = \frac{1}{5} \times \frac{35}{11}$$

$$\frac{11}{7} \neq \frac{7}{11}$$

So, It is false.

(d) $\frac{-5}{18} \div \frac{4}{17} = \frac{4}{17} \div \frac{-5}{18}$

$$\frac{-5}{18} \times \frac{17}{4} = \frac{4}{17} \times \frac{-18}{5}$$

$$\frac{-85}{72} \neq \frac{-72}{85}$$

So, It is false.

(e) $\left(\frac{5}{9} \div \frac{1}{4}\right) \div \frac{2}{5} = \frac{5}{9} \div \left(\frac{1}{4} \div \frac{2}{5}\right)$

$$\left(\frac{5}{9} \times \frac{4}{1}\right) \div \frac{2}{5} = \frac{5}{9} \div \left(\frac{1}{4} \times \frac{5}{2}\right)$$

$$\frac{20}{9} \div \frac{2}{5} = \frac{5}{9} \div \left(\frac{5}{8}\right)$$

$$\frac{20}{9} \times \frac{5}{2} = \frac{5}{9} \times \frac{8}{5}$$

$$\frac{50}{9} \neq \frac{8}{9}$$

So, It is false.

(f) $\frac{3}{16} \div \left(\frac{4}{5} \div \frac{1}{3}\right) = \left(\frac{3}{16} \div \frac{4}{5}\right) \div \frac{1}{3}$

$$\frac{3}{16} \div \left(\frac{4}{5} \times \frac{3}{1}\right) = \left(\frac{3}{16} \times \frac{5}{4}\right) \div \frac{1}{3}$$

$$\frac{3}{16} \div \frac{12}{5} = \frac{15}{64} \div \frac{1}{3}$$

$$\frac{3}{16} \times \frac{5}{12} = \frac{15}{64} \times \frac{3}{1}$$

$$\frac{5}{64} \neq \frac{45}{64}$$

So, It is false.

(g) $\left(\frac{-3}{5} \div \frac{-12}{17}\right) \div \frac{1}{8} = \frac{-3}{5} \div \left(\frac{-12}{17} \div \frac{1}{8}\right)$

$$\left(\frac{-3}{5} \times \frac{-17}{12}\right) \div \frac{1}{8} = \frac{-3}{5} \div \left(\frac{-12}{17} \times \frac{8}{1}\right)$$

$$\frac{+17}{20} \div \frac{1}{8} = \frac{-3}{5} \div \frac{-96}{17}$$

$$\frac{17}{20} \times \frac{8}{1} = \frac{-3}{5} \times \frac{-17}{96}$$

$$\frac{34}{5} \neq \frac{17}{160}$$

So, It is false.

(h) $\left(\frac{-5}{16} \div \frac{1}{3}\right) \div \frac{1}{2} = \frac{-5}{16} \div \left(\frac{1}{3} \div \frac{1}{2}\right)$

$$\left(\frac{-5}{16} \times \frac{3}{1}\right) \div \frac{1}{2} = \frac{-5}{16} \div \left(\frac{1}{3} \times \frac{2}{1}\right)$$

$$\frac{-15}{16}\div\frac{1}{2}=\frac{-5}{16}\div\frac{2}{3}$$

$$\frac{-15}{16}\times\frac{2}{1}=\frac{-5}{16}\times\frac{3}{2}$$

$$\frac{-15}{8}\neq\frac{-15}{32}$$

So, It s false.

3. The product of two rational numbers is $\frac{-3}{8}$. If one of them is $\frac{-9}{16}$, find the other.

Sol : Product of two number $=\frac{-3}{8}$

One number $=\frac{-9}{16}$

So, other number $=\frac{-3}{8}\div\frac{-9}{16}$

$$=\frac{-3}{8}\times\frac{-16}{9}$$

$$=\frac{2}{3}$$ **Ans**

4. By what rational number should $\frac{-5}{17}$ be multiplied to obtain $\frac{10}{51}$?

Sol : Let x should be multiplied with $\frac{-5}{17}$ to obtain $\frac{10}{51}$

So, $x\times\frac{-5}{17}=\frac{10}{51}$

$$x=\frac{10}{51}\div\frac{-5}{17}$$

$$x=\frac{10}{51}\times\frac{-17}{5}$$

$$x=\frac{-2}{3}$$ **Ans**

5. Divide the sum of $\frac{25}{12}$ and $\frac{4}{9}$ by their difference.

Sol :
$$=\left(\frac{25}{12}+\frac{4}{9}\right)\div\left(\frac{25}{12}-\frac{4}{9}\right)$$

$$=\left(\frac{75+16}{36}\right)\div\left(\frac{75-16}{36}\right)$$

$$=\frac{91}{36}\div\frac{59}{36}$$

$$=\frac{91}{36}\times\frac{36}{59}$$

$$=\frac{91}{59}=1\frac{32}{59}$$ **Ans**

6. Divide the sum of $\frac{5}{14}$ and $\frac{9}{28}$ by the product of $\frac{3}{7}$ and $\frac{11}{35}$.

Sol :
$$=\left(\frac{5}{14}+\frac{9}{28}\right)\div\left(\frac{3}{7}\times\frac{11}{35}\right)$$

$$=\left(\frac{10+9}{28}\right)\div\frac{33}{245}$$

$$=\frac{19}{28}\div\frac{33}{245}$$

$$=\frac{19}{28}\times\frac{245}{33}$$

$$=\frac{665}{132}=5\frac{5}{132}$$ **Ans**

7. By what number should we divide $\frac{-10}{21}$ to get $\frac{-2}{3}$?

Sol : Let, we should divide $\frac{-10}{21}$ by x to get $\frac{-2}{3}$

So, $\frac{-10}{21}\div x=\frac{-2}{3}$

$$\frac{-10}{21}\div\frac{-2}{3}=x$$

$$x=\frac{-10}{21}\times\frac{-3}{2}$$

$$x=\frac{5}{7}$$ **Ans**

8. By what number should $\frac{5}{9}$ be divided to get $\frac{5}{3}$?

Sol : Let, we should divide $\frac{5}{9}$ by x to get $\frac{5}{3}$

So, $\frac{5}{9}\div x=\frac{5}{3}$

$$x=\frac{5}{9}\div\frac{5}{3}$$

$$x=\frac{5}{9}\times\frac{3}{5}$$

$$x=\frac{1}{3}$$ **Ans**

9. Divide the sum of $\frac{-3}{4}$ and $\frac{5}{6}$ by their product.

Sol :
$$=\left(\frac{-3}{4}+\frac{5}{6}\right)\div\left(\frac{-3}{4}\times\frac{5}{6}\right)$$

$$=\left(\frac{-9+10}{12}\right)\div\left(\frac{-5}{8}\right)$$

$$=\frac{1}{12}\div\frac{-5}{8}$$

$$=\frac{1}{12}\times\frac{-8}{5}=\frac{-2}{15}$$ **Ans**

10. Divide the product of $\frac{5}{9}$ and $\frac{-6}{5}$ by their difference.

Sol :
$$= \left(\frac{5}{9}\times\frac{-6}{5}\right)\div\left[\frac{5}{9}-\left(\frac{-6}{5}\right)\right]$$
$$= \frac{-2}{3}\div\frac{25-(-54)}{45}$$
$$= \frac{-2}{3}\div\frac{25+54}{45}$$
$$= \frac{-2}{3}\div\frac{79}{45}$$
$$= \frac{-2}{3}\times\frac{45}{79}$$
$$= \frac{-30}{79}$$ **Ans**

Exercise-1F

1. A bag of rice contains $48\frac{1}{4}$ kg and weight of empty bag is $1\frac{1}{5}$ kg. Find the weight of filled bag of rice.

Sol : A bag of rice contains $= 48\frac{1}{4}$ kg rice

Weight of empty bag $= 1\frac{1}{5}$ kg

$\therefore$ Total weight of filled bag $= 48\frac{1}{4}+1\frac{1}{5}$
$$= \frac{193}{4}+\frac{6}{5}$$
$$= \frac{965+24}{20}$$
$$= \frac{989}{20}\text{ kg}$$
$$= 49\frac{9}{20}\text{ kg}$$ **Ans**

2. A bag of sugar contains $90\frac{1}{4}$ kg and weight of empty bag is $2\frac{3}{5}$ kg. Find the weight of filled bag of sugar.

Sol : A bag of sugar contains $= 90\frac{1}{4}$ kg

Weight of empty bag $= 2\frac{3}{5}$ kg

$\therefore$ Total weight of filled bag $= 90\frac{1}{4}+2\frac{3}{5}$
$$= \frac{361}{4}+\frac{13}{5}$$
$$= \frac{1805+52}{20}$$
$$= \frac{1857}{20} = 92\frac{17}{20}$$ **Ans**

3. A drum contains 30 litres of kerosene oil. If $2\frac{1}{5}$ litres of oil is leaked from it. Find the remaining quantity of kerosene oil in drum.

Sol : A drum contains kerosene oil $= 30$ litres

Leaked oil $= 2\frac{1}{5}$ litres

$\therefore$ Remaining kerosene oil in drum $= 30-2\frac{1}{5}$
$$= \frac{30}{1}-\frac{11}{5}$$
$$= \frac{150-11}{5}$$
$$= \frac{139}{5}\text{ kg}$$
$$= 27\frac{4}{5}\text{ kg}$$ **Ans**

4. Cost of one toy car is ₹ $80\frac{1}{2}$. What will be cost of 5 such cars ?

Sol : Cost of a toy car $=$ ₹ $80\frac{1}{2}$

$\therefore$ Cost of such 5 toys car $=$ ₹ $80\frac{1}{2}\times 5$
$$= ₹\ \frac{161}{2}\times 5$$
$$= ₹\ \frac{805}{2}$$
$$= ₹\ 402\frac{1}{2}$$ **Ans**

5. The cost of 1 m cloth is ₹ $10\frac{3}{5}$. Find the cost of $7\frac{1}{2}$ m of cloth.

Sol : Cost of 1 m of cloth $=$ ₹ $10\frac{3}{5}$

$\therefore$ Cost of $7\frac{1}{2}$ m of cloth $=$ ₹ $10\frac{3}{5}\times 7\frac{1}{2}$
$$= \frac{53}{5}\times\frac{15}{2}$$
$$= ₹\ \frac{159}{2}$$
$$= ₹\ 79\frac{1}{2}$$ **Ans**

6. If lengths of the parallel sides of a trapezium are $8\frac{1}{2}$ cm, 6 cm and height is 5 cm, find the area of trapezium.

Sol : Parallel sides of trapezium are $8\frac{1}{2}$ cm and 6 cm

Height = 5 cm

$\therefore$ Area of trapezium $= \frac{1}{2}\left[8\frac{1}{2}+6\right]\times 5$

$= \frac{1}{2}\left[14\frac{1}{2}\right]\times 5$

$= \frac{1}{2}\times\frac{29}{2}\times 5$

$= \frac{145}{4} = 36\frac{1}{4}\text{ cm}^2$ **Ans**

7. Find the cost of $4\frac{2}{5}$ metres of lace at the rate of ₹ $15\frac{3}{4}$ per metre.

Sol : Cost of one metre of lace = ₹ $15\frac{3}{4}$

$\therefore$ Cost of $4\frac{2}{5}$ metre of lace = ₹ $15\frac{3}{4}\times 4\frac{2}{5}$

$= \frac{63}{4}\times\frac{22}{5}$

$= \frac{693}{10} =$ ₹ 69.30 **Ans**

8. In a school $\frac{3}{7}$ of the students are girls. If there are 240 boys, find the numbers of girls in the school.

Sol : Let total number of students = x

So, girls $= \frac{3x}{7}$

and boys $= \frac{x}{1}-\frac{3x}{7}$

$= \frac{7x-3x}{7} = \frac{4x}{7}$

Given number of boys = 240

So, $\frac{4x}{7} = 240$

$x = \frac{240\times 7}{4}$

$x = 420$

So, girls in the school $= 420 - 240$

$= 180$ **Ans**

9. From a ribbon which is 22 m long, two pieces of length $5\frac{1}{5}$ m and $3\frac{2}{10}$ m are cut off. What is the length of the remaining ribbon ?

Sol : Total length of ribbon = 22 m

Two piece of length are cut = $5\frac{1}{5}$ m and $3\frac{2}{10}$ m

So, length of remaining ribbon

$= 22 - 5\frac{1}{5} - 3\frac{2}{10}$

$= \frac{22}{1}-\frac{26}{5}-\frac{32}{10}$

$= \frac{220-52-32}{10}$

$= \frac{220-84}{10}$

$= \frac{136}{10} = 13.6\text{ m or } 13\frac{3}{5}\text{ m}$ **Ans**

10. In a football match $\frac{5}{7}$ of the spectators were in a covered place and 6000 were in open. Find the total number of spectators.

Sol : Let total number of spectators = x

Spectators in covered place $= \frac{5x}{7}$

So spectators in open place $= x - \frac{5x}{7}$

$= \frac{7x-5x}{7} = \frac{2x}{7}$

Given, Spectators in open were = 6000

So, $\frac{2x}{7} = 6000$

$x = \frac{6000\times 7}{2}$

$x = 21000$

So, total number of spectators are 21000 **Ans**

MCQs

1. (a) **2.** (b) **3.** (c) **4.** (a) **5.** (b)

6. (a)

CHAPTER-2
SQUARES AND SQUARE ROOTS

Exercise-2A

1. Which of the following numbers are not perfect squares?

256

$256 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2$

Every number is making a pair,

So, it is perfect square **Ans**

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

1000

2	1000
2	500
2	250
5	125
5	25
5	5
	1

$1000 = 2\times2\times2\times5\times5\times5$

Here, 2 and 5 are not make in the pairs

Hence, 1000 is not a perfect square.

169

13	169
13	13
	1

$169 = 13\times13$

Here, 13 is making a pair.

So, It is a perfect square **Ans**

1036

2	1036
2	518
7	259
37	37
	1

$1036 = 2\times2\times7\times37$

Here, 7 and 37 are not making the pairs.

Hence, 1036 is not a perfect square.

625

5	625
5	125
5	25
5	5
	1

$625 = 5\times5\times5\times5$

Every number is making a pair.

So, it is a perfect square.

Hence, 625 is perfect square.

652

2	652
2	326
163	163
	1

$652 = 2\times2\times163$

Here, 163 is not making the pairs.

Hence, 652 is not a perfect square.

918

2	918
3	459
3	153
3	51
17	17
	1

$918 = 2\times3\times3\times4\times17$

Here, Every number is not making the pair.

Hence, 918 is not a perfect square.

500

2	500
3	250
3	125
3	25
17	5
	1

$500 = 2\times2\times5\times5\times5$

Here, 5 is not making the pair.

So, It is not a perfect square.

Hence, 500 is not a perfect square.

2. Which of the following numbers are the perfect squares of even numbers ?

324, 196, 625, 169, 10000, 576, 4489, 6561

No, which have even numbers at unit place are perfect squares of even number.

So, perfect squares of even numbers are :

324, 196, 10000, 576 **Ans**

3. Which of the following numbers are the perfect squares of the odd numbers ?

529, 2601, 2401, 1024, 5625, 4489

Numbers which have odd numbers at unit place. They are perfect squares of odd numbers.

So, perfect squares of odd numbers are :

529, 2601, 2401, 5625, 4489 **Ans**

4. Find the squares of the following, using property of perfect squares :

(a) 7

Square of $7 = 7^2$

$= 7\times7$

$= 49$ **Ans**

(b) 8

Square of $8 = 8^2$

$= 8\times8$

$= 64$ **Ans**

(c) 12

Square of $12 = 12^2$

$= 12\times12$

$= 144$ **Ans**

(d) 13

Square of $13 = 13^2$

$= 13\times13$

$= 169$ **Ans**

(e) 15

Square of $15 = 15^2$

$= 15\times15$

$= 225$ **Ans**

5. What will be the unit place digit of the squares of the following numbers ?

(a) 272

Its unit digit is 2. So, its square would end in $2\times2 = 4$ **Ans**

(b) 821

Its unit digit is 1. So, its square would end in $1\times1 = 1$

(c) 17

Its unit digit is 7. So, its square would end in $7\times7 = 49$ or 9 **Ans**

(d) 975

Its unit digit is 5. So, its square would end in $5 \times 5 = 25$ or 5 **Ans**

(e) 133

Its unit digit is 3. So, its square would end in $3 \times 3 = 9$ **Ans**

(f) 179

Its unit digit is 9. So, its square would end in $9 \times 9 = 81$ or 1 **Ans**

6. Find the value of the following, using property of perfect squares :

(a) $\mathbf{57^2 - 56^2}$

$= (57 + 56)(57 - 56)$

$= 113 \times 1$

$= 113$ **Ans**

(b) $\mathbf{203^2 - 202^2}$

$= (203 + 202)(203 - 202)$

$= 405 \times 1$

$= 405$ **Ans**

(c) $\mathbf{64^2 - 63^2}$

$= (64 + 63)(64 - 63)$

$= 127 \times 1$

$= 127$ **Ans**

(d) $\mathbf{102^2 - 101^2}$

$= (102 + 101)(102 - 101)$

$= 203 \times 1$

$= 203$ **Ans**

(e) $\mathbf{242^2 - 241^2}$

$= (242 + 241)(242 - 241)$

$= 483 \times 1$

$= 483$ **Ans**

(f) $\mathbf{49^2 - 48^2}$

$= (49 + 48)(49 - 48)$

$= 97 \times 1$

$= 97$ **Ans**

7. Express the following as the sum of odd numbers :

(a) 64

$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$ **Ans**

(b) 81

$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$ **Ans**

(c) 144

$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$

$+ 19 + 21 + 23$ **Ans**

(d) 225

$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$

$+ 19 + 21 + 23 + 25 + 27 + 29$ **Ans**

(e) 289

$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$

$+ 19 + 21 + 23 + 25 + 27 + 29 + 31 + 33$ **Ans**

8. Without adding, find the sum :

(a) $\mathbf{1 + 3 + 5 + 7 + 9 + 11 + 13 + 15}$

$= 8^2$

$= 64$ **Ans**

(b) $\mathbf{1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19}$

$= 10^2$

$= 100$ **Ans**

(c) $\mathbf{1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21}$

$= 11^2$

$= 121$ **Ans**

(d) $\mathbf{1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19}$

$\mathbf{+ 21 + 23 + 25}$

$= 13^2$

$= 169$ **Ans**

9. Find the pythagorean triplet, if first number of it is :

(a) 12

Let $2m = 12$

So, $m = \frac{12}{2} = 6$

So, Phythagoras triplets are :

$(2m, m^2 + 1, m^2 - 1)$

$(2 \times 6, 6^2 + 1, 6^2 - 1)$

$(12, 36 + 1, 36 - 1)$

$(12, 37, 35)$ **Ans**

(b) 10

Let $2m = 10$

So, $m = \frac{10}{2} = 5$

So, Phythagoras triplets are :

$(2m, m^2 - 1, m^2 + 1)$

$(2 \times 5, 5^2 - 1, 5^2 + 1)$

$(10, 25 - 1, 25 + 1)$

$(10, 24, 26)$ **Ans**

(c) 20

Let $2m = 20$

So, $m = \frac{20}{2} = 10$

So, Phythagoras triplets are :

$(2m, m^2+1, m^2-1)$

$(2\times10, 10^2-1, 10^2+1)$

$(20, 100-1, 100+1)$

$(20, 99, 101)$ **Ans**

(d) 14

Let $2m = 14$

So, $m = \frac{14}{2} = 7$

So, Phythagoras triplets are :

$(2m, m^2+1, m^2-1)$

$(2\times7, 7^2-1, 7^2+1)$

$(14, 49-1, 49+1)$

$(14, 48, 50)$ **Ans**

(e) 36

Let $m = 36$

So, $m = \frac{36}{2} = 18$

So, Phythagoras triplets are :

$(2m, m^2+1, m^2-1)$

$(2\times18, 18^2-1, 18^2+1)$

$(36, 324-1, 324+1)$

$(36, 323, 325)$ **Ans**

10. Using the prime factorization method, find which of the following numbers are perfect squares :

(a) 441

3	441
3	147
7	49
7	7
	1

$441 = \underline{3\times3}\times\underline{7\times7}$

Here, all number are in pair.

So, it is perfect square.

(b) 1331

11	1331
11	121
11	11
	1

$1331 = \underline{11\times11}\times11$

Here, 11 is not in the pair.

So, It is not a perfect square.

(c) 1025

5	1025
5	205
41	41
	1

$1025 = \underline{5\times5}\times41$

Here, 41 is not in the a pair.

So, It is not a perfect square.

(d) 1296

2	1296
2	648
2	324
2	162
3	81
3	27
3	9
3	3
	1

$1296 = \underline{2\times2}\times\underline{2\times2}\times\underline{3\times3}\times\underline{3\times3}$

Here all number are in pair.

So, it is perfect square.

(e) 512

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$512 = \underline{2\times2}\times\underline{2\times2}\times\underline{2\times2}\times$
$\underline{2\times2}\times2$

Here, it is not in the pair.

So, it is not a perfect square.

(f) 3549

3	3549
7	1183
13	169
13	13
	1

$3549 = 3\times7\times\underline{13\times13}$

Here, 7 and 3 are not in the pair.

So, it is not a perfect square.

(g) 2916

2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$2916 = \underline{2\times2}\times\underline{3\times3}\times\underline{3\times3}\times$
$\underline{3\times3}$

Here all numbers are in pair.

So, it is perfect square.

(h) 9216

2	9216
2	4608
2	2304
2	1152
2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

$9216 = \underline{2\times2}\times\underline{2\times2}\times\underline{2\times2}\times$
$\underline{2\times2}\times\underline{2\times2}\times\underline{3\times3}$

Here all numbers are in pair.

So, it is perfect square.

Exercise-2B

1. Find the square of each of the following numbers without actual multiplication :

(a) 28

$= (30-2)^2$

$= (30-2)(30-2)$

$= 900-60-60+4 = 784$ **Ans**

(b) 42

$= (40+2)^2$

$= (40+2)(40+2)$

$= 1600+80+80+4$

$= 1764$ **Ans**

(c) 63

$= (60+3)^2$

$= (60+3)(60+3)$

$= 3600+180+180+9$

$= 3969$ **Ans**

(d) 98

$= (100-2)^2$

$= (100-2)(100-2)$

$= 10000-200-200+4$

$= 9604$ **Ans**

2. Find the square root of each of the following numbers by the method of prime- factorization :

(a) 729

First, find prime factorization of 729, we have

3	729
3	243
3	81
3	27
3	9
3	3
	1

$729 = 3\times3\times3\times3\times3\times3$

$\sqrt{729} = \sqrt{3\times3\times3\times3\times3\times3}$

$= 3\times3\times3 = 27$ **Ans**

(b) 529

First, find prime factorization of 529, we have

23	529
23	23
	1

$529 = 23\times23$

$\sqrt{529} = \sqrt{23\times23}$

$= 23$ **Ans**

(c) 6400

First, find prime factorization of 6400, we have

2	6400
2	3200
2	1600
2	800
2	400
2	200
2	100
2	50
5	25
5	5
	1

$6400 = 2\times2\times2\times2\times2\times2\times$

$2\times2\times5\times5$

$\sqrt{6400} = \sqrt{\dfrac{2\times2\times2\times2\times2\times2\times}{2\times2\times5\times5}}$

$= 2\times2\times2\times2\times5$

$= 80$ **Ans**

(d) 4096

First, find prime-factorization of 4096, we have

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$4096 = 2\times2\times2\times2\times2\times2\times2\times$

$2\times2\times2\times2\times2$

$\sqrt{4096} = \sqrt{\dfrac{2\times2\times2\times2\times2\times2\times}{2\times2\times2\times2\times2}}$

$= 2\times2\times2\times2\times2\times2$

$= 64$ **Ans**

(e) 1296

2	1296
2	648
2	324
2	162
3	81
3	27
3	9
3	3
	1

$1296 = 2\times2\times2\times2\times3\times$

$3\times3\times3$

$\sqrt{1296} = \sqrt{\dfrac{2\times2\times2\times2\times3\times}{3\times3\times3}}$

$= 2\times2\times3\times3$

$= 36$ **Ans**

(f) 11664

2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$11664 = 2\times2\times2\times2\times3\times3\times$

$3\times3\times3\times3$

$\sqrt{11664} = \sqrt{\dfrac{2\times2\times2\times2\times3\times}{3\times3\times3\times3\times3}}$

$= 2\times2\times3\times3\times3$

$= 108$ **Ans**

3. Find the smallest number by which 2352 must be multiplied to get a perfect square. Also, find the square root of the perfect square so obtained.

First, find prime factorization of 2352

2	2352
2	1176
2	588
2	294
3	147
7	49
7	7
	1

So, $2352 = 2\times2\times2\times2\times3\times7\times7$

Since prime factor 3 is not making a pair, so we have to multiply 2352 by 3 to make to perfect square.

$\therefore \quad 2352\times3 = 7056$

and $\sqrt{7056} = \sqrt{2\times2\times2\times2\times3\times3\times7\times7}$

$= 2\times2\times3\times7$

$= 84$ **Ans**

4. Find the smallest number by which 2645 must be divided to get a perfect square. Also, find the square root of the perfect square so obtained.

First, find prime factorization of 2645

So, $2645 = 5 \times 23 \times 23$

Since prime factor 5 is not making a pair, so 2645 must be divided by 5 to make it perfect square.

5	2645
23	529
23	23
	1

$\therefore \quad 2645 \div 5 = 529$

and $\sqrt{529} = \sqrt{23 \times 23}$

$= 23$ **Ans**

5. Find the smallest square number which is exactly divisible by 8, 15 and 20.

2	8, 15, 20
2	4, 15, 10
2	2, 15, 5
3	1, 15, 5
5	1, 5, 5
	1, 1, 1

First find the LCM of 8, 15 and 20.

LCM of 8, 15 and 20

$= 2 \times 2 \times 2 \times 3 \times 5$

$= 120$

Now, in prime factorization of 120, prime factors 2, 3 and 5 are not in pair.

So, 120 is not a perfect square therefore 120 must be multiplied by $2 \times 3 \times 5 = 30$ to make itself a perfect square.

Hence, the required number is $120 \times 30 = 3600$.

6. 2601 soldiers are to be arranged in such a way that each row has as many soldiers as the number of rows. Find the number of rows and the number of soldiers in each row.

Let number of rows = x

So, number of soldiers in each rows = x

According to question,

3	2601
3	867
17	289
17	17
	1

$x \times x = 2601$

$x^2 = 2601$

$x = \sqrt{2601}$

$= \sqrt{3 \times 3 \times 17 \times 17}$

$= 3 \times 17$

$= 51$

So, number of rows and the number of soldiers in each row = 51 **Ans**

7. The area of a square filled is 1764 m^2. Find the length of its side.

Let the side of square be x m.

So, Area of x^2

2	1764
2	882
3	441
3	147
7	49
7	7
	1

or $x^2 = 1764$

$x^2 = 2 \times 2 \times 3 \times 3 \times 7 \times 7$

$x = \sqrt{2 \times 2 \times 3 \times 3 \times 7 \times 7}$

$= 2 \times 3 \times 7$

$= 42$

So, length of side = 42 m **Ans**

Exercise-2C

1. Find the square root by long-division method :

(a) 3481

```
   59
 5 3481
   25
109 981
    981
     ×
```

Hence, $\sqrt{3481} = 59$ **Ans**

(b) 5776

```
   76
 7 5776
   49
146 876
    876
     ×
```

Hence, $\sqrt{5776} = 76$ **Ans**

(c) 7921

```
   89
 8 7921
   64
169 1521
    1521
     ×
```

Hence, $\sqrt{7921} = 89$ **Ans**

(d) 3249

```
   57
 5 3249
   25
107 749
    749
     ×
```

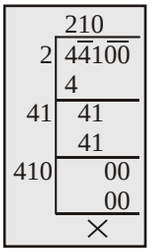
Hence, $\sqrt{3249} = 57$ **Ans**

(e) 32494

```
   222
 2 49284
   4
42  92
    84
442 884
    884
     ×
```

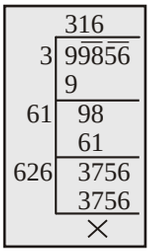
Hence, $\sqrt{49284} = 222$ **Ans**

(f) 44100



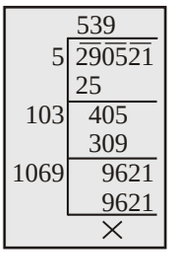
Hence, $\sqrt{44100} = 210$ **Ans**

(g) 99856



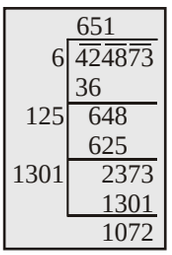
Hence, $\sqrt{99856} = 316$ **Ans**

(h) 290521



Hence, $\sqrt{290521} = 539$

2. Find the least number which must be added to 424873 to make it perfect square.



So 424873 is greater than $(651)^2$ and next perfect square is $(652)^2$ or 425104.

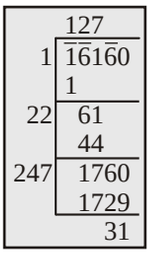
So, the least number should be added

$= 425104 - 424873$

$= 231$

Hence, 231 should be added to 424873 to make it perfect square.

3. Find the least number which must be added to 16160 to make it perfect square. Also, find the square root of this number.



So, 16160 is greater than $(127)^2$ and next perfect square is $(128)^2$ or 16384.

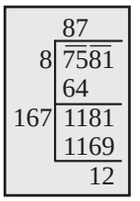
So, the least number should be added

$= 16384 - 16160 = 224$

Hence, 224 should be added to 16160 to make it perfect square.

and $\sqrt{16384} = 128$ **Ans**

4. What least number must be subtracted from 7581 to make it perfect square ? Also, find the square root of this number.



The remainder is 12, so 12 must be subtracted from 7581 to make it perfect square.

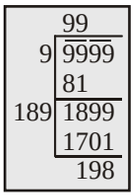
Hence, 12 must be subtracted from 7581.

and the obtained number is $7581 - 12 = 7569$

So, $\sqrt{7569} = 87$ **Ans**

5. Find the greatest number of four digit which is a perfect square.

The greatest number of 4 digits is 9999, find the square root of 9999



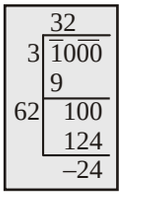
So, the greatest number of 4 digits which is a perfect square $= 9999 - 198 = 9801$

So, $\sqrt{9801} = 99$

Hence, 9801 is the perfect square of greatest number of 4 digits and its square root is 99 **Ans**

6. Find the least number of four digit which is a perfect square.

The least number of 4 digits is 1000. Find the square root of 1000.



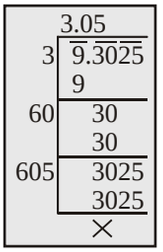
So, the least number of four digit which is a perfect square $= 100 + 24 = 1024$ **Ans**

Exercise-2D

1. Find the square root of the following decimals :

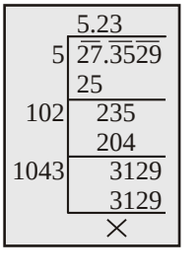
(a) $\sqrt{9.3025}$

Hence, $\sqrt{9.3025} = 3.05$ **Ans**



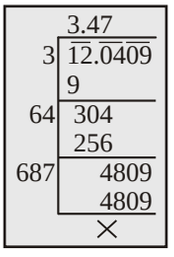
(b) $\sqrt{27.3529}$

Hence, $\sqrt{27.3529} = 5.23$ **Ans**



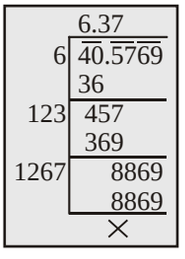
(c) $\sqrt{12.0409}$

Hence, $\sqrt{12.0409} = 3.47$ **Ans**



(d) $\sqrt{40.5769}$

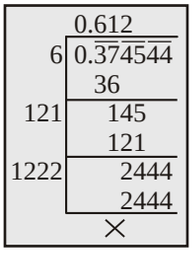
Hence, $\sqrt{40.5769} = 6.37$ **Ans**



(e) $\sqrt{0.374544}$

Hence,

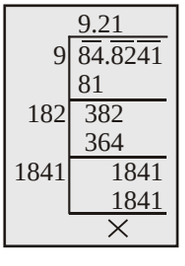
$\sqrt{0.374544} = 0.612$ **Ans**



(f) $\sqrt{84.8241}$

Hence,

$\sqrt{84.8241} = 9.21$ **Ans**



2. Find the square root of the following, correct upto three places of decimal :

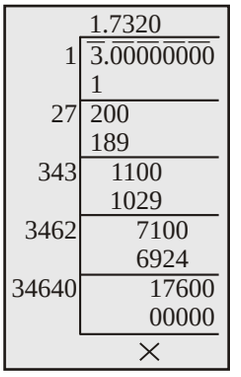
(a) $\sqrt{3}$

So, $\sqrt{3} = 1.7320$

$= 1.732$

(correct to 3 decimal places)

Hence, $\sqrt{3} = 1.732$ **Ans**



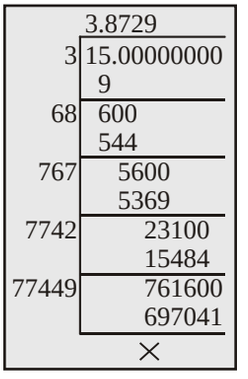
(b) $\sqrt{15}$

$\sqrt{15} = 3.8729$

$= 3.8729$

(correct to 3 decimal places)

Hence, $\sqrt{15} = 3.873$ **Ans**



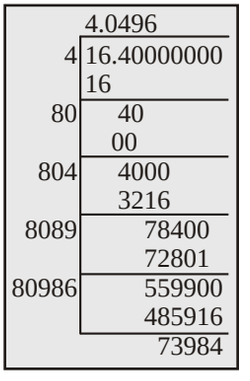
(c) $\sqrt{16.4}$

$\sqrt{16.4} = 4.0496$

$= 4.050$

(correct to 3 decimal places)

Hence, $\sqrt{16.4} = 4.050$ **Ans**



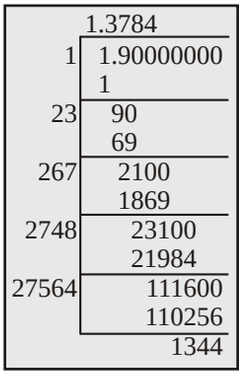
(d) $\sqrt{1.9}$

$\sqrt{1.9} = 1.3784$

$= 1.3784$

(correct to 3 decimal places)

Hence, $\sqrt{1.9} = 1.378$ **Ans**



3. Find the square root of the following :

(a) $\sqrt{\frac{196}{625}}$

$= \frac{14}{25}$ **Ans**

14
1 | 196
1
24 | 96
96
×

25
2 | 625
4
45 | 225
225
×

(b) $\sqrt{\frac{1369}{1849}}$

$= \frac{37}{43}$ **Ans**

37
3 | 1364
9
67 | 469
469
×

43
4 | 1899
16
83 | 249
249
×

(c) $\sqrt{\frac{2116}{15129}}$

$= \frac{46}{123}$ **Ans**

46
4 | 2116
16
86 | 516
516
×

123
1 | 15129
1
22 | 51
44
243 | 729
729
×

(d) $\sqrt{\frac{1369}{3249}}$

$= \frac{37}{57}$ **Ans**

37
3 | 1369
9
67 | 469
469
×

57
5 | 3249
25
107 | 749
749
×

(e) $\sqrt{1\frac{56}{169}}$

$= \sqrt{\frac{225}{169}}$

$= \frac{15}{13} = 1\frac{2}{13}$ Ans

15
1 | 225
1
25 | 125
125
×

13
1 | 169
1
23 | 69
69
×

(f) $23\frac{394}{729}$

$= \sqrt{\frac{17161}{729}}$

$= \frac{131}{27} = 4\frac{23}{27}$ **Ans**

131
1 | 17161
1
23 | 71
69
261 | 261
261
×

27
2 | 729
4
47 | 329
329
×

4. Find the value of :

(a) $\sqrt{162} \times \sqrt{128}$

$= \sqrt{2\times3\times3\times3\times3} \times \sqrt{2\times2\times2\times2\times2\times2\times2}$

$= \sqrt{\frac{2\times3\times3\times3\times3\times2\times}{2\times2\times2\times2\times2\times2}}$

$= 2\times2\times3\times2\times2\times3$

$= 144$ **Ans**

2 | 162
3 | 81
3 | 27
3 | 9
3 | 3
1

2 | 128
2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2 | 2
1

(b) $\sqrt{72} \times \sqrt{288}$

$= \sqrt{2\times2\times2\times3\times3} \times \sqrt{2\times2\times2\times2\times2\times3\times3}$

$= \sqrt{\frac{2\times2\times2\times3\times3\times2\times}{2\times2\times2\times2\times3\times3}}$

$= 2\times2\times3\times2\times2\times3$

$= 144$ **Ans**

2 | 72
2 | 36
2 | 18
3 | 9
3 | 3
1

2 | 288
2 | 144
2 | 72
2 | 36
2 | 18
3 | 9
3 | 3
1

(c) $\sqrt{243} \times \sqrt{147}$

$= \sqrt{3\times3\times3\times3\times3} \times \sqrt{3\times7\times7}$

$= \sqrt{\frac{3\times3\times3\times3\times}{3\times3\times7\times7}}$

$= 3\times3\times3\times7 = 189$ **Ans**

3 | 243
3 | 81
3 | 27
3 | 9
3 | 3
1

3 | 147
7 | 49
7 | 7
1

5. Simplify :

(a) $\frac{\sqrt{59.29} - \sqrt{59.29}}{\sqrt{59.29} + \sqrt{59.29}}$

$= \frac{7.7 - 2.3}{7.7 + 2.3}$

$= \frac{5.4}{10.0} = 0.54$ **Ans**

7.7
7 | 59.29
49
147 | 1029
1029
×

2.3
2 | 5.29
4
43 | 129
129
×

(b) $\frac{\sqrt{13.69} - \sqrt{2.89}}{\sqrt{13.69} + \sqrt{2.89}}$

$= \frac{3.7 - 1.7}{3.7 + 1.7}$

$= \frac{2.0}{5.4}$

$\frac{20}{54} \Rightarrow \frac{10}{27}$ **Ans**

3.7
3 | 13.69
9
67 | 469
469
×

1.7
1 | 2.89
1
27 | 189
189
×

6. Find the value of $\sqrt{50625}$, hence find $\sqrt{506.25} + \sqrt{5.0625}$.

Since, $\sqrt{50625} = 225$

Hence, $\sqrt{506.25} = 2.25$

and $\sqrt{5.0625} = 2.25$

so, $= \sqrt{506.25} + \sqrt{5.0625}$

$= 22.50 + 2.25$

$= 24.75$

225
2 | 50625
4
42 | 106
84
445 | 2225
2225
×

7. Find the decimal fraction which when multiplied by itself gives 0.001521.

Let decimal fraction = x

So, $x^2 = 0.001521$

or $x = \sqrt{0.001521}$

$x = 0.039$

So, decimal fraction

$= 0.039$ **Ans**

	0.039
0	0.001521
	.00
3	15
	9
69	621
	621
	×

Exercise-2E

1. The area of a square field is 60025 m^2. A boy is cycling along its boundary at 18 km/hr. In how much time will he return to the starting point ?

Area = 60025 m^2

So, $(\text{side})^2 = 60025$

or side $= \sqrt{60025}$

$= 245$ m

Perimeter $= 4 \times$ side

$= 4 \times 245$ m

$= 980$ m

Speed of boy = 18 km/hr

$= 18 \times \frac{5}{18}$ m/sec

$= 5$ m/sec

So, time $= \frac{\text{Distance}}{\text{Speed}}$

$= \frac{980}{5} = 196$ sec

or 3 min 16 sec **Ans**

	245
2	60025
	4
44	200
	176
485	2425
	2425
	×

2. Area of a square park is 7396 m^2. Find the perimeter of the square park.

Area = 7396 m^2

So, $(\text{side})^2 = 7396$

or side $= \sqrt{7396}$

$= 86$ m

So, Perimeter $= 86 \times 4$ side

$= 344$ m **Ans**

	86
4	7396
	64
166	996
	996
	×

3. The cost of levelling a square ground at ₹ 1.80 per m^2 is ₹ 91936.80. Find the cost of fencing at ₹ 2.25 per m.

Area of square field $= \frac{91936.80}{1.80}$

$= 51076\ m^2$

So, $(\text{side})^2 = 51076$

or side $= \sqrt{51076}$

	226
2	57076
	4
42	110
	84
446	2676
	2676
	×

Side = 226 m

Perimeter $= 4 \times$ side

$= 4 \times 226 = 904$ m

Total cost fencing = ₹ 2.25×904

= ₹ 2034 **Ans**

4. The cost of grassing a square lawn at ₹ 1.35 per m^2 is ₹ 72037.35. Find the cost of fencing with wire two times at ₹ 2.85 per m.

Area of square length $= \frac{72037.35}{1.35}$

$= 53361\ m^2$

So, $(\text{side})^2 = 53661$

or side $= \sqrt{53361}$

Side = 231

Perimeter $= 4 \times$ side

$= 4 \times 231 = 924$ m

	231
2	53361
	4
43	133
	129
461	461
	461
	×

Total length of wire $= 2 \times 924$ m $= 1848$ m

So total cost of fencing with wire = ₹ 2.85×1848 m

= ₹ 5266.80 **Ans**

5. Area of a square field is 35721m^2. A man is walking along its boundary at a speed of 12 km/hr. In how much time will he complete four rounds along the boundary ?

Area of square field = 35721 m^2

So, $(\text{side})^2 = 35721$

or side $= \sqrt{35721}$

Side = 189 m

So, Perimeter $= 4 \times 189$ m

$= 756$ m

	189
1	35721
	1
28	257
	224
369	3321
	3321
	×

Distance covered in 4 rounds $= 4 \times 256$ m

$= 3024$ m

Speed = 12 km/hr

$= \frac{12 \times 5}{18}$ m/sec

$= \frac{10}{3}$ sec

Time $= \frac{\text{Distance}}{\text{Speed}}$

$= \frac{3024 \times 3}{10}$ sec

$= \frac{9072}{10} = 907.2$ sec **Ans**

MCQs

1. (a) **2.** (b) **3.** (a) **4.** (c) **5.** (b)

6. (a)

CHAPTER 3 : CUBES AND CUBE ROOTS

Exercise-3A

1. Express each of the following numbers as the sum of odd numbers (by property 4) :

(a) $5^3 = 125$

$21+23+25+27+29$ **Ans**

(b) $6^3 = 216$

$31+33+35+37+39+41$ **Ans**

(c) $8^3 = 512$

$57+59+61+63+65+67+69+71$ **Ans**

(d) $10^3 = 1000$

$91+93+95+97+99+101+103+105+107+109$

2. Find the value of each of the following, using property 5 :

(a) $5^3 - 4^3 = 1+5\times4\times3$

$= 1+60$

$= 61$ **Ans**

(b) $20^3 - 19^3 = 1+20\times19\times3$

$= 1+1140$

$= 1141$ **Ans**

(c) $10^3 - 9^3 = 1+10\times9\times3$

$= 1+270$

$= 271$ **Ans**

(d) $7^3 - 6^3 = 1+7\times6\times3$

$= 1+126$

$= 127$ **Ans**

(e) $12^3 - 11^3 = 1+12\times11\times3$

$= 1+396$

$= 397$ **Ans**

(f) $39^3 - 38^3 = 1+39\times38\times3$

$= 1+4446$

$= 1+4447$ **Ans**

3. Find the ones digit of the cubes of the following numbers :

(a) 19

Here, we have 9 as ones digit, so cube of this number will end at $9\times9\times9 = 72\underline{9}$

It means, ones digit of cube of 19 will be 9.

(b) 52

Here, we have 2 as ones digit, so cube of this number will end at $2\times2\times2 = \underline{8}$

It means, ones digit of cube of 52 will be 8.

(c) 149

Here, we have 9 as ones digit, so cube of this number will end at $9\times9\times9 = 72\underline{9}$

It means, ones digit of cube of 149 will be 9.

(d) 1008

Here, we have 8 as ones digit, so cube of this number will end at $8\times8\times8 = 51\underline{2}$

It means, ones digit of cube of 1008 will be 2.

(e) 3331

Here, we have 1 as ones digit, so cube of this number will end at $1\times1\times1 = \underline{1}$

It means, ones digit of cube of 3331 will be 1.

(f) 777

Here, we have 7 as ones digit, so cube of this number will end at $7\times7\times7 = 34\underline{3}$

It means, ones digit of cube of 777 will be 3.

4. Find the cubes of each of the following numbers :

(a) $(12) = 12\times12\times12$

$= 1728$ **Ans**

(b) $(-15)^3 = -15\times-15\times-15$

$= -3375$ **Ans**

(c) $\left(\frac{3}{5}\right)^3 = \frac{3}{5}\times\frac{3}{5}\times\frac{3}{5}$

$= \frac{27}{125}$ **Ans**

(d) $(2.5)^3 = 2.5\times2.5\times2.5$

$= 15.625$ **Ans**

(e) $(1.5)^3 = 1.5\times1.5\times1.5$

$= 3.375$ **Ans**

(f) $\left(\frac{-4}{9}\right)^3 = \frac{-4}{9}\times\frac{-4}{9}\times\frac{-4}{9}$

$= \frac{-64}{729}$ **Ans**

5. Which of the following numbers are perfect cubes ?

(a) 3375

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

First, Find the prime factorization of 3375.

$3375 = 3\times3\times3\times5\times5\times5$

Since, all prime factors are in the group of three.

So, 3375 is a perfect cube.

(b) 2744

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

First, Find the prime factorization of 2744.

$2744 = 2\times2\times2\times7\times7\times7$

Since, all prime factors are in the group of three.

So, 2744 is a perfect cube.

(c) 15360

2	15360
2	7680
2	3840
2	1920
2	960
2	480
2	240
2	120
2	60
2	30
3	15
5	5
	1

First, Find the prime factorization of 15360.

$15360 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times5$

Since, all prime factors 2, 3 and 5 are not in the group of three.

So, 15360 is not a perfect cube.

(d) 39304

2	39304
2	19652
2	9826
17	4913
17	289
17	17
	1

First, Find the prime factorization of 39304.

$39304 = 2\times2\times2\times17\times17\times17$

Since, all prime factors are in the group of three.

So, 39304 is a perfect cube.

(e) 7842

2	7842
3	3921
1307	1307
	1

First, Find the prime factorization of 7842.

$7842 = 2\times3\times1307$

Since, all prime factors are not in the group of three.

So, 7842 is a not perfect cube.

(f) 4096

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

First, Find the prime factorization of 4096.

$4096 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2$

Since, all prime factors are in the group of three.

So, 4096 is a perfect cube.

6. Find the smallest number by which 1024 must be multiplied so that the product is a perfect cube.

2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

First, Find the prime factorization of 1024

$1024 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2$

The prime factors 2 is not in the of three.

so, 1024 is not a perfect cube. To make it perfect cube, we need two more 2.

Hence, 1024 must be multiplied by $(2\times2=4)$ to make it perfect cube.

7. Find the smallest number by which 46305 must be multiplied so that the product is a perfect cubez.

3	46305
3	15435
3	5145
5	1715
7	343
7	49
7	7
	1

First, Find the prime factorization of 1024

$1024 = 3\times3\times3\times5\times7\times7\times7$

The prime factors 5 is not in the group of three.

so, 46305 is not a perfect cube. To make it perfect cube, we need two more 5.

Hence, 46305 must be multiplied by $(5\times5=25)$ to make it perfect cube.

8. Find the smallest number by which 2560 must be divided so that the quotient is a perfect cube.

2	2560
2	1280
2	640
2	320
2	160
2	80
2	40
2	20
2	10
5	5
	1

First, Find the prime factorization of 2560

$2560 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times5$

The prime factors 5 is not in the group of three. so, 2560 must be by 5 to make it perfect cube.

Hence, 2560 must be divided by 5 to make it perfect cube.

9. Find the smallest number by which 5324 must be divided so that the quotient is a perfect cube.

First, Find the prime factorization of 5324.

2	5324
2	2662
11	1331
11	121
11	11
	1

$5324 = 2\times 2\times 11\times 11\times 11$

The prime factors 2 is not in the group of three. so, 5324 must be divided by $(2\times 2 = 4)$ to make it perfect cube.

Hence, 5324 must be divided by 4 to make it perfect cube.

10. Find the smallest number by which 1323 must be divided so that the quotient is a perfect cube.

First, Find the prime factorization of 1323.

3	1323
3	441
3	147
7	49
7	7
	1

$1323 = 3\times 3\times 3\times 7\times 7$

The prime factors 7 is not in the group of three. so, 1323 must be divided by $(7\times 7 = 49)$ to make it perfect cube.

Hence, 1323 must be divided by 49 to make it perfect cube.

Exercise-3B

1. Find the cube root of the following :

(a) 9261

First, find prime factorization of 9261

3	9261
3	3087
3	1029
7	343
7	49
7	7
	1

$9261 = 3\times 3\times 3\times 7\times 7\times 7$

Now $\sqrt[3]{9261} = \sqrt[3]{3\times 3\times 3\times 7\times 7\times 7}$

$= 3\times 7$

$= 21$

Hence, cube-root of 9261 is 21.

(b) 32768

First, find prime factorization of 32768

2	32768
2	16384
2	8192
2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$32768 = 2\times 2\times 2\times 2\times 2\times 2\times$
$2\times 2\times 2\times 2\times 2\times 2\times$
$2\times 2\times 2$

Now $\sqrt[3]{32768} = \sqrt[3]{\begin{matrix}2\times 2\times 2\times 2\times 2\times\\ 2\times 2\times 2\times 2\times 2\times\\ 2\times 2\times 2\times 2\times 2\end{matrix}}$

$= 2\times 2\times 2\times 2\times 2$

$= 32$

Hence, cube-root of 32768 is 21.

(c) 5832

First, find prime factorization of 5832

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$5832 = 2\times 2\times 2\times 3\times$
$3\times 3\times 3\times 3\times 3$

Now $\sqrt[3]{5832} = \sqrt[3]{\begin{matrix}2\times 2\times 2\times 3\times 3\times\\ 3\times 3\times 3\times 3\end{matrix}}$

$= 2\times 3\times 3 = 18$

Hence, cube-root of 5832 is 18.

(d) 15625

First, find prime factorization of 15625

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

$15625 = 5\times 5\times 5\times 5\times 5\times 5$

Now $\sqrt[3]{15625} = \sqrt[3]{5\times 5\times 5\times 5\times 5\times 5}$

$= 5\times 5$

$= 25$

Hence, cube-root of 15625 is 25.

(e) 21952

First, find prime factorization of 21952

2	21952
2	10976
2	5488
2	2744
2	1372
2	686
7	343
7	49
7	7
	1

$21952 = 2\times 2\times 2\times 2\times$
$2\times 2\times 7\times 7\times 7$

Now $\sqrt[3]{21952} = \sqrt[3]{\begin{matrix}2\times 2\times 2\times 2\times 2\times\\ 2\times 7\times 7\times 7\end{matrix}}$

$= 2\times 2\times 7 = 28$

Hence, cube-root of 21952 is 28.

(f) 39304

First, find prime factorization of 39304

2	39304
2	19652
2	9826
17	4913
17	289
17	17
	1

$39304 = 2\times 2\times 2\times 17\times 17\times 17$

Now $\sqrt[3]{39304} = \sqrt[3]{2\times 2\times 2\times 17\times 17\times 17}$

$= 2\times 17 = 34$

Hence, cube-root of 39304 is 34.

2. Evaluate the following :

(a) $\sqrt[3]{55296}\times\sqrt[3]{54}$

Now, Find the prime factorization of both 55296 and 54.

2	54
3	27
3	9
3	3
	1

2	55296
2	27648
2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

$\sqrt[3]{55256\times 54} = \sqrt[3]{\begin{matrix}2\times 2\times 2\times 2\times 2\times\\ 2\times 2\times 2\times 2\times 2\times 2\times\\ 3\times 3\times 3\times 2\times 3\times 3\times 3\end{matrix}}$

$= 2\times 2\times 2\times 2\times 3\times 3$

$= 144$

(b) $\sqrt[3]{729} \times \sqrt[3]{8000}$

3	729
3	243
3	81
3	27
3	9
3	3
	1

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

Now, Find the prime factorization of both 729 and 8000

$$\sqrt[3]{729 \times 8000} = \sqrt[3]{\begin{matrix}3\times3\times3\times3\times3\times\\3\times2\times2\times2\times2\times\\2\times2\times5\times5\times5\end{matrix}}$$

$$= 3\times3\times2\times2\times5$$

$$= 180$$ **Ans**

(c) $\sqrt[3]{13.824} \times \sqrt[3]{8000}$

2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Now, Find the prime factorization of both 13.824 and 8000

$$= \sqrt[3]{13.824} \times \sqrt[3]{8000}$$

$$= \sqrt[3]{13824 \times 8}$$

$$\sqrt[3]{13824\times8} = \sqrt[3]{\begin{matrix}2\times2\times2\times2\times2\times\\2\times2\times2\times2\times3\\\times3\times3\times2\times2\times2\end{matrix}}$$

$$= 2\times2\times2\times3\times2 = 48$$ **Ans**

(d) $\sqrt[3]{432} \times \sqrt[3]{4000}$

2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

Now, Find the prime factorization of both 432 and 4000

$$\sqrt[3]{432} \times \sqrt[3]{4000} = \sqrt[3]{\begin{matrix}2\times2\times2\times2\times\\3\times3\times3\times2\times2\times\\2\times2\times2\times5\times5\times5\end{matrix}}$$

$$= 2\times2\times3\times2\times5$$

$$= 120$$ **Ans**

3. Find the cube root of the following :

(a) $\sqrt{-1728}$

2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

We have $\sqrt[3]{-1728} = -\sqrt[3]{1728}$

So, find prime factorisation of 1728

$$1728 = 2\times2\times2\times2\times2\times2\times3\times3\times3$$

$$\sqrt[3]{1728} = \sqrt[3]{\begin{matrix}2\times2\times2\times2\times\\2\times2\times3\times3\times3\end{matrix}}$$

$$= 2\times2\times3 = 12$$

So, $\sqrt[3]{-1728} = -12$ **Ans**

(b) $\sqrt{-17576}$

2	17576
2	8788
2	4394
13	2197
13	169
13	13
	1

We have $\sqrt[3]{-17576} = -\sqrt[3]{17576}$

So, find prime factorisation of 17576

$$17576 = 2\times2\times2\times13\times13\times13$$

$$\sqrt[3]{17576} = \sqrt[3]{2\times2\times2\times13\times13\times13}$$

$$= 2\times13 = 26$$

So, $\sqrt[3]{-17576} = -26$ **Ans**

(c) $\sqrt[3]{\dfrac{10648}{12167}}$

2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

23	12167
23	529
23	23
	1

$$= \sqrt[3]{\frac{10648}{12167}}$$

$$= \sqrt[3]{\frac{2\times2\times2\times11\times11\times11}{23\times23\times23}}$$

$$= \frac{2\times11}{23} = \frac{22}{23}$$ **Ans**

(d) $\sqrt[3]{-140608}$

2	140608
2	70304
2	35152
2	17576
2	8788
2	4394
13	2197
13	169
13	13
	1

We have,

$$\sqrt[3]{-140608} = -\sqrt[3]{140608}$$

So prime factorisation of 140608

$$140608 = 2\times2\times2\times2\times2\times2\times13\times13\times13$$

$$\sqrt[3]{140608} = \sqrt[3]{\begin{matrix}2\times2\times2\times2\times2\times\\2\times13\times13\times13\end{matrix}}$$

$$= 2\times2\times13$$

$$= 52$$

Hence, $\sqrt[3]{-140608} = -52$ **Ans**

(e) $\sqrt{\dfrac{-2197}{3375}}$

13	2197
13	169
13	13
	1

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

$$= \frac{\sqrt[3]{-2197}}{\sqrt[3]{3575}}$$

$$= \frac{\sqrt[3]{-13\times-13\times-13}}{\sqrt[3]{3\times3\times3\times5\times5\times5}}$$

$$= \frac{-13}{3\times5} = \frac{-13}{15}$$ **Ans**

(f) $\frac{-343}{6859}$

7	343
7	49
7	7
	1

19	6859
19	361
19	19
	1

$$= \frac{\sqrt[3]{-343}}{\sqrt[3]{6859}}$$

$$= \frac{\sqrt[3]{-7\times-7\times-7}}{\sqrt[3]{19\times19\times19}}$$

$$= \frac{-7}{19}$$ **Ans**

4. Find the cube root of the following :

(a) 32.768

or $\sqrt[3]{32.768}$

2	32768
2	16384
2	8192
2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

2	1000
2	500
2	250
5	125
5	25
5	5
	1

$$= \sqrt[3]{\frac{32768}{1000}}$$

$$= \frac{\sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2}}{\sqrt[3]{2\times2\times2\times5\times5\times5}}$$

$$= \frac{2\times2\times2\times2\times2}{2\times5}$$

$$= \frac{32}{10} = 3.2$$ **Ans**

(b) 3.375

or $\sqrt[3]{3.375}$

or $\frac{\sqrt[3]{3375}}{\sqrt[3]{1000}}$

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

2	1000
2	500
2	250
5	125
5	25
5	5
	1

$$= \frac{\sqrt[3]{3\times3\times3\times5\times5\times5}}{\sqrt[3]{2\times2\times2\times5\times5\times5}}$$

$$= \frac{3\times5}{2\times5}$$

$$= \frac{15}{10} = 1.5$$ **Ans**

(c) 10.648

2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

2	1000
2	500
2	250
5	125
5	25
5	5
	1

or $\sqrt[3]{10.648} = \frac{\sqrt[3]{10648}}{\sqrt[3]{1000}}$

$$= \frac{\sqrt[3]{2\times2\times2\times11\times11\times11}}{\sqrt[3]{2\times2\times2\times5\times5\times5}}$$

$$= \frac{2\times11}{2\times5} = \frac{22}{10} = 2.2$$ **Ans**

(d) 5.832

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

2	1000
2	500
2	250
5	125
5	25
5	5
	1

or $\sqrt[3]{5.832} = \sqrt[3]{\frac{5832}{1000}}$

$$= \frac{\sqrt[3]{2\times2\times2\times3\times3\times3\times3\times3\times3\times}}{\sqrt[3]{2\times2\times2\times5\times5\times5}}$$

$$= \frac{2\times11}{2\times5} = \frac{22}{10} = 2.2$$ **Ans**

5. Show that :

$$\frac{\sqrt[3]{729}}{\sqrt[3]{-8000}} = \sqrt[3]{\frac{729}{-8000}}$$

3	729
3	243
3	81
3	27
3	9
3	3
	1

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

L.H.S.

$$= \frac{\sqrt[3]{3\times3\times3\times3\times3\times3}}{\sqrt{2\times2\times2\times2\times2\times2\times5\times5\times5}}$$

$$= \frac{3\times3}{-2\times2\times5}$$

$$= \frac{9}{-20} = \frac{-9}{20}$$

Now, **R.H.S.**

$$\sqrt[3]{\frac{729}{-8000}}$$

$$= -\sqrt{\frac{3\times3\times3\times3\times3\times3}{2\times2\times2\times2\times2\times2\times5\times5\times5}}$$

$$= \frac{-3\times3}{2\times2\times5}$$

$$= \frac{-9}{20}$$

So, L.HS = R.H.S **Ans**

6. Show that :

$$\frac{\sqrt[3]{-2197}}{\sqrt[3]{4096}} = \sqrt[3]{\frac{-2197}{4096}}$$

13	2197
13	169
13	13
	1

8	4096
8	512
8	64
2	8
2	4
2	2
	1

$$\frac{-\sqrt[3]{13\times13\times13}}{\sqrt[3]{8\times8\times8\times2\times2}} = \sqrt[3]{\frac{13\times13\times13}{8\times8\times8\times2\times2\times2}}$$

$$\frac{-13}{8\times2} = \frac{-13}{8\times2}$$

$$\frac{-13}{16} = \frac{-13}{16}$$ **Hence, Proved**

MCQs

1. (c) **2.** (a) **3.** (a) **4.** (b) **5.** (d)

6. (a)

CHAPTER 4 : EXPONENTS POWERS

Exercise-4A

1. Expand each of the following and write base and the exponent :

(a) $\mathbf{7^8}$

Base = 7, Exponent = 8

$7\times7\times7\times7\times7\times7\times7\times7$ **Ans**

(b) $\mathbf{(-6)^7}$

Base = (−6), Exponent = 7

$(-6)\times(-6)\times(-6)\times(-6)\times(-6)$

$\times(-6)\times(-6)$ **Ans**

(c) $\mathbf{(-13)^4}$

Base = (−13) Exponent = 4

$(-13)\times(-13)\times(-13)\times(-13)$ **Ans**

(d) $\mathbf{15^3}$

Base = 15, Exponent = 3

$15\times15\times15$ **Ans**

(e) $\left(\frac{\mathbf{3}}{\mathbf{11}}\right)^{\mathbf{-3}}$

Base = $\left(\frac{3}{11}\right)$, Exponent = −3

$$\left(\frac{3}{11}\right)^{-3} \Rightarrow \left(\frac{11}{3}\right)^{3}$$

or $\frac{11}{3}\times\frac{11}{3}\times\frac{11}{3}$ **Ans**

(f) $\left(\frac{\mathbf{4}}{\mathbf{9}}\right)^{\mathbf{-7}}$

Base = $\left(\frac{4}{9}\right)$, Exponent = −7

$$\left(\frac{4}{9}\right)^{-7} \Rightarrow \left(\frac{9}{4}\right)^{7}$$

or $\frac{9}{4}\times\frac{9}{4}\times\frac{9}{4}\times\frac{9}{4}\times\frac{9}{4}\times\frac{9}{4}\times\frac{9}{4}$ **Ans**

2. Write the following numbers in the exponential form :

(a) **243** $= 3\times3\times3\times3\times3$

$= (3)^5$ **Ans**

(b) **−343** $= -7\times-7\times-7$

$= (-7)^3$ **Ans**

(c) $\frac{\mathbf{64}}{\mathbf{125}}$ $= \frac{4}{5}\times\frac{4}{5}\times\frac{4}{5}$

$= \left(\frac{4}{5}\right)^3$ **Ans**

(d) $\frac{\mathbf{-1}}{\mathbf{27}}$ $= \frac{-1\times}{3\times}\frac{-1\times}{3\times}\frac{-1}{3}$

$= \left(\frac{-1}{3}\right)^3$ **Ans**

(e) $\frac{\mathbf{81}}{\mathbf{625}}$ $= \frac{3\times}{5\times}\frac{3\times}{5\times}\frac{3\times}{5\times}\frac{3}{5}$

$= \left(\frac{3}{5}\right)^4$ **Ans**

(f) $\frac{\mathbf{-512}}{\mathbf{1331}} = \frac{-8\times}{11\times}\frac{-8\times}{11\times}\frac{-8}{11}$

$= \left(\frac{-8}{11}\right)^3$ **Ans**

3. Find the value of each of the following :

(a) $8^{2/3}$ $= (2\times 2\times 2)^{2/3}$

$= (2^3)^{2/3} = 2^{\left(3\times\frac{2}{3}\right)}$

$= (2)^2 = 2\times 2 = 4$ **Ans**

(b) $(169)^{3/2}$ $= (13\times 13)^{3/2}$

$= \left(13^2\right)^{3/2}$

$= 13^{\left(2\times\frac{3}{2}\right)} = 13^3$

$= 13\times 13\times 13 = 2197$ **Ans**

(c) $\left(\frac{-4}{3}\right)^5$ $= \frac{-4\times}{3\times}\frac{-4\times}{3\times}\frac{-4\times}{3\times}\frac{-4\times}{3\times}\frac{-4}{3}$

$= \frac{-1024}{243}$ **Ans**

(d) $(343)^{-2/3}$ $= (7\times 7\times 7)^{-2/3}$

$= (7^3)^{-2/3} = 7^{\left(3\times\frac{-2}{3}\right)} = (7^{-2})$

$= \frac{1}{7^2} = \frac{1}{7\times 7} = \frac{1}{49}$ **Ans**

(e) $\left(\frac{343}{125}\right)^{-2/3} = \left(\frac{7\times 7\times 7}{5\times 5\times 5}\right)^{-2/3}$

$= \left[\left(\frac{7}{5}\right)^3\right]^{-2/3} = \left(\frac{7}{5}\right)^{3\times\frac{-2}{3}}$

$= \left(\frac{7}{5}\right)^{-2} \Rightarrow \left(\frac{5}{7}\right)^2$

$\Rightarrow \frac{5\times 5}{7\times 7} = \frac{25}{49}$ **Ans**

(f) $\left(\frac{125}{216}\right)^{-2/3} = \left(\frac{5\times 5\times 5}{6\times 6\times 6}\right)^{-2/3}$

$= \left[\left(\frac{5}{6}\right)^3\right]^{-2/3} = \left(\frac{5}{6}\right)^{3\frac{-2}{3}}$

$= \left(\frac{5}{6}\right)^{-2} \Rightarrow \left(\frac{6}{5}\right)^2$

$= \frac{6\times 6}{5\times 5} = \frac{36}{25}$ **Ans**

4. Simplify and express the result in power notation with positive exponent :

(a) $7^5 \times 7^3 \div 7^{-4}$

$= 7^5 \times 7^3 \div 7^{-4}$

$= 7^{5+3} \div 7^{-4}$

$= 7^8 \div 7^{-4}$

$= 7^{8-(-4)}$

$= 7^{8+4}$

$= 7^{12}$ **Ans**

(b) $6^{11} \times 6^3 \times 6^{-5}$

$= 6^{11} \times 6^3 \times 6^{-5}$

$= 6^{11+3-5}$

$= 6^{14-5}$

$= 6^9$ **Ans**

(c) $(-4)^{-2} \times (5)^{-3} \times (5)^{-4}$

$= (-4)^{-2} \times 5^{-3+(-4)}$

$= (-4)^{-2} \times 5^{-7}$

$= \frac{1}{(-4)^2 \times (5)^7}$ **Ans**

(d) $\left(\frac{5}{9}\right)^{-2} \times \left(\frac{3}{5}\right)^{-3} \times \left(\frac{3}{5}\right)^0$

$= \left(\frac{5}{9}\right)^{-2} \times \left(\frac{3}{5}\right)^{-3} \times 1$

$= \left(\frac{9}{5}\right)^2 \times \left(\frac{5}{3}\right)^3 \times 1$

$= \frac{9\times 9\times 5\times 5\times 5}{5\times 5\times 3\times 3\times 3}$

$= 3\times 5$

$= 15^1$ **Ans**

5. Evaluate each of the following :

(a) $(3^0 + 4^{-1}) \times 2^2$

$= \left(1\times\frac{1}{4}\right)\times 2\times 2$

$= \left(\frac{4+1}{4}\right)\times 4$

$= \frac{5}{4}\times 4 = 5$ **Ans**

(b) $(2^{-1} \times 4^{-1}) \div 2^{-4}$

$= \left(\frac{1}{2}\times\frac{1}{4}\right)\div\frac{1}{2^4}$

$= \frac{1}{2}\times\frac{1}{4}\times\frac{2^4}{1}$

$= \frac{1\times 1\times 2\times 2\times 2\times 2}{2\times 4\times 1}$

$= 2$ **Ans**

(c) $\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{4}\right)^{-2} + \left(\frac{1}{5}\right)^{-2}$

$= \left(\frac{2}{1}\right)^2 + \left(\frac{4}{1}\right)^2 + \left(\frac{5}{1}\right)^2$

$= 4 + 16 + 25$

$= 45$ **Ans**

(d) $\left[\left(\frac{4}{3}\right)^{-1}-\left(\frac{1}{4}\right)^{-1}\right]^{-1}$

$=\left[\frac{3}{4}-\frac{4}{1}\right]^{-1}$

$=\left[\frac{3-16}{4}\right]^{-1}$

$=\left[\frac{-13}{4}\right]^{-1}$

$=\frac{-4}{13}$ **Ans**

(e) $(3^{-1}+4^{-1}+8^{-1})^{0}$

$=\left(\frac{1}{3}+\frac{1}{4}+\frac{1}{8}\right)^{0}$

$=\left(\frac{8+6+3}{24}\right)^{0}$

$=\left(\frac{17}{24}\right)^{0}$

$=1$ **Ans**

(f) $(4^{0}+5^{0})\times(4^{0}-5^{0})$

$=(1+1)\times(1-1)$

$=2\times 0$

$=0$ **Ans**

6. Solve the following exponential equations :

(a) $(-3)^{m+1}\times(-3)^{5}=(-3)^{7}$

$=(-3)^{M+1+5}=(-3)^{7}$

so, $M+6=7$

$M=7-6$

$M=1$ **Ans**

(b) $5^{x}=625$

$5^{x}=5\times5\times5\times5$

$5^{x}=5^{4}$

or $x=4$ **Ans**

(c) $(\sqrt{2})^{2x}=64$

$(\sqrt{2})^{2x}=2\times2\times2\times2\times2\times2$

$(\sqrt{2})^{2x}=\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times$

$\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times\sqrt{2}\times\sqrt{2}$

$(\sqrt{2})^{2x}=(\sqrt{2})^{12}$

or $2x=12$

$x=\frac{12}{2}$

$x=6$ **Ans**

(d) $6^{2x+1}\div 36=216$

$6^{2x+1}\div 6\times6=6\times6\times6$

$6^{2x+1}\div 6^{2}=6^{3}$

$6^{2x+1-2}=6^{3}$

$6^{2x-1}=6^{3}$

or $2x-1=3$

$2x=3+1$

$2x=4$

$x=\frac{4}{2}$

$x=2$ **Ans**

Exercise-4B

1. Express each of the following in the exponential form :

(a) $\sqrt{15}$

$=(15)^{1/2}$ **Ans**

(b) $\sqrt[3]{43}$

$=(43)^{1/3}$ **Ans**

(c) $\sqrt[6]{19}$

$=(19)^{1/6}$ **Ans**

(d) $\sqrt[7]{405}$

$=(405)^{1/7}$ **Ans**

2. Express as radicals :

(a) $6^{1/5}$

$=\sqrt[5]{6}$ **Ans**

(b) $(13)^{1/7}$

$=\sqrt[7]{13}$ **Ans**

(c) $6^{5/7}$

$=\sqrt[7]{6^{5}}$

$=\sqrt[7]{6\times6\times6\times6\times6}$

$=\sqrt[7]{7776}$ **Ans**

(d) $(4)^{-1/7}$

$=\left(\frac{1}{4}\right)^{1/7}$

$=\sqrt[7]{\frac{1}{4}}$ **Ans**

3. Find the value of each of the following :

(a) $4\times(9)^{1/2}\times(27)^{1/3}$

$=4\times\sqrt{9}\times\sqrt[3]{27}$

$=4\times\sqrt{3\times3}\times\sqrt[3]{3\times3\times3}$

$=4\times3\times3$

$=36$ **Ans**

(b) $(4)^{1/3} \times (64)^{1/2} \times (4)^{2/3}$

$= (4)^{1/3} \times (4)^{2/3} \times \sqrt{64}$

$= 4^{\left(\frac{1}{3}+\frac{2}{3}\right)} \times \sqrt{8\times 8}$

$= 4 \times 8$

$= 32$ **Ans**

(c) $(125)^{-2/3} \times (64)^{4/3}$

$= (5\times 5\times 5)^{-2/3} \times (4\times 4\times 4)^{4/3}$

$= (5^3)^{-2/3} \times (4^3)^{4/3}$

$= 5^{-2} \times 4^4 = \frac{4^4}{5^2}$

$= \frac{4\times 4\times 4\times 4}{5\times 5} = \frac{256}{25}$ **Ans**

(d) $6 \times (36)^{-1/2} \times (36)^{3/2}$

$= 6 \times 36^{\frac{-1}{2}} \times 36^{\frac{3}{2}}$

$= 6 \times 36^{\frac{-1}{2}+\frac{3}{2}}$

$= 6 \times 36$

$= 216$ **Ans**

4. Simplify :

(a) $\sqrt{\frac{49}{64}} \times \sqrt[3]{\frac{512}{343}}$

$= \sqrt{\frac{7\times 7}{8\times 8}} \times \sqrt[3]{\frac{8\times 8\times 8}{7\times 7\times 7}}$

$= \frac{7}{8} \times \frac{8}{7}$

$= 1$ **Ans**

(b) $\sqrt[5]{\frac{2}{5}} \times \sqrt[5]{\frac{16}{625}}$

$= \sqrt[5]{\frac{2}{5}} \times \sqrt[5]{\frac{2\times 2\times 2\times 2}{5\times 5\times 5\times 5}}$

$= \sqrt[5]{\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}}$

$= \frac{2}{5}$ **Ans**

(c) $\sqrt{\frac{16}{81}} \times \sqrt[5]{\frac{243}{32}}$

$= \sqrt{\frac{4\times 4}{9\times 9}} \times \sqrt[5]{\frac{3\times 3\times 3\times 3\times 3}{2\times 2\times 2\times 2\times 2}}$

$= \frac{4}{9} \times \frac{3}{2} = \frac{2}{3}$ **Ans**

(d) $\sqrt[5]{\frac{243}{3125}} \times \sqrt[3]{\frac{125}{27}}$

$= \sqrt[5]{\frac{3\times 3\times 3\times 3\times 3}{5\times 5\times 5\times 5\times 5}} \times \sqrt[3]{\frac{5\times 5\times 5}{3\times 3\times 3}}$

$= \frac{3}{5} \times \frac{5}{3} = 1$ **Ans**

5. Evaluate :

(a) $(5^2 + 12^2)^{3/2}$

$= (25+144)^{3/2}$

$= (169)^{3/2} = (13\times 13)^{3/2}$

$= (13^2)^{3/2} = 13^3$

$= 2197$ **Ans**

(b) $(1^3 + 2^3 + 3^3)^{-5/2}$

$= (1+8+27)^{-5/2}$

$= (36)^{-5/2} = (6\times 6)^{-5/2}$

$= (6^2)^{-5/2} = 6^{-5} = \frac{1}{6^5}$

$= \frac{1}{6\times 6\times 6\times 6\times 6}$

$= \frac{1}{7776}$ **Ans**

(c) $(3^2 + 4^2)^{1/2}$

$= (9+16)^{1/2}$

$= (25)^{1/2}$

` $= (5\times 5)^{1/2}$

$= (5^2)^{1/2}$

$= 5$ **Ans**

(d) $(10^2 - 8^2)^{1/2}$

$= (100-64)^{1/2}$

$= (36)^{1/2}$

$= (6\times 6)^{1/2}$

$= (6^2)^{1/2}$

$= 6$ **Ans**

6. Evaluate :

(a) $(0.01024)^{3/5}$

$= \left(\frac{1024}{100000}\right)^{3/5}$

$= \left(\frac{4\times 4\times 4\times 4\times 4}{10\times 10\times 10\times 10\times 10}\right)^{3/5}$

$= \left[\left(\frac{4}{10}\right)^5\right]^{3/5} = \left(\frac{4}{10}\right)^3$

$= \frac{4\times 4\times 4}{10\times 10\times 10} = 0.064$ **Ans**

(b) $(0.008)^{-2/3}$

$= \left(\frac{8}{1000}\right)^{-2/3}$

$= \left(\frac{2\times 2\times 2}{10\times 10\times 10}\right)^{-2/3}$

$$= \left[\left(\frac{2}{10}\right)^3\right]^{-2/3}$$

$$= \left(\frac{2}{10}\right)^{-2} = \left(\frac{10}{2}\right)^2$$

$$= (5)^2 = 5\times 5 = 25$$ **Ans**

(c) $(0.125)^{2/3}$

$$= \left(\frac{125}{1000}\right)^{2/3}$$

$$= \left(\frac{5\times 5\times 5}{10\times 10\times 10}\right)^{2/3}$$

$$= \left[\left(\frac{5}{10}\right)^3\right]^{2/3} = \left(\frac{5}{10}\right)^2$$

$$= \frac{5\times 5}{10\times 10} = \frac{25}{100} = 0.25$$ **Ans**

(d) $(0.064)^{-2/3}$

$$= \left(\frac{64}{1000}\right)^{-2/3}$$

$$= \left(\frac{4\times 4\times 4}{10\times 10\times 10}\right)^{-2/3}$$

$$= \left[\left(\frac{4}{10}\right)^3\right]^{-2/3}$$

$$= \left(\frac{4}{10}\right)^{-2} = \left(\frac{10}{4}\right)^2$$

$$= \frac{10\times 10}{4\times 4} = \frac{25}{4}$$ **Ans**

7. Simplify :

(a) $3x^{5/6} \times 7x^{-7/3}$

$$= 3\times 7\times x^{5/6} \times x^{-7/3}$$

$$= 21\times x^{\frac{5}{6}-\frac{7}{3}}$$

$$= 21\times x^{\frac{5-14}{6}}$$

$$= 21\times x^{-3/2}$$

or $$= \frac{21}{x^{3/2}}$$ **Ans**

(b) $(y^{-4})^3 \times (x^{-1/4})^{12}$

$$= y^{-4\times 3} \times x^{-\frac{1}{4}\times 12}$$

$$= y^{-12} \times x^{-3}$$

$$= \frac{1}{x^3 y^{12}}$$ **Ans**

(c) $\left\{\sqrt[3]{\left(\frac{m}{n}\right)^9}\right\}^{-12}$

$$= \left[\left(\frac{m}{n}\right)^{9\times\frac{1}{3}}\right]^{-12}$$

$$= \left[\left(\frac{m}{n}\right)^3\right]^{-12}$$

$$= \left(\frac{m}{n}\right)^{-36} \text{ or } \left(\frac{n}{m}\right)^{36}$$ **Ans**

Exercise-4C

1. Express the following numbers in standard form :

(a) **456000000**

$$= 4.56\times 10^8$$ **Ans**

(b) **716000000000**

$$= 7.16\times 10^{11}$$ **Ans**

(c) **30000000000**

$$= 3.0\times 10^{10}$$ **Ans**

(d) **0.000000078**

$$= 7.8\times 10^{-8}$$ **Ans**

(e) **0.000000000714**

$$= 7.14\times 10^{-10}$$ **Ans**

(f) **0.0000069**

$$= 6.9\times 10^{-6}$$ **Ans**

2. Express the following numbers in usual form :

(a) 3.7×10^4

$$= 37000$$ **Ans**

(b) 3.10×10^9

$$= 3100000000$$ **Ans**

(c) 3.18×10^7

$$= 31800000$$ **Ans**

(d) 1.51×10^{-6}

$$= 0.0000015$$ **Ans**

3. Express the following statement (in numbers) in standard form :

(a) **1 nanometre is equal to** $\frac{1}{1000000000}$ **m.**

$$= 1\times 10^{-9}\ m$$ **Ans**

(b) **The earth has about 135000000 cu km**

$$= 1.35\times 10^8 \text{ cu km}$$ **Ans**

(c) **The distance of the moon from the earth is 384400000 m.**

$$= 3.844\times 10^8 \text{ m}$$ **Ans**

(d) **1 pico is equal to** $\frac{1}{1000000000000}$ **m.**

$$= 1\times 10^{-12} \text{ m}$$ **Ans**

(e) The mass of proton in gram is $\frac{1673}{1000000000000000000}$

$$= 1673 \times 10^{-18}$$

$$= 1.673 \times 10^{-15}$$ **Ans**

MCQs

1. (a) **2.** (b) **3.** (a) **4.** (c) **5.** (a)

6. (b)

CHAPTER 5 : PLAYING WITH NUMBERS

Exercise-5A

1. Sum of the digits of a two digit number is 9. If the number obtained by reversing the order of digits is 27 more than the original number, find the original number.

Let the digit at tens place be x and the digit at ones be y.

Then number is $(10x + y)$

Since, sum of digits is 9

So, $x + y = 9$

$$y = 9 - x$$

So, the number $= 10x + (9 - x) = 9x + 9$

On reversing the order of digits, we have new number is $10y + x$.

$$= 10(9 - x) + x$$

$$= 90 - 9x$$

According to given condition,

$$90 - 9x = 9x + 9 + 27$$

$$-9x - 9x = 36 - 90$$

$$-18x = -54$$

$$x = \frac{+54}{+18} = 3$$

So, Original number $= 9x + 9$

$$= 9 \times 3 + 9$$

$$= 27 + 9 = 36$$

Hence, the original number = 36 **Ans**

2. The sum of the digits of a two digit number is 7. If the number obtained by reversing the order of digits is 27 less than the original number, find the original number.

Let the digit at tens place be x and the digit at ones place be y.

Then the number is $(10x + y)$

Since, sum of digits is 7

$$x + y = 7$$

$$y = 7 - x$$

So the number $= 10x + (7 - x) = 9x + 7$

On reversing the order of digit we have new number is $10y + x$.

$$= 10(7 - x) + x$$

$$= 70 - 9x$$

According to given condition

$$70 - 9x = 9x + 7 - 27$$

$$-9x - 9x = -20 - 70$$

$$-18x = -90$$

$$x = \frac{90}{18} = 5$$

So, original number $= 9x + 7$

$$= 9 \times 5 + 7$$

$$= 45 + 7 = 52$$

Hence, the original number = 52. **Ans**

3. In a two digit number, the digit at ones place is four times the digit at the tens place and sum of the digits is equal to 10, find the number.

Let the digit at tens place = x and the digit at once place be $4x$ then the number is $(10x + 4x) = 14x$.

Since the sum of digits is 10.

$$x + 4x = 10$$

$$5x = 10$$

$$x = \frac{10}{5} = 2$$

Hence the original number $= 14x$

$$14 \times 2 = 28$$ **Ans**

4. A number consists of two digit whose sum is 9. If 9 is subtracted from the number the digits interchange their places. Find the number.

Let the digit at tens place be x and the digit at ones place be y.

Then, the digit number is $(10x + y)$

Since sum of digit is 9

So, $x + y = 9$

$$y = 9 - x$$

So the number $= 10x + (9 - x)$

$$= 9x + 9$$

Now, according to question

$$(10x + y) - 9 = 10y + x$$

$$10x + 9 - x - 9 = 10(9 - x) + x$$

$$9x = 90 - 10x + x$$

$$9x = 90 - 9x$$

$$9x + 9x = 90$$
$$18x = 90$$
$$x = \frac{90}{18} = 5$$
$$x = 5$$

So, original number $= 9x + 9$
$= 9 \times 5 + 9$
$= 45 + 9 = 54$ **Ans**

5. The sum of the digits of a two digit number is 10. If 36 is subtracted from the number, the digits interchange their places. Find the number.

Let the digit at tens place be x and the digit at ones place be y.

Then the number is $(10x + y)$

Since sum of digit is 10

So, $x + y = 10$
$y = 10 - x$

So the number $= 10x + 10 - x$
$= 9x + 10$

Now, according to question

$10x + y - 36 = 10y + x$
$10x + 10 - x - 36 = 10(10 - x) + x$
$9x - 26 = 100 - 10x + x$
$9x - 26 = 100 - 9x$
$9x + 9x = 100 + 26$
$18x = 126$
$x = \frac{126}{18}$
$x = 7$

So, the number $= 9x + 10$
$= 9 \times 7 + 10$
$= 63 + 10$
$= 73$ **Ans**

Exercise-5B

1. Which of the following numbers are divisible by 2 ?

42, 63, 94, 78, 102, 103, 136, 1995, 20126, 5135.

A number is divisible by 2 if its unit digit is even e.g. 0, 2, 4, 6 and 8.

So, number divisible by 2 are 42, 94, 78, 102, 136, 20126.

2. Which of the following numbers are divisible by 3 ?

415, 603, 708, 514, 316, 219, 123, 4569, 2136.

A number is divisible by 3 if the sum of its digit is divisible by 3.

$415 = 4 + 1 + 5 = 10$ so, not divisible by 3.

$603 = 6 + 0 + 3 = 9$ so, divisible by 3.

$708 = 7 + 0 + 8 = 15$ so, divisible by 3.

$514 = 5 + 1 + 4 = 10$ so, not divisible by 3.

$316 = 3 + 1 + 6 = 10$ so, not divisible by 3.

$219 = 2 + 1 + 9 = 12$ so, divisible by 3.

$123 = 1 + 2 + 3 = 6$ so, divisible by 3.

$4569 = 4 + 5 + 6 + 9 = 24$ so, divisible by 3.

$2136 = 2 + 1 + 3 + 6 = 12$ so, divisible by 3.

3. Which of the following numbers are divisible by 5 ?

60, 75, 85, 90, 93, 106, 305, 3045, 2104, 30105.

A number is divisible by 5 if it ones place digit is either 0 or 5.

So, number divisible by 5 are 60, 75, 85, 90, 305, 3045, 30105. **Ans**

4. Which of the following numbers are divisible by 9 ?

819, 309, 618, 154, 3163, 1314, 21897, 5143.

A number is divisible by 9 if the sum of its digits is divisible by 9.

$819 = 8 + 1 + 9 = 18$, divisible by 9.

$309 = 3 + 0 + 9 = 12$, not divisible by 9.

$618 = 6 + 1 + 8 = 15$, not divisible by 9.

$154 = 1 + 5 + 4 = 10$, not divisible by 9.

$3163 = 3 + 1 + 6 + 3 = 13$, not divisible by 9.

$1314 = 1 + 3 + 1 + 4 = 9$, divisible by 9.

$21897 = 2 + 1 + 8 + 9 + 7 = 27$, divisible by 9.

$5143 = 5 + 1 + 4 + 3 = 13$, not divisible by 9.

5. Which of the following numbers are divisible by 10 ?

50, 165, 170, 415, 530, 650, 770, 485, 985, 1005

A number is divisible by 10, if its unit digit is 0.

So, numbers divisible by 10 are 50, 170, 530, 650, 770.

6. If 21y5 is divisible by 9, find the value of y .

Now, sum of digits $= 2 + 1 + y + 5$
$= 8 + y$

For the dvisiblity of 9

$8 + y$ should be multiple of 9

So, $8 + y = 9$

or, $y = 9 - 8$
$y = 1$ **Ans**

7. If 81x4 is divisible by 3, find the value of x.

Now, Sum of digits $= 8 + 1 + x + 4$
$= 13 + x$

For the divisibility of 3

$13 + x$ should be multiple of 3

So, $13 + x = 3$ or 6 or 9 or 12 or 15 or 18 .....

or $13 + x = 15$
$x = 15 - 3$
$x = 2$ **Ans**

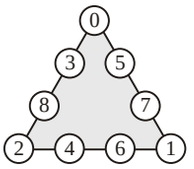
8. If 913z is divisible by 5, find the value of z.

For of divisibility of 5, ones digit should be 0 or 5. So value of 2 will be 0 or 5. **Ans**

Exercise-5C

1. Do it yourself.

2. In the given triangle, fill the numbers from 0 to 8 (without repetition) in the nine circles so that the numbers in each side of the triangle add up to 13.



3. Find the values of the letters in the following :

(a)

$$\begin{array}{r} C\ D \\ +\ 3\ 7 \\ \hline 7\ C \end{array} \rightarrow \begin{array}{r} 3\ 6 \\ +\ 3\ 7 \\ \hline 7\ 3 \end{array}$$

So, $C = 3, D = 6$ **Ans**

(b)

$$\begin{array}{r} AB \\ \times 5 \\ \hline CA\ B \end{array} \rightarrow \begin{array}{r} 25 \\ \times 5 \\ \hline 125 \end{array}$$

So, $A = 2, B = 5, C = 1$

(c)

$$\begin{array}{r} 2AB \\ +\ AB1 \\ \hline B18 \end{array}$$

$B + 1 = 8$

$\Rightarrow \quad B = 7$

$A + 7 = 1$

So A must be 4.

$$\begin{array}{r} 247 \\ +471 \\ \hline 718 \end{array}$$

(d)

$$\begin{array}{r} 12A \\ +6AB \\ \hline A09 \end{array}$$

$2 + A = 10$

$\Rightarrow \quad A = 10 - 2$

$A = 8$

$8 + B = 9$

$\Rightarrow \quad B = 9 - 8 = 1$

So, $A = 8, B = 1$ **Ans**

$$\begin{array}{r} 128 \\ +681 \\ \hline 809 \end{array}$$

(e)

$$\begin{array}{r} PQ \\ \times 6 \\ \hline QQQ \end{array} \rightarrow \begin{array}{r} 74 \\ \times 6 \\ \hline 444 \end{array}$$

So, $Q = 4$ **Ans**

(f)

$$\begin{array}{r} BA \\ \times\ B\ 3 \\ \hline \end{array} \rightarrow \begin{array}{r} 2\ 5 \\ \times\ 2\ 3 \\ \hline 5\ 7\ 5 \end{array}$$

So, $A = 5, B = 2$ **Ans**

4. In the given problem, replace the letters by digits to complete the procedure of division.

In the question, the first number is 8, so $7 \times 8 = 56$.

$\therefore \quad E = 5, F = 6$

Now, $5B - 56 = 2$

So, $B = 8$

Now, $C - 1 = 2$, so, $C = 2$.

Then, $H = 2$ and $G = 3$

$2D - 21 = 0$

So, $D = 1$

$J = 3$

Hence, $B = 8, C = 3, D = 1, E = 5, F = 6,$

$G = 3, H = 3, J = 3$ **Ans**

$$\begin{array}{r|l} 7 & 5BCD\,8GJ \\ -\ EF & \\ \hline 2C & \\ -H1 & \\ \hline 2D & \\ -\ 21 & \\ \hline 0 & \end{array}$$

$$\begin{array}{r|l} 7 & 5831\,833 \\ -\ 56 & \\ \hline 23 & \\ -21 & \\ \hline 21 & \\ -\ 21 & \\ \hline 0 & \end{array}$$

MCQs

1. (c) **2.** (a) **3.** (a) **4.** (b) **5.** (d)

6. (a)

CHAPTER 6 : COMPARING QUANTITIES

Exercise-6A

1. 60% of 70 students of a class are girls. Find the number of boys in the class. Also, find the ratio of the number of boys to the number of girls in the class.

Total students = 70

Girls = 60%

So, number of girls $= \dfrac{70 \times 60}{100} = 42$

So, number of boys $= 70 - 42$

$= 28$

Boys : Girls $= 28 : 42$

$= 2 : 3$

2. 42% of 50 students are weak in mathematics. How many students are good in mathematics ?

Students = 50

Weak in maths = 42%

$= \dfrac{50 \times 42}{100} = 21$

So number of students are good in maths $= 50 - 21$

$= 29$

3. Girls are 35% of the total number of students and are 14. Find the strength of the class.

Let the strength of the class = x

Girls = 35%

Also number of girl = 14

So, $= \frac{x \times 35}{100} = 14$

$x = \frac{1400}{35}$

$x = 40$ **Ans**

4. The price of sugar was ₹ 18 last month. It has increased by 10% this month. What is the new price ?

Price of sugar last math = ₹ 18

It was increased 10%

So, increased price $= \frac{18 \times 10}{100}$

$= ₹ 1.80$

So, New price $= ₹ 18 + ₹ 1.80$

$= ₹ 19.80$ **Ans**

5. The price of a LCD was ₹ 72000 last year in the month of October, but this year price was reduced by 25%. What is the new price of the LCD ?

Price of LCD last year in the month of October = ₹ 72000

Price was reduced = 25%

So, Reduced price $= \frac{₹\ 72000 \times 25}{100}$

$= 18000$

So, new price of LCD = ₹ 72000 = ₹ 18000

= ₹ 54000 **Ans**

6. The price of 'Maruti 800' was ₹ 2,12,000 last year. It has decreased by 5% this year. Find new price of this car.

Price of 'Maruti 800' was = ₹ 2,12,000

Price was decreased = 5%

So, decreased in price $= \frac{2{,}12000 \times 5}{100}$

= ₹ 10600

So, new price of this car = ₹ 212000 – ₹ 10600

= ₹ 201400 **Ans**

7. The price of a scooty was ₹ 38000 last year. It has increased by 6% this year due to hike in metal. Find the price of scooty this year.

Price of scooty last year = ₹ 38000

Price was increased = 6%

So, increased price $= \frac{₹\ 38000 \times 6}{100} = ₹\ 2280$

So, price of scooty this year = ₹ 38000 + ₹ 2280

= ₹ 40280 **Ans**

8. An alloy of metal contain s 45% nickel, 25% copper and rest is zinc. How much zinc is there in 3 kg alloys ?

Nickel = 45%

Copper = 25%

So, percentage of zinc $= 100\% - [45 + 25]\%$

$= 100 - 70 = 30\%$

Total weight of alloy = 3 Kg

= 3000 gram

Quantity of zinc $= \frac{3000 \times 30}{100} = 900$ gram **Ans**

9. Mr. Saini's income is 20% more than Mrs. Saini's income. By what per cent is Mrs. Saini's income less then Mr. Saini ?

Let Mrs. Saini's income = 100

Then Mr. Saini's income $= 100 + \frac{100 \times 20}{100}$

$= 100 + 20$

$= 120$

Now Mr. Saini's income 120, then Mrs. Saini's income = 100

Mr. Saini's income is 1 then Mrs. saini income $= \frac{100}{120}$

100 Mrs. Saini's income ₹ 100 then $= \frac{100 \times 100}{120}$

$= 83\frac{1}{3}$

So, Mrs. Saini's income less than, Mr. Saini is income

$= 100 - \frac{250}{3}$

$= \frac{300 - 250}{3}$

$= \frac{50}{3}\%$ **Ans**

10. The price of a dress was ₹ 500. In December 2006 the price was increased by 10%. During October 2007 it was reduced by 10%. What is the new price of the shirt ?

Price of trees was = ₹ 500

It was increased in December 2006 = 10%

So, New price $= \frac{₹\ 500 + 500 \times 10}{100}$

$= ₹\ 500 + ₹\ 50$

$= ₹\ 550$

During October 2007 it was reduced by 10%

So, New price $= ₹\ 550 - \frac{550 \times 10}{100}$

$= ₹\ 550 - ₹\ 55 = ₹\ 495$

Exercise - 6B

1. A man sold a fridge for ₹ 6251 and lost $\frac{1}{20}$ of the cost price. Find the cost price.

S.P = ₹ 6251

Let cost price = x

Cost loss = $\frac{x}{20}$

S.P = cost price – loss

$6251 = \frac{x - x}{20}$

$6251 = \frac{20x - x}{20}$

$\frac{19x}{20} = 6251$

$x = \frac{6251 \times 20}{19}$

$x = 329 \times 20$

x = ₹ 6580 **Ans**

2. A shopkeeper buys 5 fans for ₹ 4050. He spends ₹ 50 on the transportation. he sells them at a gain of 15%. Find the selling price of a fan.

Cost price of 5 Fans = ₹ 4050

Transportation charges = ₹ 50

So, total cost price = ₹ 4050 + ₹ 50

= ₹ 4100

gain = 15%

gain = $\frac{4100 \times 15}{100}$ = ₹ 615

So, S.P. 5 fans = ₹ 4100 + ₹ 615

= ₹ 4715

So, S.P. of one fans = ₹ 4715 ÷ 5

= ₹ 943

3. A vender bought 9 sweets for ₹ 1. At what rate should he sell it to gain 80% ?

A Gender bought 9 sweets for = ₹ 1

C.P. of 1 Sweet = $\frac{₹1}{9}$

gain = 80%

gain = $\frac{1}{9} \times \frac{80}{100}$

$= \frac{8}{90}$

S.P = C.P + gain

$= \frac{1}{9} + \frac{8}{90}$

$\frac{10 + 8}{90} = \frac{18}{90}$

S.P of one Sweets = ₹ $\frac{1}{5}$

So, he should sell them 5 for ₹ 1.

4. A flask was sold ₹ 72 incurring a loss of 10%. What was its cost price ?

S.P = ₹ 72

loss = 10%

C.P = $\left(\frac{100}{100 - L\%}\right) \times$ S.P

$= \frac{100}{(100 - 10)\%} \times 72$

$= \frac{100}{90} \times 72$ = ₹ 80 **Ans**

5. A girl buys lemons at 4 for ₹ 3 and sells them at 5 for ₹ 4. How much did she gain or loss ?

Cost price of 4 lemon = ₹ 3

Cost price of 1 lemon = ₹ $\frac{3}{4}$

S.P. of 5 lemon = ₹ 4

S.P. of 1 lemon = ₹ $\frac{4}{5}$

So, gain = S.P – C.P

= ₹ $\left(\frac{4}{5} - \frac{3}{5}\right)$

= ₹ $\frac{16 - 15}{20}$ = ₹ $\frac{1}{20}$ **Ans**

gain% = $\frac{1/20}{3/4} \times 100$

$= \frac{100 \times 4}{3 \times 20}$

$= \frac{20}{3} = 6\frac{2}{3}\%$ **Ans**

6. By selling oranges at the rate of ₹ 72 per dozen, a woman losses 10% of her investment. What would be the percentage of her gain or loss, if she sold them at ₹ 600 per hundred ?

S.P. of dozen oranges = ₹ 72

S.P of 1 orange = ₹ $\frac{72}{12}$ = ₹ 6

She rupees loss 10% of her investment

Now, again, S.P pf 100 oranges = ₹ 600

S.P of 1 orange = ₹ $\frac{600}{100}$ = ₹ 6

Because S.P of o ne orange is same above = ₹ 6

So again, her loss percentage is 10% **Ans**

7. A shopkeeper buys 100 pens for ₹ 200 and sells 20 of them at a gain of 10%. At what gain per cent must he sell the remainder so as to gain 20% in all ?

C.P of 100 pens = ₹ 200

C.P of 1 pen = ₹ 2

C.P of 20 pen = ₹ 2×20

= ₹ 40

gain = 10%

$= \frac{4\times 10}{100} =$ ₹ 4

So, S.P of 20 pen = $40+4=$ ₹ 44

Now, 20% of 200 $= \frac{200\times 20}{100} = 40$

Total S.P = $200+40$

= ₹ 240

We have collected ₹ 44 already

Now balance = ₹ $240-$ ₹ $44=$ ₹ 196

So S.P of 80 pens should be = ₹ 196

and C.P of 80 pens = ₹ 160

Now, we have to get ₹ 36 profit on C.P ₹ 160.

So, $\text{gain\%} = \frac{\text{gain}}{\text{C.P}}\times 100$

$= \frac{36}{160}\times 100$

$= \frac{90}{4} = 22.5\%$ **Ans**

8. Jai Narayan sells two radio sets for ₹ 2288 each. On one he gains 10% and on the other he loses 10%. Find his gain or loss per cent ?

S.P of each radio set = ₹ 2288

C.P of one radio $= \left(\frac{100}{100+P\%}\right)\times \text{S.P}$

$= \left(\frac{100}{100+10}\right)\times 2288$

$= \frac{100}{110}\times 2288$

= ₹ 2080

C.P of other radio $= \frac{(100)}{(100-L\%)}\times \text{S.P}$

$= \left(\frac{100}{100-10}\right)\times 2288$

$= \frac{100}{90}\times 2288$

= ₹ 2542.22

So total C.P of both radio = $2080+2542.22$

= ₹ 4622.22

Total S.P of both radio = 2×2288

= ₹ 4576

So, loss occurs = $4622.22-4576$

= ₹ 46.22

$\text{loss\%} = \frac{46.22}{4622.22}\times 100$

= 1% **Ans**

9. Rameej sells two watches for ₹ 990, each, gaining 10% on one and losing 10% on the other. Find her gain or loss percent in the whole transaction.

S.P of each watch = ₹ 990

C.P of I watch $= \left(\frac{100}{100+P\%}\right)\times \text{S.P}$

$= \left(\frac{100}{100+10}\right)\times 990$

$= \frac{100}{110}\times 990$

= ₹ 900

C.P of II watch $= \left(\frac{100}{100-L\%}\right)\times \text{S.P}$

$= \left(\frac{100}{100-10}\right)\times 990$

$= \frac{100}{90}\times 990$

= ₹ 1100

So, total C.P of both watches = ₹ $900+$ ₹ 1100

= ₹ 2000

Total S.P of watches = ₹ 2×990

= ₹ 1980

So, loss on whole transaction = ₹ $2000-$ ₹ 1980

= ₹ 20

$\text{loss\%} = \frac{20}{2000}\times 100$

= 1% **Ans**

10. By selling a chair for ₹ 432, a shopkeeper loses 4%. For how much should he sell it to gain 12% ?

S.P of chair = ₹ 432

loss = 4%

C.P of chair $= \left(\frac{100}{100-L\%}\right)\times \text{S.P}$

$= \left(\frac{100}{100-4}\right)\times 432$

$= \frac{100}{96}\times 432$

$= 25\times 18$

= ₹ 450

S.P of chair to gain 12% $= \left(\frac{100+P\%}{100}\right) \times$ C.P

$= \frac{100+12}{100} \times 450$

$= \frac{112 \times 450}{100}$

= ₹ 504 **Ans**

11. By selling a refrigerator for ₹ 6600, a shopkeeper gains 10%. For what price should it sell to gain 28%.

S.P. of refrigerator = ₹ 6600

gain = 10%

C.P of refrigerator $= \left(\frac{100}{100+P\%}\right) \times$ S.P

$= \left(\frac{100}{100+10}\right) \times 6600$

$= \frac{100}{110} \times 6600$

= ₹ 6000

S.P of refrigerator to gain 28%

$= \left(\frac{100+P\%}{100}\right) \times$ C.P

$= \left(\frac{100+28}{100}\right) \times 6000$

$= \frac{128 \times 6000}{100}$

= ₹ 7680 **Ans**

Exercise-6C

1. A steam iron is marked at ₹ 800 and sold it for ₹ 720. Find the discount percent.

Marked price = ₹ 800

S.P = ₹ 720

So, Discount = ₹ 800 − ₹ 720

= ₹ 80

Discount% $= \frac{80}{800} \times 100$

= 10% **Ans**

2. Sheena has a boutique and allows 4% discount on the marked price of her items and still earns a profit of 20%. What is the cost price of a salwar-suit, which is marked at ₹ 680.

Marked price = ₹ 680

Discount = 4%

So, discount $= ₹ \frac{680 \times 4}{100} = 27.20$

So, S.P = ₹ 680 − ₹ 27.20

= ₹ 652.80

Profit = 20%

C.P $= \left(\frac{100}{100+P}\right) \times$ S.P

$= \frac{100}{120} \times 652.80$

= ₹ 544 **Ans**

3. Marked price of a fan is ₹ 950. Due to off season discount, company gives a discount of 20% on it. Find its selling price.

Marked price of fan = ₹ 950

Discount = 20%

Discount $= \frac{₹\ 950 \times 20}{100} = ₹\ 190$

S.P = ₹ 950 − ₹ 190 = ₹ 760 **Ans**

4. List price of a bike is ₹ 46000. It is available at a discount of 8%. Find the selling price of the bike.

List price of bike = ₹ 46000

Discount = 8%

Discount $= ₹ \frac{46000 \times 8}{100}$

= ₹ 3680

S.P of bike = ₹ 46000 − ₹ 3680

= ₹ 42320 **Ans**

5. Find the single discount equivalent to two successive discounts of 10% and 15%.

Let amount = ₹ 100

Ist discount = 10%

$= \frac{100 \times 10}{100} = 10$

Left amount = 100 − 10 = 90

II discount = 15%

Discount $= \frac{90 \times 15}{100} = 13.5$

Now left amount = 90 − 76.5

= 23.5

So, equivalent to two successive discount 10% and 15% = 23.5 **Ans**

6. A shopkeeper allows 10% discount on the marked price on a table and still earns a profit of 25%. What is the cost price of a table, it it is marked at ₹ 1250 ?

Marked price of a table = ₹ 1250

Discount = 10%

Discount $= \frac{1250 \times 10}{100} = ₹\ 125$

So, S.P = ₹ 1250 − ₹ 125

= ₹ 1125

Profit = 25%

$$C.P = \left(\frac{100}{100+P\%}\right)\times S.P$$

$$= \frac{100}{125}\times 1125$$

$$= ₹\ 900 \qquad \textbf{Ans}$$

7. A Cooler is marked at ₹ 1200 and sold it for ₹ 1150. Find the rate of discount.

Marked price of cooler = ₹ 1200

S.P of cooler = ₹ 1150

So, discount = ₹ 1200 − ₹ 1150

= ₹ 50

$$\text{Discount\%} = \frac{50}{1200}\times 100$$

$$= 4\frac{1}{6}\% \qquad \textbf{Ans}$$

8. List price of a refrigerator is ₹ 12000. It is available at a discount of 15%. Find its selling price after discount.

List price of refrigerator = ₹ 12000

Discount = 15%

$$\text{Discount} = \frac{12000\times 15}{100}$$

= ₹ 1800

S.P of refrigerator = ₹ 12000 − ₹ 1800

= ₹ 10200 **Ans**

Exercise-6D

1. The cost of a pair of shoes was ₹ 850. The sales tax was charged at the rate of 5%. Find the cost of pair of shoes after sales tax.

Cost price of a pair of shoes = ₹ 850

Sales to x = 5%

$$\text{Sales tax} = \frac{850\times 5}{100}$$

= ₹ 42.5

So, cost price after sales tax = ₹ 850 + ₹ 42.50

= ₹ 892.50 **Ans**

2. Find the buying price of a soap included 8% sales tax if, price of soap is ₹ 45.

Price of soap = ₹ 45

Sale tax = 8%

$$\text{Sale tax} = \frac{45\times 8}{100} = ₹\ 3.60$$

So, cost price included sales tax = ₹ 45 + 3.60

= ₹ 48.60 **Ans**

3. Vibhor bought a colour TV for ₹ 10500 and VAT is charged at the rate of 4%. Find the price of Colour TV after VAT.

C.P of T.V = ₹ 10500

VAT = 4%

$$\text{VAT} = \frac{10500\times 4}{100} = ₹\ 420$$

Price of colour T.V. after VAT = ₹ 10500 + ₹ 420

= ₹ 10920 **Ans**

4. The selling price (inclusive of VAT of 9%) of a Refrigerator is ₹ 13407. Find the marked price of Refrigerator.

Let M.P refrigerator = ₹ 100

VAT = 9%

$$\text{VAT} = \frac{100\times 9}{100} = 9$$

S.P = 100 + 9

= ₹ 109

If S.P = 109 then M.P = ₹ 100

If S.P = 1 then M.P = ₹ $\frac{100}{109}$

If S.P ₹ 13407 then M.P = ₹ $\frac{100\times 13407}{109}$

= ₹ 12300 **Ans**

5. If the rate of VAT increases by 2% then selling price of an article goes up by ₹ 140, Find the marked price of the article.

Let M.P = x

Then according to question

$x \times 2\% = ₹\ 140$

or $\frac{x\times 20}{100} = ₹\ 140$

$$x = \frac{140\times 100}{2}$$

x = ₹ 7000 **Ans**

6. Madhu bought a coat costing ₹ 1800 at ₹ 1980 after paying VAT. Calculate the rate of tax charged.

Cost of coat = ₹ 1800

Cost of coat after VAT = ₹ 1900

So, VAT charged = ₹ 1980 − ₹ 1800

= ₹ 180

$$\text{VAT\%} = \frac{180}{1800}\times 100$$

= 10% **Ans**

7. Anu purchased a watch for ₹ 330 including 10% VAT and a pen for ₹ 212 including 6% VAT. Find the marked price for each of these items.

Let M.P of watch = ₹ 100

VAT = 10% = ₹ 10

S.P of watch = 100 + 10 = ₹ 110

If S.P = 110, then M.P of watch = ₹ 100

If S.P ₹ 1, then M.P of watch = ₹ $\frac{100}{110}$

If S.P ₹ 330, then M.P of watch = ₹ $\frac{100}{110}\times 330$

= ₹ 300 **Ans**

Now, Let M.P of Pen = ₹ 100

VAT = 6% ⇒ 6

If S.P = ₹ 106, then M.P of pen = ₹ 100

If S.P = ₹ 1, then M.P of pen = ₹ $\frac{100}{106}$

If S.P = ₹ 212, then M.P of pen = ₹ $\frac{100}{106}\times 212$ = ₹ 200

So, M.P of watch = ₹ 300

and M.P of pen = ₹ 200 **Ans**

MCQs

1. (c) **2.** (a) **3.** (a) **4.** (b) **5.** (d)

6. (a)

CHAPTER 7 : COMPOUND INTEREST

Exercise-7A

1. Find the amount and compound interest for :

(a) Principal = ₹ 5000, Rate = 6% p.a., Time = 3 years

P = ₹ 5000, R = 6%, T = 3 years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 5000\left[1+\frac{6}{100}\right]^3$$

$$= 5000\times\left(\frac{106}{100}\right)^3$$

$$= \frac{5000\times 106\times 106\times 106}{100\times 100\times 100}$$

$$= 5955.08$$

So, CI = A – P

= 5955.08 – 5000

= ₹ 955.08

(b) Principal = ₹ 8000, Rate = 8% p.a., Time = $2\frac{1}{2}$ years

= 2 years + 6 months

For T = 2 years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$A = 8000\left[1+\frac{8}{100}\right]^2$$

$$= 8000\times\left[\frac{108}{100}\right]^2$$

$$= \frac{8000\times 108\times 108}{100\times 100}$$

$$= ₹\ 9331.20$$

So, C.I = $A - P$

= 9331.20 – 8000

= ₹ 1331.20

Now, for 6 months, P = 9331.20, R = 8, $T = \frac{1}{2}$ years

$$I = \frac{P\times R\times T}{100}$$

$$I = \frac{9331.20\times 8\times T}{100\times 2}$$

$$T = ₹\ 373.248$$

Total C.I = 1331.20 + 373.248

= ₹ 1704.448 **Ans**

(c) Principal = ₹ 300, Rate = 3% p.a., Time = 2 years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 300\left[1+\frac{3}{100}\right]^2$$

$$= 30\left[\frac{103}{100}\right]^2$$

$$= \frac{300\times 103\times 103}{100\times 100}$$

$$A = ₹\ 318.27$$

So, C.I = $A - P$

= 318.27 – 300

= ₹ 18.27 **Ans**

(d) Principal = ₹ 2500, Rate = 12% p.a., Time = 2 years

$$A = P\left[1+\frac{R}{100}\right]$$

$$= 2500\left[1+\frac{12}{100}\right]^2$$

$$= 2500\times\left[\frac{112}{100}\right]^2$$

$$= \frac{2500\times 112\times 112}{100\times 100}$$

$$A = ₹\ 3136$$

So, C.I = $A - P$

= ₹ 3136 – 2500

= ₹ 636 **Ans**

2. Mahesh lent ₹ 40,500 to Rakesh at the rate of 8% p.a., compounded annually. Find the amount payable by Rakesh to Mahesh at the end of 2 years.

$P = ₹\ 40500,\ R = 8\%,\ T = 2$ years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 40500\left[1+\frac{8}{100}\right]^2$$

$$= 40500\times\left[\frac{108}{100}\right]^2$$

$$= \frac{40500\times108\times108}{100\times100}$$

$$A = ₹\ 47239.20$$

Amount payable by Rakesh to Mahesh ₹ 47239.20.

3. Rehana borrows ₹ 15000 at 10% p.a. for 4 years at simple interest and her friend Rama borrows same amount for same time at the rate of 8% p.a. compounded annually. Who pays more interest and by how ?

For Rehana

$P = ₹\ 15000,\ R = 10\%,\ T = 4$ years

$$\text{S.I} = \frac{P\times R\times T}{100}$$

$$= \frac{15000\times10\times4}{100}$$

$$= ₹\ 6000$$

For her friend

$P = ₹\ 15000,\ R = 8\%,\ T = 4$ years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 15000\left[1+\frac{8}{100}\right]^4$$

$$= 15000\left[\frac{108}{100}\right]^4$$

$$= 15000\times\frac{108}{100}\times\frac{108}{100}\times\frac{108}{100}\times\frac{108}{100}$$

$$= ₹\ 20407.33$$

So, C.I $= A - P$ $= 20407.33 - 15000$

$$= ₹\ 5407.33$$

Rehana pays more interest $= (6000 - 5407.33)$

$$= 592.67$$ **Ans**

4. Simple interest on a sum of money for 2 years at $6\frac{1}{2}\%$ p.a. is ₹ 5200. What will be the compound interest on same sum at the same rate for the same time period ?

$T = 2$ years , $R = 6\frac{1}{2}\% = \frac{13}{2}\%$, S.I $= ₹\ 5200$, $P = ?$

$$P = \frac{\text{S.I}\times100}{R\times T}$$

$$= \frac{5200\times100\times2}{2\times13}$$

$$P = ₹\ 40000$$

Now, $P = ₹\ 40000$

$$R = 6\frac{1}{2}\% = \frac{13}{2}\%$$

$T = 2$ years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 40000\times\left[1+\frac{13}{2\times100}\right]^2$$

$$= 40000\times\left[\frac{213}{200}\right]^2$$

$$= \frac{40000\times213\times213}{200\times200}$$

$$= 45369$$

Now, C.I $= A - P = 45369 - 4000$

$$= ₹\ 5369$$ **Ans**

5. A sum of money amounts to ₹ 9261 in 3 years at 5% p.a. compounded annually. Find the sum.

Let $P = x,\ A = ₹\ 9261,\ R = 5\%,\ T = 3$ years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$9261 = x\left[1+\frac{5}{100}\right]^3$$

$$9261 = x\left[\frac{105}{100}\right]^3$$

$$9261 = x\times\frac{105\times105\times105}{100\times100\times100}$$

$$x = \frac{9261\times100\times100\times100}{105\times105\times105}$$

$$x = ₹\ 8000$$

So, $P = ₹\ 8000$ **Ans**

6. A sum of money deposited at 2% p.a. compounded annually becomes ₹ 10404 at the end of 2 years. Find the sum.

$A = ₹\,10404,\ R = 2\%,\ T = 2\,\text{years},\ P = ?$

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$10404 = P\left[1+\frac{2}{100}\right]^2$$

$$10404 = P\left[\frac{102}{100}\right]^2$$

$$10404 = P\times\frac{102\times102\times102}{100\times100}$$

$$P = \frac{10404\times100\times100}{102\times102}$$

$$P = ₹\,10000$$ **Ans**

7. At what rate percent per annum will a sum of ₹ 4000 yield compound of ₹ 410 in 2 years ?

C.I $= ₹\,410,\ P = ₹\,4000$

$$A = P + \text{C.I}$$
$$= 4000 + 410$$
$$= ₹\,4410$$

$T = 2\,\text{years},\ R = ?$

$$4410 = 4000\left[1+\frac{R}{100}\right]^2$$

$$\frac{4410}{4000} = \left[1+\frac{R}{100}\right]^2$$

$$\left[\frac{21}{20}\right]^2 = \left[1+\frac{P}{100}\right]^2$$

$$1+\frac{R}{100} = \frac{21}{20}$$

$$\frac{R}{100} = \frac{21}{20}-1$$

$$\frac{R}{100} = \frac{21-20}{20}$$

$$\frac{R}{100} = \frac{1}{20}$$

$$R = \frac{100}{20} = 5$$

$$R = 5\%$$ **Ans**

8. In how many years will ₹ 2000 amount to ₹ 2662 at 10% p.a. compounded annually ?

$P = ₹\,2000,\ A = ₹\,2662,\ R = 10\%,\ T = ?$

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$2662 = 2000\left[1+\frac{10}{100}\right]^T$$

$$\frac{2662}{2000} = \left[\frac{11}{10}\right]^T$$

$$\frac{1331}{1000} = \left[\frac{11}{10}\right]^T$$

$$\left[\frac{11}{10}\right]^3 = \left[\frac{11}{10}\right]^T$$

$$T = 3\,\text{years}$$ **Ans**

9. In how many years will ₹ 1800 amount to ₹ 2178 at 10% p.a. compounded annually ?

$P = ₹\,1800,\ A = ₹\,2178,\ R = 10\%,\ T = ?$

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$2178 = 1800\left[1+\frac{10}{100}\right]^T$$

$$\frac{2178}{1800} = \left[\frac{11}{10}\right]^T$$

$$\frac{121}{100} = \left[\frac{11}{10}\right]^T$$

$$\left[\frac{11}{10}\right]^2 = \left[\frac{11}{10}\right]^T$$

$$T = 2\,\text{years}$$ **Ans**

10. At what rate percent per annum will ₹ 640 amounts to ₹ 774.40 in 2 years compounded annually ?

$P = ₹\,640,\ A = ₹\,774.40,\ T = 2\,\text{years},\ R = ?$

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$774.40 = 640\left[1+\frac{R}{100}\right]^T$$

$$\frac{774.40}{640} = \left[1+\frac{R}{100}\right]^2$$

$$\frac{77440}{64000} = \left[1+\frac{R}{100}\right]^2$$

$$\frac{88\times88}{80\times80} = \left[1+\frac{R}{100}\right]^2$$

$$\left[\frac{88}{80}\right]^2 = \left[1+\frac{R}{100}\right]^2$$

or $1+\frac{R}{100}=\frac{88}{80}$

$\frac{R}{100}=\frac{88}{80}-1$

$\frac{R}{100}=\frac{88-80}{80}$

$\frac{R}{100}=\frac{8}{80}$

$R=\frac{100\times 8}{80}$

$R=10\%$ **Ans**

Exercise-7B

1. A sum is borrowed at the rate of 8% p.a. compounded half-yearly. If after 2 years it amounts to ₹ 7500, find the sum borrowed.

$R=8\%$ per annum or 4% per half years

$T=2$ years or 4 half years

$A=₹\ 7500,\ P=?$

$A=P\left[1+\frac{R}{100}\right]^T$

$7500=P\left[1+\frac{4}{100}\right]^4$

$7500=P\left[1+\frac{1}{25}\right]^4$

$7500=P\times\left[\frac{26}{25}\right]^4$

$P=\frac{7500\times 25\times 25\times 25\times 25}{26\times 26\times 26\times 26}$

$P=₹\ 6411$ **Ans**

2. Find the amount and the compound interest on ₹ 20000 for $1\frac{1}{2}$ years at 10% per annum, compounded half-yearly. Would this interest be more than the interest he would get if it was compounded annually.

$P=₹\ 20000$

$R=10\%$ p.a. or 5% per half yearly

$T=1\frac{1}{2}$ years or 2 half years

$A=P\left[1+\frac{R}{100}\right]^T$

$A=20000\left[1+\frac{5}{100}\right]^3$

$A=20000\left[1+\frac{1}{20}\right]^3$

$=20000\times\left[\frac{21}{20}\right]^3$

$=20000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$

$A=₹\ 23152.5-20000$

$=₹\ 3152.50$

Yes, this interest is more than the interest which he would if it was compounded annually.

3. Vikram invested ₹ 10000 at the rate of 8% per annum, compounded quarterly. What amount would he get after $1\frac{1}{2}$ years ?

$P=₹\ 10000$

$R=8\%$ p.a. or 2% quarterly

$T=1\frac{1}{2}$ years or 6 quarter

$A=P\left[1+\frac{R}{100}\right]^T$

$A=10000\left[1+\frac{2}{100}\right]^6$

$=10000\left[\frac{102}{106}\right]^6$

$=10000\times\frac{102}{100}\times\frac{102}{100}\times\frac{102}{100}\times\frac{102}{100}\times\frac{102}{100}\times\frac{102}{100}$

$A=₹\ 11261.62$

So, Vikram will get ₹ 11261.62 **Ans**

4. Varun invested ₹ 50,000 at an interest rate of 12% per annum compounded half-yearly. What amount would he get after 2 years ?

$P=₹\ 50000$

$R=12\%$ p.a. or 6% half yearly

$T=2$ years or 4 half years

$A=P\left[1+\frac{R}{100}\right]^T$

$A=50000\left[1+\frac{6}{100}\right]^4$

$=50000\times\left[\frac{106}{100}\right]^4$

$=50000\times\frac{106}{100}\times\frac{106}{100}\times\frac{106}{100}\times\frac{106}{100}$

$A=₹\ 63123.85$

So, Varun will get ₹ 63123.85 after 2 years.

5. Calculate the amount if ₹ 18000 is invested at 15% per annum compounded half yearly for 1 year.

$P = ₹\,18000$

$R = 15\%$ p.a. or $\frac{15}{2}\%$ per half yearly

$T = 1$ year or 2 half year

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$A = 18000\left[1+\frac{15}{200}\right]^2$$

$$A = 1800\,0\times\left[\frac{215}{200}\right]^2$$

$$= \frac{18000\times 215\times 215}{200\times 200}$$

$$= ₹\,20801.25$$

6. Reeta lent ₹ 5000 to Anu at the rate $8\frac{1}{3}\%$ per annum compound interest, Find the amount payable by Anu to Reeta after two years.

$P = ₹\,5000$

$R = 8\frac{1}{3}\% \quad \Rightarrow \quad \frac{25}{3}\%$ p.a.

$T = 2$ years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 5000\left[1+\frac{25}{300}\right]^2$$

$$= 5000\times\left[\frac{325}{300}\right]^2$$

$$= 5000\times\frac{325}{300}\times\frac{325}{300}$$

$$= ₹\,5868.06$$

So, Amount payable by Anu to Reeta after two years $= ₹\,5868.06$ **Ans**

7. Pooja took a loan of ₹ 1,50,000 for her studies from a bank at the rate of 10% per annum, compounded quarterly. Find the amount paid by her after 2 years.

$P = ₹\,150000$

$R = 10\%$ p.a. $= 2.5\%$ per quarterly

$T = 2$ years $= 8$ quarters

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 150000\left[1+\frac{2.5}{100}\right]^8$$

$$= 150000\left[\frac{102.5}{100}\right]^8$$

$$= 150000\times\left[\frac{1025}{1000}\right]^8$$

$$= 150000\times\left[\frac{41}{40}\right]^8$$

$$= 150000\times\frac{41}{40}\times\frac{41}{40}\times\frac{41}{40}\times\frac{41}{40}$$
$$\times\frac{41}{40}\times\frac{41}{40}\times\frac{41}{40}\times\frac{41}{40}$$

$$A = ₹\,182760.4$$

So, ₹ 182760.44 amount should be paid by her.

8. Rishi took ₹ 56000 from bank at the rate of 12% per annum, compounded half-yearly for $1\frac{1}{2}$ years and gave this money to his friend Anshul at same rate for same time but compounded quarterly. Calculate the saving in interest for Rishi in this transaction.

$P = ₹\,56000$

$R = 12\%$ p.a. or 6% per half yearly

$T = 1\frac{1}{2}$ years or 3 half years

$$A = P\left[1+\frac{R}{100}\right]^T$$

$$= 56000\times\left[\frac{106}{100}\right]^3$$

$$= 56000\times\frac{106\times 106\times 106}{100\times 100\times 100}$$

$$A = ₹\,66696.90$$

C.I paid by Rishi $= A - P$

$$= 66696.90 - 56000$$

$$= ₹\,10696.90$$

Now, again for his friend :

$P = ₹\,56000$

$R = 12\%$ p.a. or 3% per quarterly

$T = 1\frac{1}{2}$ years or 6 quarters

$$A = P\left[1+\frac{12}{100}\right]^T$$

$$= 56000\left[1+\frac{3}{100}\right]^6$$

$$= 56000\left[\frac{103}{100}\right]^6$$

$$= 56000\times\frac{103}{100}\times\frac{103}{100}\times\frac{103}{100}\times\frac{103}{100}\times\frac{103}{100}\times\frac{103}{100}$$

$A = ₹\ 66866.93$

$\text{C.I} = A - P$

$= 66866.93 - 56000$

$= ₹\ 10866.93$

So, profit of Rishi in this transaction

$= ₹\ 10866.93 - 10696.90$

$= ₹\ 170.03$ **Ans**

Exercise-7C

1. A printing machine worth ₹ 50,000, is depreciated at the rate of 10% per annum. Find its value after 2 years.

$P = ₹\ 50000,\ R = 10\%$ p.a., $T = 2$ years

Value is depreciating

So, $$A = P\left[P - \frac{R}{100}\right]^T$$

$$A = 50000\left[1 - \frac{10}{100}\right]^2$$

$$= 50000\left[\frac{90}{100}\right]^2$$

$$= 50000\times\frac{90}{100}\times\frac{90}{100}$$

$= ₹\ 41500$

So, values of machine after 2 years = ₹ 41500

2. Find the population of a city after 2 years, if its present population is 15 lakh and growth rate is 2.5% per annum.

$T = 2$ years, $P = 1500000,\ R = 2.5\%$ p.a.

$$A = P\left[1 + \frac{2.5}{100}\right]^2$$

$$= 1500000\left[\frac{102.5}{100}\right]^2$$

$$= 1500000\times\frac{102.5\times102.5}{100\times100}$$

$= 1575937$ **Ans**

3. The population of a city was 20 lakh in the year 2001. It was increased at the rate of 4% per annum. Find the population at the end of 2005.

$P = 2000000,\ R = 4\%$ p.a., $T = 4$ years

$$A = P\left[1 + \frac{R}{100}\right]^T$$

$$= 2000000\left[1 + \frac{4}{1000}\right]^4$$

$$= 2000000\left[\frac{104}{100}\right]^4$$

$$= 2000000\times\frac{104}{100}\times\frac{104}{100}\times\frac{104}{100}\times\frac{104}{100}$$

$A = 2339717$ **Ans**

4. The count of virus in a certain material is decreasing at the rate of 4.5% per day. Find the count of virus at the end of fourth day, if the count was initially 1,85,000.

$P = 185000,\ R = 4.5\%$ per day, $T = 4$ days

Virus is decreasing

So, $$A = P\left[1 - \frac{R}{100}\right]^T$$

$$= 185000\left[1 - \frac{4.5}{100}\right]^4$$

$$= 185000\left[\frac{95.5}{100}\right]^4$$

$$= 185000\times\frac{95.5}{100}\times\frac{95.5}{100}\times\frac{95.5}{100}\times\frac{95.5}{100}$$

$= 153881$ **Ans**

5. The population of a town is 80000. If the population increases at the rate of 75 per thousand, find the population of this town after two years.

$P = 80000$

$R = 75$ p.a. thousand $= 7.5\%$

$T = 2$ years

$$A = P\left[1 + \frac{R}{100}\right]^T$$

$$= 80000\left[1 + \frac{7.5}{100}\right]^2$$

$$= 80000\left[\frac{107.5}{100}\right]^2$$

$$A = 80000\times\frac{107.5}{100}\times\frac{107.5}{100}$$

$= 92450$ **Ans**

6. A scooter was bought at ₹ 42000. It's value depreciated at the rate of 8% per annum, find its value after 1 year ?

$P = ₹\ 42000,\ R = 8\%\ \text{p.a.},\ T = 1\,\text{year}$

Value is depreciating

So, $A = P\left[1 - \frac{R}{100}\right]^T$

$= 42000 \times \left[1 - \frac{8}{100}\right]^1$

$= 42000 \times \frac{92}{100}$

$= ₹\ 38640$ **Ans**

So, the value of scooter after 1 year = ₹ 38640.

7. The value of machine depreciates by 10% annually, if the present value of the value is 100000 what will be its value after two years ?

$R = 10\%$ p.a., $P = 100000, T = 2\,\text{years}$

Value is depreciating

So, $A = P\left[1 - \frac{10}{100}\right]^T$

$A = 100000\left[1 - \frac{10}{100}\right]^2$

$= 100000\left[\frac{90}{100}\right]^2$

$= 100000 \times \frac{90}{100} \times \frac{90}{100}$

$= ₹\ 81000$ **Ans**

MCQs

1. (a) **2.** (c) **3.** (a) **4.** (c) **5.** (b)

6. (a)

CHAPTER-8 : DIRECT AND INDIRECT PROPORTIONS

Exercise-8A

1. If the cost of 18 pens is ₹ 423, find the cost of 25 such pens.

Pen	Cost (₹)
18 ↓	423 ↓
25	x

So, $\frac{x}{423} = \frac{25}{18}$

$x = \frac{25 \times 423}{18}$

$x = ₹\ 587.5$

So, the cost of 25 pens will be ₹ 587.50. **Ans**

2. A car travel 432 km in 48 *l* of petrol. How far would it travel in 28 *l* ?

Distance (km)	Petrol (l)
432 ↓	48 ↓
x	28

$\frac{x}{432} = \frac{28}{48}$

$x = \frac{28 \times 432}{48}$

$x = 252\,\text{km}$ **Ans**

3. If the cost of 24 kg sugar is ₹ 624, what is the cost of 19 kg sugar ?

Sugar (kg)	Cost (₹)
24 ↓	624 ↓
19	x

$\frac{x}{624} = \frac{19}{24}$

$x = \frac{19 \times 624}{24}$

$x = ₹\ 494$ **Ans**

4. If the cost of 9 kg rice is ₹ 166.50, how much rice can be bought for ₹ 425.50 ?

Rice (kg)	Cost (₹)
9 ↓	166.50 ↓
x	425.50

$\frac{x}{9} = \frac{425.50}{166.50}$

$x = \frac{42550 \times 9}{16650}$

$x = 23\,\text{kg}$ **Ans**

5. A piece of furniture costs ₹ 1250.50. How much would 13 pieces of furniture cost ?

Piece of furniture	Cost (₹)
1 ↓	1250.60 ↓
13	x

$$\frac{x}{1250.50} = \frac{13}{1}$$

$$x = \frac{13 \times 1250.50}{1}$$

$x = ₹\ 16256.50$ kg **Ans**

6. If 30 stamps of equal value cost ₹ 150.00. How many stamps of the same value can be bought for ₹ 200.00 ?

Stamps (kg)	Cost (₹)
30 ↓	₹ 150.00 ↓
x	₹ 200.00

$$\frac{x}{30} = \frac{200}{150}$$

$$x = \frac{200 \times 30}{150}$$

$x = 40$ **Ans**

7. At a party, 6 bottles of juice are served for every batch of 14 children. How many bottles would be served if 56 children are present at the party ?

bottles	Children
6 ↓	14 ↓
x	56

$$\frac{x}{6} = \frac{56}{14}$$

$$x = \frac{56 \times 6}{14}$$

$x = 24$ **Ans**

8. 5 teachers can correct 500 examination papers in 1 week. How many teachers would be employed to correct 1500 papers in the same time ?

Teachers	Papers
5 ↓	500 ↓
x	1500

$$\frac{x}{5} = \frac{1500}{500}$$

$$x = \frac{1500 \times 5}{500}$$

$x = 15$ teachers **Ans**

9. The length of the shadow of a 100 m high building is 72 m at a particular time. Find the length of a tower whose shadow is 18 m long at the same time.

Shadow (m)	Actual length (m)
72 ↓	100 ↓
18	x

$$\frac{x}{100} = \frac{18}{72}$$

$$x = \frac{18 \times 100}{72}$$

$x = 25$ m **Ans**

10. A man covers a distance of 50 m in 40 steps. How many steps will be required to cover a distance of 315 m.

distance cover (m)	steps
50 ↓	40 ↓
315	x

$$\frac{x}{40} = \frac{315}{50}$$

$$x = \frac{315}{50} \times 40$$

$x = 252$ steps **Ans**

11. If 30 men can dig 18 acres of a plot in one day, how many men will dig 30 acres in one day ?

Men	acres
30 ↓	18 ↓
x	30

$$\frac{x}{30} = \frac{30}{18}$$

$$x = \frac{30 \times 30}{18}$$

$x = 50$ **Ans**

12. A hospital supports 73 patients at an average monthly cost of ₹ 58,400. What is the amount to be spent if the number of patients are increased by 37 ?

Patients	Monthly Cost (₹)
73 ↓	58,400 ↓
110	x

$$\frac{x}{58400} = \frac{110}{73}$$

$$x = \frac{58400 \times 110}{73}$$

$x = ₹\ 88000$ **Ans**

Exercise-8B

1. 14 men can dig a canal in 48 days. How many men can dig the same canal in 21 days ?

Men	days
14 ↓	48 ↑
x	21

$$\frac{x}{14} = \frac{48}{21}$$

$$x = \frac{14 \times 48}{21}$$

$x = 32$ mens **Ans**

2. If 42 men reap a field in 16 days. In how many days can 56 men reap the same field ?

Men	days
42 ↑	16 ↓
56	x

$$\frac{x}{16}=\frac{42}{56}$$

$$x=\frac{42\times 16}{56}$$

$$x=12\,\text{days}$$ **Ans**

3. 24 men can make a wall in 9 days. In how many days can 27 men make the same wall ?

Men	days
24 ↑	9 ↓
27	x

$$\frac{x}{9}=\frac{24}{27}$$

$$x=\frac{24\times 9}{27}$$

$$x=8\,\text{days}$$ **Ans**

4. 18 horses can graze a field in 32 days. How many horses can graze the same field in 36 days ?

horses	days
18 ↓	32 ↑
x	36

$$\frac{x}{18}=\frac{32}{36}$$

$$x=\frac{32\times 18}{36}$$

$$x=16\,\text{horses}$$ **Ans**

5. A school has 8 periods a day each of 50 minutes duration. How long would each period be, if the school has 10 periods a day, assuming the working hours of the school is same ?

Period	duration (min)
8 ↑	50 ↓
10	x

$$\frac{x}{50}=\frac{8}{10}$$

$$x=\frac{8\times 50}{10}$$

$$x=40\ \text{min.}$$ **Ans**

6. A stock of food is enough for 120 soldiers for 24 days. A reinforcement of 40 soldiers is joined to this camp, how long would the same stock last ?

Soldiers	days
120 ↑	24 ↓
160	x

$$\frac{x}{24}=\frac{120}{160}$$

$$x=\frac{120\times 24}{160}$$

$$x=18\ \text{days}$$ **Ans**

7. A stock of food is enough for 80 soldiers for 60 days. How long would the same stock last for 120 soldiers ?

Soldiers	days
80 ↑	60 ↓
120	x

$$\frac{x}{60}=\frac{80}{120}$$

$$x=\frac{80\times 60}{120}$$

$$x=40\ \text{days}$$ **Ans**

8. A contractor takes a contract to make a road in 48 days, he uses 60 workers to do this job. If he wants that work would be completed in 36 days then, how many more workers are required ?

workers	days
60 ↓	48 ↑
x	36

$$\frac{x}{60}=\frac{48}{36}$$

$$x=\frac{48\times 60}{36}$$

$$x=80\ \text{days}$$

So, $80-60=20$ workers more required to complete a road in 36 days. **Ans**

9. If 12 men can dig a pond in 8 days. How many men can dig it in 6 days ?

Men	days
12 ↓	8 ↑
x	6

$$\frac{x}{12}=\frac{8}{6}$$

$$x=\frac{8\times 12}{6}$$

$$x=16\,\text{men}$$ **Ans**

10. Rahul runs at a speed of 35 km per hour and completed a race in 16 minutes. If Sohan's speed is 32 km per hour, in how much time will he complete the race ?

Speed (km/hr)		Time (min)	
35	↑	16	↓
32		x	

$$\frac{x}{16}=\frac{35}{32}$$

$$x=\frac{35\times 16}{32}$$

$$x=17.5\,\text{minute}$$ **Ans**

MCQs

1. (a) **2.** (a) **3.** (b) **4.** (c) **5.** (b)

6. (c)

CHAPTER 9 : TIME, WORK AND DISTANCE

Exercise-9A

1. A can do a piece of work in 18 days and *B* can do same work in 24 days. In how many days can they complete it, if they do it together ?

A can do a work = 18 days

A's one day's work $=\frac{1}{18}$

B can do same work in 24 days

B's one day's work $=\frac{1}{24}$

Both's one days work $=\frac{1}{18}+\frac{1}{24}$

$$=\frac{4+3}{72}=\frac{7}{72}$$

So, They both can do it together in $\frac{72}{7}$ days

$$=10\frac{2}{7}\text{ days}$$

2. If *A, B* and *C* can do a piece of work in 9 days, working together. If *B* can do it alone in 21 days and *C* can do it alone it 18 days. In how many days can *A* complete the same work alone ?

A, B and C can do a work in 9 days

A, B, C is 1 day's work $=\frac{1}{9}$

B can do it alone in 21 days

B's 1 day's work $=\frac{1}{21}$

C can do it alone in 18 days

C's 1 day's work $=\frac{1}{18}$

So A's one days work $=\frac{1}{9}-\frac{1}{21}-\frac{1}{18}$

$$=\frac{14-6-7}{126}=\frac{1}{126}$$

So, A can do same work alone in 126 days.

3. Rekha and Meeta can weave a sweater in 12 days, Meeta and Payal in 15 days, Payal and Rekha in 20 days. In how many days will they weave it, if they weave together ? In how many days will each of them weave, if they weave it alone ?

Rekha and Meeta can weave a sweater in 12 day

Rekha and Meeta is one day's work $=\frac{1}{12}$

Meeta and Payal can weave it in 15 days

Meeta and Payal's one day's work $=\frac{1}{15}$

Payal and Rekha can weave it in 20 days

Payal and Rekha's one day's work $=\frac{1}{20}$

Rekha, Meeta and Payal's one day's work

$$=\frac{1}{12}+\frac{1}{15}+\frac{1}{20}$$

$$=\frac{1}{2}\left[\frac{5+4+3}{60}\right]$$

$$=\frac{1}{2}\times\left[\frac{12}{60}\right]=\frac{1}{10}$$

So, they will do it in only 10 days

Now, Rekha's one day's work $=\frac{1}{10}-\frac{1}{15}$

$$=\frac{3-2}{30}=\frac{1}{30}$$

So, Rekha can do it only in 30 days

Meeta's one day's work $=\frac{1}{10}-\frac{1}{20}$

$$=\frac{2-1}{20}=\frac{1}{20}$$

So, Meeta can do it only in 20 days

Payal's one day's work $=\frac{1}{10}-\frac{1}{12}$

$$=\frac{6-5}{60}=\frac{1}{60}$$

So Payal can do it only in 60 days **Ans**

4. Suresh can do a work in 30 days and his brother Manoj can finish it in 25 days. They work together for 6 days, then Suresh leaves the work due to accident. In how many days will Manoj finish the remaining work?

Suresh can do a work in 30 days

Suresh's one day's work $= \frac{1}{30}$

Manoj can do this work in 25 days

Manoj's one day work $= \frac{1}{25}$

Both's one day's work $= \frac{1}{30} + \frac{1}{25}$

$= \frac{5+6}{150} = \frac{11}{150}$

So, They both can do it only in $\frac{150}{11}$ days

They work together for 6 days

Their 6 days work $= \frac{11}{150} \times 6 = \frac{11}{25}$

Remaining work $= 1 - \frac{11}{25}$

$= \frac{25-11}{25} = \frac{14}{25}$

After 6 days work. Suresh leaves the work due to accident. So, left work Mohan will do.

Mohan will do one work in = 25 days

Mohan will do $\frac{14}{25}$ work in $= \frac{14}{25} \times 25$

$= 14$ days **Ans**

5. A tap can fill a tank in 8 hours. Due to leakage in the bottom of tank, the tank fills up in 10 hours. If the tank is full, in how many hours will it be empty due to leakage ?

A tap can fill a tank in 8 hours

It will fill in 1 hour $= \frac{1}{8}$

Let leakage can empty tank in x hours

So, leakage in 1 hour $= \frac{1}{x}$

But with leakage tap can fill tank in 10 hour

It will fill in 1 hour with leakage $= \frac{1}{10}$

So, $\frac{1}{8} - \frac{1}{x} = \frac{1}{10}$

or $\frac{1}{8} - \frac{1}{10} = \frac{1}{x}$

or $\frac{5-4}{40} = \frac{1}{x}$

$\frac{1}{40} = \frac{1}{x}$

or $x = 40$

So, due to leakage it will be empty in 40 hours.

6. A and B separately can do a piece of work in 8 days and 12 days respectively. How much time will they take together to do the same work ?

A can do a work = 8 days

A's one day's work $= \frac{1}{8}$

B can do a work = 12 days

B's one day's work $= \frac{1}{12}$

Both's one day's work $= \frac{1}{8} + \frac{1}{12}$

$= \frac{3+2}{24} = \frac{5}{24}$

So, they both can do this work together in $\frac{24}{5}$ days

or $4\frac{4}{5}$ days

7. 15 men dig 7.5 long trench in one day. How many men should be employed for digging 1.5 m long trench ?

Men		trench (long)	
15	↓	7.5	↓
x		1.5	

$\frac{x}{15} = \frac{1.5}{7.5}$

$x = \frac{15 \times 15}{25}$

$x = 3$ Men **Ans**

8. Tap A can fill a tank in 8 minutes. outlet B can empty the tank in 12 minutes, If both are kept open, how long will it take to fill the tank ?

A can fill a tank in 8 minutes

A can fill in one minute $= \frac{1}{8}$

Outlet B can empty the tank in 12 minutes

B can empty it in one minute $= \frac{1}{12}$

Now, They both are opened then they will fill tank in one minute $= \frac{1}{8} - \frac{1}{12}$

$$= \frac{3-2}{24} = \frac{1}{24}$$

So, It will take 24 minute to fill it, If the both taps are opened. **Ans**

9. A and B can finish a piece of work in 6 days and 4 days respectively. A started work and worked for 2 days. He was then joined by B, find the time taken to finish the work ?

A can finish a piece of work in 6 days

A is one day's work $= \frac{1}{6}$

B can do a piece of work in 4 days

B's one day's work $= \frac{1}{4}$

Now, A's two days work $= \frac{1}{6} \times 2 = \frac{1}{3}$

$$\text{Left work} = 1 - \frac{1}{3} = \frac{2}{3}$$

A and B both's one day work $= \frac{1}{6} + \frac{1}{4}$

$$= \frac{4+6}{24}$$

$$= \frac{10}{24} = \frac{5}{12}$$

So they both can do it in $\frac{12}{5}$ days.

They both can do 1 work in $= \frac{12}{5}$ days

They both can do $\frac{2}{3}$ work in $= \frac{12}{5} \times \frac{2}{3}$ days

$$= \frac{8}{5} \text{ days}$$

$$= 1\frac{3}{5} \text{ days}$$ **Ans**

10. A and B working together can complete a Job in 3 hours, if A alone can do the Job in $7\frac{1}{2}$ hours, in how much time can B alone finish the Job ?

A and B together can complete a work in 3 hours

$$\text{Their one hour's work} = \frac{1}{3}$$

A can do this work in $7\frac{1}{2}$ hours or $= \frac{15}{2}$ hours

$$\text{A's one hour's work} = \frac{2}{15}$$

So B's one hour's work $= \frac{1}{3} - \frac{2}{15}$

$$= \frac{5-2}{15}$$

$$= \frac{3}{15} = \frac{1}{5}$$

So, B alone can finish it in 5 hours. **Ans**

Exercise-9B

1. Convert each of the following speed into m/s :

(a) 36 km/hr

$$= 36 \times \frac{5}{18} \text{ m/sec}$$

$$= 10 \text{ m/sec}$$ **Ans**

(b) 65 km/hr

$$= 65 \times \frac{5}{18} \text{ m/sec}$$

$$= \frac{325}{18} \text{ m/sec}$$

$$= 18\frac{1}{18} \text{ m/sec}$$ **Ans**

(c) 120 km/hr

$$= 120 \times \frac{5}{18} \text{ sec}$$

$$= \frac{100}{3} \text{ m/sec}$$

$$= 33\frac{1}{3} \text{ m/sec}$$ **Ans**

(d) 108 km/hr

$$= 108 \times \frac{5}{18} \text{ m/sec}$$

$$= 30 \text{ m/sec}$$ **Ans**

2. Convert each of the following speed into km/hr :

(a) 15 m/s

$$= 15 \times \frac{18}{5} \text{ km/hr}$$

$$= 54 \text{ km/hr}$$ **Ans**

(b) 85 m/s

$$= 85 \times \frac{18}{5} \text{ km/hr}$$

$$= 306 \text{ km/hr}$$ **Ans**

(c) 40 m/s

$$= 40 \times \frac{18}{5} \text{ km/hr}$$

$$= 144 \text{ km/hr}$$ **Ans**

(d) 105 m/s

$$= 105 \times \frac{18}{5} \text{ km/hr}$$

$$= 378 \text{ km/hr}$$ **Ans**

3. A car is running at the speed of 72 km/hr. How much distance will it cover in 22 minutes ?

$$\text{Speed of car} = 72 \text{ km/hr}$$

$$= 72 \times \frac{5}{18} \text{ m/sec}$$

$$= 20 \text{ m/sec}$$

$$\text{Time} = 22 \text{ minute}$$

$$= 22 \times 60 \text{ sec}$$

$$= 1320 \text{ sec}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$= 20 \times 1320 \text{ m}$$

$$= 26400 \text{ m}$$

or $= 26.4$ km **Ans**

4. A train is moving at a uniform speed of 80 km/hr. How much time will it take to travel 140 km ?

$$\text{Speed} = 80 \text{ km/hr}$$

$$\text{Distance} = 140 \text{km/hr}$$

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$= \frac{140}{80} \text{ hour}$$

$$= \frac{14 \times 60}{8} \text{ min}$$

$$= 105 \text{ minute}$$

or 1 hour 45 minute **Ans**

5. Vibhor is going on bicycle at a speed of 15 km/hr. How much distance will he cover in 25 minutes ?

$$\text{Speed of Vibhor} = 15 \text{ km/hr}$$

$$= 15 \times \frac{5}{18} \text{ m/sec}$$

$$= \frac{25}{6} \text{ m/sec}$$

$$\text{Time} = 25 \text{ minute}$$

$$= 25 \times 60 \text{ sec}$$

$$= 1500 \text{ sec}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$= \frac{25}{6} \times 1500 \text{ metre}$$

$$= 6250 \text{ metre}$$

$$= 6.25 \text{ m/sec}$$ **Ans**

6. The speed of the train 125 m long is 45 km per hour. How much time will it take to pass a platform 625 m long ?

$$\text{Speed of train} = 45 \text{ km/hr}$$

$$= 45 \times \frac{5}{18} \text{ m/sec}$$

$$= 12.5 \text{ m/sec}$$

Total distance, which train has to be covered to pass a platform = length of platform + length of train

$$= 625 \text{ m} + 125 \text{ m}$$

$$= 750 \text{ m}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{750}{12.5} = 60 \text{ see} = 1 \text{ min}$$ **Ans**

7. A train 150 m long is running at a speed of 50 km/hr. How long will it take to cross a telegraph post.

$$\text{Distance} = \text{length of train} = 150 \text{ m}$$

$$\text{Speed} = 50 \text{ km/hr}$$

$$= \frac{50 \times 5}{18} \text{ m/sec}$$

$$= \frac{250}{18}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{150 \times 18}{250} = \frac{54}{5} \text{ sec}$$

$$= 10.8 \text{ sec}$$ **Ans**

8. Two trains 350 m and 250 m long are going at 42 km/hr and 30 km per hour respectively in opposite direction. How long would it take them to pass each other ?

(2) 30 km/hr ← 250 → (1) 42 km/hr

350

They both are going in opposite direction.

So, their combined speed = 30 km/hr + 42 km/hr

$$= 72 \text{ km/hr}$$

$$= \frac{72 \times 5}{18}$$

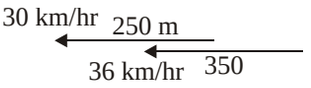
$$= 20 \text{ m/sec}$$

Total distance = 350 m + 250 m = 600 m

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$= \frac{600}{20} = 30 \text{ sec}$$ **Ans**

9. Two trains 250 m and 350 m long are going in the same direction at 30 per hour and 36 per hour respectively. The longer train is behind the shorter train. How long would it take to pass each other ?



Both train are going in same direction

So their speed $= 36 - 30 = 6\,\text{km}$

$$= 6 \times \frac{5}{18}$$

$$= \frac{5}{3}\,\text{m/sec}$$

Total distance $= 350 + 250 = 600\,\text{m}$

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$= \frac{600 \times 3}{5}$$

$$= 360\,\text{sec} = 6\,\text{minute}$$ **Ans**

CHAPTER 10 : ALGEBRAIC EXPRESSION

Exercise-10A

1. Multiply :

(a) $5x^2y$ **and** $8y^2x^3$

$$= 5x^2y \times 8y^2x^3$$

$$= 40x^5y^3$$ **Ans**

(b) $-7a^2b^3$ **and** a^3b^4

$$= -7a^2b^3 \times a^3b^4$$

$$= -7a^5b^7$$ **Ans**

(c) $\frac{20}{7}abc$ **and** $\frac{7}{8}a^3b^2c^5$

$$= \frac{20}{7}abc \times \frac{7}{8}a^3b^2c^5$$

$$= \frac{20}{7} \times \frac{7}{8}a^4b^3c^6$$

$$= \frac{5}{2}a^4b^3c^6$$ **Ans**

(d) $\frac{-4}{5}a^3b$ **and** $\frac{5}{8}a^2c$

$$= \frac{-4}{5} \times \frac{5}{8}a^5bc$$

$$= \frac{-1}{2}a^5bc$$ **Ans**

(e) $-4x^2y$, $5xy^2$ **and** $6x^2yz$

$$= -4x^2y \times 5xy^2 \times 6x^2yz$$

$$= -4 \times 5 \times 6 \times x^5y^4z$$

$$= -120x^5y^4z$$ **Ans**

(f) $3xyz$, $-2x^3y^3z^4$ **and** $7x^5y^5z^6$

$$= 3xyz \times -2x^3y^3z^4 \times 7x^5y^5z^6$$

$$= 3 \times -2 \times 7 \times x^9y^9z^{11}$$

$$= -42x^9y^9z^{11}$$ **Ans**

2. Find the product of the following and find the values for $x = 1$, $y = -2$, $z = -1$, $a = 3$, $b = 4$, $c = -1$:

(a) $(-3x^2y) \times (4y^2z)$

$$= -3 \times 4 \times x^2y^3z$$

$$= -12x^2y^3z$$

$$= -12 \times (1)^2 \times (-2)^3 \times (-1)$$

$$= -12 \times 1 \times 1 \times -2 \times -2 \times -2 \times -1$$

$$= -96$$ **Ans**

(b) $(-7ab^2c) \times (3a^2bc^2)$

$$= -7 \times 3 \times a^3 \times b^3 \times c^3$$

$$= -21a^3b^3c^3$$

$$= -21 \times (3)^3 \times (4)^3 \times (-1)^3$$

$$= -21 \times 3 \times 3 \times 3 \times 4 \times 4 \times 4 \times -1 \times -1 \times -1$$

$$= 36288$$ **Ans**

(c) $\left(\frac{-7}{5}a^2b\right) \times (5ab^2)$

$$= \frac{-7}{5} \times 5 \times a^3 \times b^3$$

$$= -7a^3b^3$$

$$= -7 \times (3)^3 \times (4)^3$$

$$= -7 \times 3 \times 3 \times 3 \times 4 \times 4 \times 4$$

$$= -12096$$ **Ans**

(d) $\frac{9}{7}y^2z^3 \times \frac{-14}{27}xy^3b$

$$= \frac{9}{7} \times \frac{-14}{27} \times xy^5z^3b$$

$$= \frac{-2}{3} \times xy^5z^3b$$

$$= \frac{-2}{3} \times 1 \times (-2)^5 \times (-1)^3 \times 4$$

$$= \frac{-2}{3} \times 1 \times -2 \times -2 \times -2 \times -2 \times -2 \times -1 \times -1 \times -1 \times 4$$

$$= \frac{-256}{3}$$ **Ans**

(e) $\left(\frac{-3}{14}xy^3\right) \times \left(\frac{7}{6}yb^2\right)$

$$= \frac{-3}{14} \times \frac{7}{6} \times xy^4b^2$$

$$= \frac{-1}{4} \times xy^4b^2$$

$$= \frac{-1}{4} \times 1 \times (-2)^4 \times (4)^2$$

$$= \frac{-1}{4} \times 1 \times -2 \times -2 \times -2 \times -2 \times 4 \times 4$$

$$= -64$$ **Ans**

(f) $\left(\frac{-5}{7}\right) \times \left(\frac{3}{2}x^2y\right) \times \left(\frac{-14}{5}y\right)$

$$= \frac{-5}{7} \times \frac{3}{2} \times \frac{-14}{5} \times x^2y^2$$

$$= 3x^2y^2$$

$$= 3 \times (1)^2 \times (-2)^2$$

$$= 3 \times 1 \times 1 \times -2 \times -2$$

$$= 12$$ **Ans**

3. Find the product:

(a) $3a^2b \times (-7a^3b^2c^3) \times (-4b^3c^2)$

$$= 3 \times -7 \times -4 \times a^2 \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c^2$$

$$= 84a^5b^6c^5$$ **Ans**

(b) $(-4x^2y) \times (5xy^2z^3) \times (6y^3z^4)$

$$= -4 \times 5 \times 6 \times x^2 \times x \times y \times y^2 \times y^3 \times z^3 \times z^4$$

$$= -120x^3y^6z^7$$ **Ans**

(c) $\left(\frac{4}{3}x^3yz\right) \times \left(\frac{1}{3}y^2z\right) \times (-9xyz^3)$

$$= \frac{4}{3} \times \frac{1}{3} \times -9 \times x^3 \times x \times y \times y^2 \times y \times z \times z \times z^3$$

$$= -4x^4y^4z^5$$ **Ans**

(d) $\left(\frac{-6}{7}t^2uv\right) \times (3ut^3v) \times \left(\frac{-14}{15}v^2\right)$

$$= \frac{-6}{7} \times 3 \times \frac{-14}{15} \times t^2 \times t^3 \times u \times u \times v \times v \times v^2$$

$$= \frac{12}{5}t^5u^2v^4$$ **Ans**

(e) $\left(\frac{15}{7}st^2w\right) \times \left(\frac{-4}{5}t^3w^2\right) \times \left(\frac{14}{3}s^3w^2\right)$

$$= \frac{15}{7} \times \frac{-4}{5} \times \frac{14}{3} \times s \times s^3 \times t^2 \times t^3 \times w \times w^2 \times w^2$$

$$= -8s^4t^5w^5$$ **Ans**

(f) $\left(\frac{1}{5}a^2b\right) \times \left(\frac{-3}{8}b^3c^2\right) \times \left(\frac{16}{9}a^3b^4\right)$

$$= \frac{1}{5} \times \frac{-3}{8} \times \frac{16}{9} \times a^2 \times a^3 \times b \times b^3 \times b^4 \times c^2$$

$$= \frac{-2}{15}a^5b^8c^2$$ **Ans**

4. Verify : $(25xyz)\left(\frac{1}{5}xyz\right)^2 = x^3y^3z^3$, for $x = 2$, $y = 1$, $z = 2$.

$$(25xyz)\left(\frac{1}{5}xyz\right)^2 = x^3y^3z^3$$

$$(25 \times 2 \times 1 \times 2) \times \left(\frac{1}{5} \times 2 \times 1 \times 2\right)^2 = (2)^3 \times (1)^3 \times (2)^3$$

$$(100) \times \left(\frac{4}{5}\right)^2 = 8 \times 1 \times 8$$

$$100 \times \frac{16}{25} = 64$$

$$4 \times 16 = 64$$

$$64 = 64$$

L.H.S = R.H.S

5. Multiply $\frac{1}{8}x^2y^2z$, $\frac{2}{3}xyz$ and $-6yz$ and verify the result for $x = 2$, $y = 3$ and $z = 2$.

$$= \frac{1}{8}x^2y^2z \times \frac{2}{3}xyz \times -6yz$$

$$= \frac{-1}{8} \times x^3y^4z^3$$

$$= \frac{-1}{2} \times (2)^3 \times (3)^4 \times (2)^3$$

$$= \frac{-1}{2} \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 2 \times 2 \times 2$$

$$= -2592$$ **Ans**

6. Find the value of $7x^5 \times \left(\frac{-1}{21}xy^2\right) \times 3xyz^2$ when $x = 1, y = 2$ and $z = 3$.

$$= 7x^5 \times \left(\frac{-1}{21}xy^2\right) \times 3xyz^2$$

$$= 7 \times \frac{-1}{21} \times 3 \times x^5 \times x \times x \times y^2 \times y \times z^2$$

$$= -1x^7 y^3 z^2$$

$$= -1 \times 1 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$= -72$$ **Ans**

7. Find the value of $2m^2n^2 \times 7m^2$, when $m = \frac{-1}{2}$ and $n = 4$.

$$= 2m^2n^2 \times 7m^2$$

$$= 14m^4n^2$$

$$= 14 \times \left(\frac{-1}{2}\right)^4 \times (4)^2$$

$$= 14 \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times 4 \times 4$$

$$= 14$$ **Ans**

Exercise-10B

Find the product :

1. $8x^3 \times (5x - 6y^2)$

$$= 8x^3 \times 5x - 8x^3 \times 6y^2$$

$$= 40x^4 - 48x^3y^2$$ **Ans**

2. $x^2(x^2y + y^2x)$

$$= x^2 \times x^2y + x^2 \times y^2x$$

$$= x^4y + x^3y^2$$ **Ans**

3. $-6y \times (2xy + 3y^2)$

$$= -6y \times 2xy - 6y \times 3y^2$$

$$= -12xy^2 - 18y^3$$ **Ans**

4. $\frac{1}{3}xy \times (4x - 9y)$

$$= \frac{1}{3}xy \times 4x - \frac{1}{3}xy \times 9y$$

$$= \frac{4}{3}x^2y - 3xy^2$$ **Ans**

5. $\frac{1}{8}xy \times \left(\frac{1}{10}x^2y^2 - \frac{4}{5}y\right)$

$$= \frac{1}{8}xy \times \frac{1}{10}x^2y^2 - \frac{1}{8}xy \times \frac{4}{5}y$$

$$= \frac{1}{80}x^3y^3 - \frac{1}{10}xy^2$$ **Ans**

6. $\frac{7}{5}a(a^3 + b^3)$

$$= \frac{7}{5}a \times a^3 + \frac{7}{5}a \times b^3$$

$$= \frac{7}{5}a^4 + \frac{7}{5}ab^3$$ **Ans**

7. $-\frac{7}{4}x^2\left(\frac{2}{7}x^2 + 4y^2\right)$

$$= \frac{-7}{4}x^2 \times \frac{2}{7}x^2 - \frac{7}{4}x^2 \times 4y^2$$

$$= \frac{-1}{2}x^4 - 7x^2y^2$$ **Ans**

8. $\frac{1}{10}x\left(\frac{3}{5}x^2 - \frac{1}{4}y^2\right)$

$$= \frac{1}{10}x \times \frac{3}{5}x^2 - \frac{1}{10} \times \frac{1}{4}y^2$$

$$= \frac{3}{50}x^3 - \frac{1}{40}y^2$$ **Ans**

Simplify :

9. $xy(y^2 - 3x) - 4(x^2y + 6z) + 2y^2(x - 4)$

$$= xy \times y^2 - xy \times 3x - 4x^2y - 4 \times 6z + 2y^2 \times x - 2y^2 \times 4$$

$$= xy^3 - 3x^2y - 4x^2y - 24z + 2xy^2 - 8y^2$$

$$= xy^3 - 7x^2y - 243 + 2xy^2 - 8y^2$$

$$= xy^3 - 8y^2 + 2xy^2 - 7x^2y - 24z$$ **Ans**

10. $x^2(2 - 4y^2) + x(xy^2 - 3x) - 3y(y - 4x^2y)$

$$= x^2 \times 2 - x^2 \times 4y^2 + x \times xy^2 - x \times 3x - 3y \times y + 3y \times 4x^2y$$

$$= 2x^2 - 4x^2y^2 + x^2y^2 - 3x^2 - 3y^2 + 12x^2y^2$$

$$= 2x^2 - 3x^2 - 3y^2 - 4x^2y^2 + x^2y^2 + 12x^2y^2 - x^2 - 3y^2 + 9x^2y^2$$ **Ans**

11. $a(b - c) - b(c - a) - c(a - b)$

$$= ab - ac - bc + ab - ac + bc$$

$$= ab + ab - ac - ac - bc + bc$$

$$= 2ab - 2ac$$ **Ans**

12. $4t(s - 4t) + s(3t - s) + 7t^2 + 4$

$$= 4st - 16t^2 + 3st - s^2 + 7t^2 + 4$$

$$= -16t^2 + 7t^2 - s^2 + 4st + 3st + 4$$

$$= -9t^2 - s^2 + 7st + 4$$ **Ans**

13. $\frac{2}{7}t\,(t-16)-3t\left(\frac{5}{9}t-1\right)-\frac{1}{7}(3-4t^2)$

$$=\frac{2}{7}t^2-\frac{32}{7}t-\frac{5}{3}t^2+3t-\frac{3}{7}+\frac{4}{7}t^2$$

$$=\frac{2}{7}t^2-\frac{5}{3}t^2+\frac{4}{7}t^2-\frac{32}{7}t+3t-\frac{3}{7}$$

$$=\frac{6t^2-35t^2+12t^2}{21}+\left(\frac{-32t+21t}{7}\right)-\frac{3}{7}$$

$$=\frac{-17t^2}{21}-\frac{11t}{7}-\frac{3}{7}$$ **Ans**

14. Find the product : $9x^2y\times(x+5y)$ and find its value of $x=2$ and $y=-3$.

$9x^2y\times(x+5y)$

$$=9x^2y\times x+9x^2y\times 5y$$

$$=9x^3y+45x^2y^2$$

Putting $x=2,\ y=-3$

$$=9\times(2)^3\times(-3)+45\times(2)^2\times(-3)^2$$

$$=9\times2\times2\times2\times-3+45\times2\times2\times3\times3$$

$$=-216+1620$$

$$=1404$$ **Ans**

15. Find the product $7xy(4xy+12y^2)$ and find its value for $x=-2$ and $y=2.5$

$7xy(4xy+12y^2)$

$$=7xy\times4xy+7xy\times12y^2$$

$$=28x^2y^2+84xy^3$$

Putting $x=2$ and $y=2.5$

$$=28\times-2\times-2\times2.5\times2.5$$
$$+84\times(-2)\times2.5\times2.5\times2.5$$

$$=700-2625$$

$$=-1925$$ **Ans**

Exercise

Multiply :

1. $(2x-y)$ by $(3x-5y)$

$$=(2x-y)\times(3x-5y)$$
$$=2x(3x-5y)-y(3x-5y)$$
$$=6x^2-10xy-3xy+5y^2$$
$$=6x^3-13xy+5y^2$$ **Ans**

2. $(3a+2)$ by $(2a-5)$

$$=(3a+2)\times(2a-5)$$
$$=3a(2a-5)+2(2a-5)$$
$$=6a^2-15a+4a-10$$
$$=6a^2-11a-10$$ **Ans**

3. $(p+q)$ by $(p-q)$

$$=(p+q)\times(p-q)$$
$$=p(p-q)+q(p-q)$$
$$=p^2-pq+pq-q^2$$
$$=p^2-q^2$$ **Ans**

4. $\left(\frac{1}{2}x^2+y^2\right)$ by $\left(x^2-\frac{1}{2}y^2\right)$

$$=\left(\frac{1}{2}x^2+y^2\right)\times\left(x^2-\frac{1}{2}y^2\right)$$

$$=\frac{1}{2}x^2\left(x^2-\frac{1}{2}y^2\right)+y^2\left(x^2-\frac{1}{2}y^2\right)$$

$$=\frac{x^4}{2}-\frac{x^2y^2}{4}+x^2y^2-\frac{1}{2}y^4$$

$$=\frac{x^4}{2}+\frac{3x^2y^2}{4}-\frac{1}{2}y^4$$ **Ans**

5. $(2x^2-5y^2)$ by (x^2+3y^2)

$$=(2x^2-5y^2)\times(x^2+3y^2)$$
$$=2x^2(x^2+3y^2)-5y^2(x^2+3y^2)$$
$$=2x^4+6x^2y^2-5x^2y^2-15y^4$$
$$=2x^4+x^2y^2-15y^4$$ **Ans**

6. $(4x-3y)$ by $(3x^2+4y^2)$

$$=(4x-3y)\times(3x^2+4y^2)$$
$$=4x(3x^2+4y^2)-3y(3x^2+4y^2)$$
$$=12x^3+16xy^2-9x^2y-12y^3$$ **Ans**

Find the product :

7. $\left(\frac{3}{4}x+\frac{4}{5}y\right)\left(\frac{4}{5}x-\frac{1}{7}y\right)$

$$=\frac{3}{4}x\left(\frac{4}{5}x-\frac{1}{7}y\right)+\frac{4}{5}y\left(\frac{4}{5}x-\frac{1}{7}y\right)$$

$$=\frac{3}{5}x^2-\frac{3}{28}xy+\frac{16}{25}xy-\frac{4}{35}y^2$$

$$=\frac{3}{5}x^2+\left(\frac{-75xy+448xy}{700}\right)-\frac{4}{35}y^2$$

$$=\frac{3}{5}x^2+\frac{373xy}{700}-\frac{4}{35}y^2$$ **Ans**

8. $\left(\frac{5}{2}x-\frac{1}{3}y\right)(x-3y)$

$$= \frac{5}{2}x(x-3y) - \frac{1}{3}y(x-3y)$$

$$= \frac{5x^2}{2} - \frac{15xy}{2} - \frac{1}{3}xy + y^2$$

$$= \frac{5x^2}{2} + \frac{-45xy - 2xy}{6} + y^2$$

$$= \frac{5x^2}{2} - \frac{47xy}{6} + y^2$$ **Ans**

9. $\left(x^4 + \frac{1}{x^4}\right)\left(x - \frac{1}{x}\right)$

$$= x^4\left(x - \frac{1}{x}\right) + \frac{1}{x^4}\left(x - \frac{1}{x}\right)$$

$$= x^5 - x^3 + \frac{1}{x^3} - \frac{1}{x^5}$$ **Ans**

10. $\left(\frac{3}{4}a + \frac{2}{3}b\right)(4a - 3b)$

$$= \frac{3}{4}a(4a-3b) + \frac{2}{3}b(4a-3b)$$

$$= 3a^2 - \frac{9ab}{4} + \frac{8ab}{3} - 3b^2$$

$$= 3a^2 + \left(\frac{-9ab + 16ab}{4}\right) - 2b^2$$

$$= 3a^2 + \frac{7ab}{4} - 2b^2$$ **Ans**

11. $\left(\frac{2}{5}x - \frac{1}{2}y\right)(10x - 8y)$

$$= \frac{2}{5}x(10x-8y) - \frac{1}{2}y(10x-8y)$$

$$= 4x^2 - \frac{16xy}{5} - 5xy + 4y^2$$

$$= 4x^2 + \left(\frac{-16xy - 25xy}{5}\right) + 4y^2$$

$$= 4x^2 - \frac{41xy}{5} + 4y^2$$ **Ans**

12. $\left(\frac{7}{4}a - \frac{3}{5}b\right)(5a + 4b)$

$$= \frac{7}{4}a(5a+4b) - \frac{3}{5}b(5a+4b)$$

$$= \frac{35a^2}{4} + 7ab - 3ab - \frac{12b^2}{5}$$

$$= \frac{35a^2}{4} + 4ab - \frac{12b^2}{5}$$ **Ans**

Find the product :

13. $(3x - 9)(3x^2 - 4x + 7)$

$$= 3x(3x^2 - 4x + 7) - 9(3x^2 - 4x + 7)$$

$$= 15x^3 - 12x^2 + 21x - 27x^2 + 36x - 63$$

$$= 15x^3 - 39x^2 + 57x - 63$$ **Ans**

14. $(4x - y)(3x + y - 4)$

$$= 4x(3x + y - 4) - y(3x + y - 4)$$

$$= 12x^2 + 4xy - 16x - 3xy - y^2 - 4y$$

$$= 12x^2 + xy - 16x - 4y - y^2$$ **Ans**

15. $(4a + 3b)(a^2 - ab + b^2)$

$$= 4a(a^2 - ab + b^2) + 3b(a^2 - ab + b^2)$$

$$= 4a^3 - 4a^2b + 4ab^2 + 3a^2b - 3ab^2 + 3b^3$$

$$= 4a^3 - a^2b + ab^2 + 3b^3$$ **Ans**

16. $(x - y)(x^2 + xy + y^2)$

$$= x(x^2 + xy + y^2) - y(x^2 + xy + y^2)$$

$$= x^3 + x^2y + xy^2 - x^2y - xy^2 - y^3$$

$$= x^3 - y^3$$ **Ans**

17. $(4x - 2)(x^2 - 3xy + y^2)$

$$= 4x(x^2 - 3xy + y^2) - 2(x^2 - 3xy + y^2)$$

$$= 4x^3 - 12x^2y + 4xy^2 - 2x^2 + 6xy - 2y^2$$

$$= 4x^3 - 2x^2 - 12x^2y + 4xy^2 + 6xy - 2y^2$$

18. $(3x + 4y - 3)(x - y + 3)$

$$= 3x(x - y + 3) + 4y(x - y + 3) - 3(x - y + 3)$$

$$= 3x^2 - \underline{3xy} + \underline{9x} + \underline{4xy} - 4y^2 + 12y - 3x + 3y - 9$$

$$= 3x^2 + xy + 6x - 4y^2 + 15y - 9$$ **Ans**

Find the product

19. $(9x + 5y)(4x - 3y)$

$$= 9x(4x - 3y) + 5y(4x - 3y)$$

$$= 36x^2 - 27xy + 20xy - 15y^2$$

$$= 36x^2 - 7xy - 15y^2$$ **Ans**

20. $(7x - 4y)(2x + 5)$

$$= 7x(2x + 5) - 4y(2x + 5)$$

$$= 14x^2 + 35x - 8xy - 20y$$ **Ans**

21. $(x^2 - x - 1)(3x^2 - x + 8)$

$$= x^2(3x^2 - x + 8) - x(3x^2 - x + 8)$$
$$-1(3x^2 - x + 8)$$

$$= 3x^4 - x^3 + 8x^2 - 3x^3 + x^2 - 8x$$
$$-3x^2 + x - 8$$

$$= 3x^4 - 4x^3 + 6x^2 - 7x - 8$$ **Ans**

22. $(x^2 - 5x + 8)\,(x^2 + 3x - 6)$

$= x^2\,(x^2 + 3x - 6) - 5x\,(x^2 + 3x - 6)$
$\quad + 8\,(x^2 + 3x - 6)$
$= x^4 + 3x^3 - 6x^2 - 5x^3 - 15x^2 + 30x$
$\quad + 8x^2 + 24x - 48$
$= x^4 - 2x^3 - 13x^2 + 54x - 48$ **Ans**

Simplify :

23. $c\,(b-a) + b\,(a-c) - a\,(b-c)$

$= bc - ac + ab - bc - ab + ac$
$= bc - bc - ac + ac + ab - ab$
$= 0 + 0 + 0$
$= 0$ **Ans**

24. $x\,(x + y^2 + z) + y^2\,(x + y + z) - z\,(x + y^2)$

$= x^2 + xy^2 + xz + xy^2 + y^3$
$\quad + y^2z - xz - y^2z$
$= x^2 + 2xy^2 + y^3$ **Ans**

25. $x\,(x + y^2 + z) + y^2\,(x - y - 2z) - z\,(x + y^2)$

$= x^2 + xy^2 + xz + xy^2 - y^3$
$\quad - 2y^2z - xz - y^2z$
$= x^2 + 2xy^2 - 3y^2z - y^3$ **Ans**

26. $(2x + 5y)\,(3x - 4y) - (7x + 3y)\,(2x + y)$

$= [2x\,(3x - 4y) + 5y\,(3x - 4y)]$
$\quad - [7x\,(2x + y) + 3y\,(2x + y)]$
$= [6x^2 - 8xy + 15xy - 20y^2]$
$\quad - [14x^2 + 7xy + 6xy + 3y^2]$
$= 6x^2 + 7xy - 20y^2 - 14x^2 - 13xy - 3y^2$
$= -8x^2 - 6xy - 23y^2$ **Ans**

Exercise-10D

1. Divide :

(a) $12x^2y^3$ **by** $3xy$

$= \dfrac{12x^2y^3}{3xy}$
$= 4xy^2$ **Ans**

(b) $36abc^2$ **by** $(-9ac)$

$= \dfrac{36abc^2}{-9ac}$
$= -4bc$ **Ans**

(c) $(-60p^2q^2r^2)$ **by** $(-12pqr^2)$

$= \dfrac{-60p^2q^2r^2}{-12pqr^2}$
$= 5pq$ **Ans**

(d) $25x^2yz$ **by** $3xyz$

$= \dfrac{25x^2yz}{3xyz}$
$= \dfrac{25}{3}x$ **Ans**

(e) $-56mnp^2$ **by** $7mn$

$= \dfrac{-56mnp^2}{7mn}$
$= -8p^2$ **Ans**

(f) $-72x^2yz^2$ **by** $12xy$

$= \dfrac{-72x^2yz^2}{12xy}$
$= -6xz^2$ **Ans**

(g) $\dfrac{2}{3}x^2y$ **by** $\dfrac{-1}{3}xy$

$= \dfrac{\frac{2}{3}x^2y}{\frac{-1}{3}xy}$
$= -2y$ **Ans**

(h) $-36a^3b^4$ **by** $8ab^3$

$= \dfrac{-36a^3b^4}{8ab^3}$
$= \dfrac{-9}{2}a^2b$ **Ans**

2. Divide :

(a) $5x^3 - 30x^2 + 45x$ **by** $5x$

$= \dfrac{5x^3 - 30x^2 + 45x}{5x}$
$= \dfrac{5x^3}{5x} - \dfrac{30x^2}{5x} + \dfrac{45x}{5x}$
$= x^2 - 6x + 9$ **Ans**

(b) $8x^2y^2 - 6xy^2 + 10x^2y^3$ **by** $2xy$

$= \dfrac{8x^2y^2 - 6xy^2 + 10x^2y^3}{2xy}$
$= \dfrac{8x^2y^2}{2xy} - \dfrac{6xy^2}{2xy} + \dfrac{10x^2y^3}{2xy}$
$= 4xy - 3y + 5xy^2$ **Ans**

(c) $4x^3 + 8x^2 - x$ **by** $(-2x)$

$$= \frac{4x^3 + 8x^2 - x}{-2x}$$

$$= \frac{4x^3}{-2x} + \frac{8x^2}{-2x} - \frac{x}{-2x}$$

$$= -2x^2 - 4x + \frac{1}{2}$$ **Ans**

(d) $\sqrt{3}y^3 + 2\sqrt{3}y^2$ **by** $3y$

$$= \frac{\sqrt{3}y^3 + 2\sqrt{3}y^2}{3y}$$

$$= \frac{\sqrt{3}y^3}{3y} + \frac{2\sqrt{3}y^2}{3y}$$

$$= \frac{y^2}{\sqrt{3}} + \frac{2y}{\sqrt{3}}$$ **Ans**

(e) $10a^2b - 6ab + 12ab^2$ **by** $3ab$

$$= \frac{10a^2b - 6ab + 12ab^2}{3ab}$$

$$= \frac{10a^2b}{3ab} - \frac{6ab}{3ab} + \frac{12ab^2}{3ab}$$

$$= \frac{10}{3}a - 2 + 4b$$ **Ans**

(f) $-5m^3 - 35m^2 + 40m$ **by** $5m$

$$= \frac{-5m^3 - 35m^2 + 40m}{5m}$$

$$= \frac{-5m^3}{5m} - \frac{35m^2}{5m} + \frac{40m}{5m}$$

$$= -m^2 - 7m + 8$$ **Ans**

(g) $y^4 - 3y^3 + \frac{1}{2}y^2$ **by** $3y$

$$= \frac{y^4 - 3y^3 + \frac{1}{2}y^2}{3y}$$

$$= \frac{y^4}{3y} - \frac{3y^3}{3y} + \frac{\frac{1}{2}y^2}{3y}$$

$$= \frac{y^3}{3} - y^2 + \frac{y}{6}$$ **Ans**

(h) $8x^2y^2 - 6x^4y^3 + 10x^2y^3$ **by** $2x^2y$

$$= \frac{8x^2y^2 - 6x^4y^3 + 10x^2y^3}{2x^2y}$$

$$= \frac{8x^2y^2}{2x^2y} - \frac{6x^4y^3}{2x^2y} + \frac{10x^2y^3}{2x^2y}$$

$$= 4y - 3x^2y^2 + 5y^2$$ **Ans**

3. Divide by long division method :

(a) $(x^2 + 12x + 35)$ **by** $(x + 7)$

$$\begin{array}{r|l} x+7 & x^2+12x+35 \\ & \underline{x^2+7x} \\ & \quad 5x+35 \\ & \quad \underline{5x+35} \\ & \quad \times \end{array} \quad x+5$$

$\therefore \quad x + 5$ **Ans**

(b) $6x^2 - 13x + 6$ **by** $(2x - 3)$

$$\begin{array}{r|l} 2x-3 & 6x^2-13x+6 \\ & \underline{6x^2-9x} \\ & \quad -4x+6 \\ & \quad \underline{-4x+6} \\ & \quad \times \end{array} \quad 3x-2$$

$\therefore \quad (3x - 2)$ **Ans**

(c) $12x^3 - 20x^2 - 9x + 15$ **by** $(3x - 5)$

$$\begin{array}{r|l} 3x-5 & 12x^3-20x^2-9x+15 \\ & \underline{12x^3-20x^2} \\ & \quad -9x+15 \\ & \quad \underline{-9x+15} \\ & \quad \times \end{array} \quad 4x^2-3$$

$\therefore \quad (4x^2 - 3)$ **Ans**

(d) $a^3 - 6a^2 + 11a - 6$ **by** $(a^2 - 5a + 6)$

$$\begin{array}{r|l} a^2-5a+6 & a^3-6a^2+11a-6 \\ & \underline{a^3-5a^2+6a} \\ & \quad -a^2+5a-6 \\ & \quad \underline{-a^2+5a-6} \\ & \quad \times \end{array} \quad a-1$$

$\therefore \quad (a - 1)$ **Ans**

(e) $(p^4 + p^2 + 1)$ **by** $(p^2 + p + 1)$

$$\begin{array}{r|l} p^2+p+1 & p^4+p^2+1 \\ & \underline{p^4+p^3+p^2} \\ & \quad -p^3+1 \\ & \quad \underline{-p^3-p^2-p} \\ & \quad p^2+p+1 \\ & \quad \underline{p^2+p+1} \\ & \quad \times \end{array} \quad p^2-p+1$$

$\therefore \quad (p^2 - p + 1)$ **Ans**

(f) $6y^5+4y^4-3y^3-1$ **by** $(3y^2-y+1)$

$$3y^2-y+1\overline{)\,6y^5+4y^4-3y^3-1\,(\,2y^3+2y^2-y-1}$$
$$\underline{-\;\;6y^5\mp 2y^4\pm 2y^3}$$
$$6y^4-5y^3-1$$
$$\underline{-\;\;6y^4\mp 2y^3\pm 2y^2}$$
$$-3y^3-2y^2-1$$
$$\underline{+\;\;-3y^3\pm y^2\mp y}$$
$$-3y^2+y-1$$
$$\underline{+\;\;-3y^2\pm y\mp 1}$$
$$\times$$

$\therefore \quad (2y^3+2y^2-y-1)$ **Ans**

4. Divide :

(a) $6y^5-y^4+4y^3-5y^2-y-15$ **by**

$2y^2-y+3$

$$2y^2-y+3\overline{)\,6y^5-y^4+4y^3-5y^2-y-15\,(}\;3y^3+y^2-2y-5$$
$$\underline{-\;\;6y^5\mp 3y^4\pm 9y^3}$$
$$2y^4-5y^3-5y^2$$
$$\underline{-\;\;2y^4\mp y^3\pm 3y^2}$$
$$-4y^3-8y^2-y$$
$$\underline{+\;\;-4y^3\pm 2y^2\mp 6y}$$
$$-10y^2+5y-15$$
$$\underline{+\;\;-10y^2\pm 5y\mp 15}$$
$$\times$$

$\therefore \quad (3y^3+y^2-2y-5)$

(b) $6x^5+4x^4-3x^3-1$ **by** $1-x+3x^2$

$$3x^2-x+1\overline{)\,6x^5+4x^4-3x^3-1\,(}\;2x^3+2^2-x-1$$
$$\underline{-\;\;6x^5\mp 2x^4\pm 2x^3}$$
$$6x^4-5x^3-1$$
$$\underline{-\;\;6x^4\mp 2x^3\pm 2x^2}$$
$$-3x^3+2x^2-1$$
$$\underline{+\;\;-3x^3\pm x^2\mp x}$$
$$-3x^2+x-1$$
$$\underline{+\;\;-3x^2\pm x\mp 1}$$
$$\times$$

$\therefore \quad (2x^3+2x^2-x-1)$ **Ans**

(c) $9t^3+6t^2-4t+6$ **by** t^2+3t-1

$$(t^2+3t-1)\overline{)\,9t^3+6t^2-4t+6\,(}\;9t-21$$
$$\underline{-\;\;9t^3\mp 27t^2\mp 9t}$$
$$-21t^2+5t+6$$
$$\underline{+\;\;-21t^2\pm 63t\mp 21}$$
$$68t-15$$

$\therefore \quad (9t-21)$ **Ans**

(d) $8y^4+14y^3-2y^2+7y-8$ **by**

$4y^2+3y-2$

$$(4y^2+3y-2)\overline{)\,8y^4+14y^3-2y^2+7y-8\,(}\;2y^2+2y-1$$
$$\underline{-\;\;8y^4\mp 6y^3\mp 4y^2}$$
$$8y^3+2y^2+7y$$
$$\underline{-\;\;8y^3\mp 6y^2\mp 4y}$$
$$-4y^2+11y-8$$
$$\underline{+\;\;-4y^3\pm 3y\mp 2}$$
$$14y-10$$

$\therefore \quad (2y^2+2y-1)$

(e) $-26+37t-14t^2+t^3$ **by** $13-2t+t^2$

$$t^2-2t+13\overline{)\,t^3-14t^2+37t-26\,(}\;t-12$$
$$\underline{-\;\;t^3\mp 2t^2\mp 13t}$$
$$-12t^2+24t-26$$
$$\underline{+\;\;-12t^2\pm 24t\mp 26}$$
$$\times$$

$\therefore \quad (t-12)$ **Ans**

MCQs

1.	(b)	**2.**	(d)	**3.**	(b)	**4.**	(b)	**5.**	(c)
6.	(b)	**7.**	(d)	**8.**	(b)	**9.**	(b)	**10.**	(c)
11.	(b)	**12.**	(d)	**13.**	(b)	**14.**	(b)	**15.**	(c)

CHAPTER-11 :

Exercise-11A

1. Find the product, using identity :

(a) $\left(3a^2+\dfrac{1}{3a^2}\right)^2$

$$=(3a^2)^2+\left(\frac{1}{3a^2}\right)^2+2\times 3a^2\times\frac{1}{3a^2}$$
$$=9a^4+\frac{1}{9a^4}+2$$ **Ans**

(b) $(6x - y^2)^2$

$= (6x)^2 + (y^2)^2 - 2 \times 6x \times y^2$

$= 36x^2 + y^4 - 12xy^2$ **Ans**

(c) $\left(\frac{1}{5}x^2 + \frac{1}{3}y^2\right)^2$

$= \left(\frac{1}{5}x^2\right)^2 + \left(\frac{1}{3}y^2\right)^2 + 2 \times \frac{1}{5}x^2 \times \frac{1}{3}y^2$

$= \frac{x^4}{25} + \frac{y^4}{9} + \frac{2x^2y^2}{15}$ **Ans**

(d) $\left(15 + \frac{1}{3}\right)^3$

$= (15)^3 + \left(\frac{1}{3}\right)^3 + 3 \times 15 \times \frac{1}{3}\left(15 + \frac{1}{3}\right)$

$= 3375 + \frac{1}{27} + 15\left(15 + \frac{1}{3}\right)$

$= 3375 + \frac{1}{27} + 225 + 5$

$= 3605 + \frac{1}{27}$

$= \frac{3607 \times 27 + 1}{27}$

$= \frac{97335 + 1}{27}$

$= \frac{97336}{27}$ **Ans**

(e) $\left(\frac{1}{2}xy - z^2\right)^2$

$= \left(\frac{1}{2}xy\right)^2 + (z^2)^2 - 2 \times \frac{1}{2}xy \times z^2$

$= \frac{1}{4}x^2y^2 + z^4 - xyz^2$ **Ans**

(f) $\left(5x^2 + \frac{1}{x}\right)\left(5x^2 - \frac{1}{x}\right)$

$= (5x^2)^2 - \left(\frac{1}{x}\right)^2$

$= 25x^4 - \frac{1}{x^2}$ **Ans**

2. Expand, using identity :

(a) $(3a + 4b)^2$

$= (3a)^2 + (4b)^2 + 2 \times 3a \times 4b$

$= 9a^2 + 16b^2 + 24ab$ **Ans**

(b) $(5x + 7)^2$

$= (5x)^2 + (7)^2 + 2 \times 5x \times 7$

$= 25x^2 + 49 + 70x$ **Ans**

(c) $\left(\frac{2a}{3} + \frac{4b}{5}\right)^2$

$= \left(\frac{2a}{3}\right)^2 + \left(\frac{4b}{5}\right)^2 + 2 \times \frac{2a}{3} \times \frac{4b}{5}$

$= \frac{4a^2}{9} + \frac{16b^2}{25} + \frac{16ab}{15}$ **Ans**

(d) $(\sqrt{2}a + \sqrt{3}b)^2$

$= (\sqrt{2}a)^2 + (\sqrt{3}b)^2 + 2 \times \sqrt{2}a \times \sqrt{3}b$

$= 2a^2 + 3b^2 + 2\sqrt{6}ab$ **Ans**

(e) $\left(\frac{2p}{5q} + \frac{5q}{2p}\right)^2$

$= \left(\frac{2p}{5q}\right)^2 + \left(\frac{5q}{2p}\right)^2 + 2 \times \frac{2p}{5q} \times \frac{5q}{2p}$

$= \frac{4p^2}{25p^2} + \frac{25q^2}{4p^2} + 2$ **Ans**

(f) $\left(5ab + \frac{3}{2}c\right)^2$

$= (5ab)^2 + \left(\frac{3}{2}c\right)^2 + 2 \times 5ab \times \frac{3}{2}c$

$= 25a^2b^2 + \frac{9}{4}c^2 + 15abc$ **Ans**

(g) $\left(\frac{\sqrt{5}b}{\sqrt{2}c} - \frac{\sqrt{2}c}{\sqrt{5}b}\right)^2$

$= \left(\frac{\sqrt{5}b}{\sqrt{2}c}\right)^2 + \left(\frac{\sqrt{2}c}{\sqrt{5}b}\right)^2 - 2 \times \frac{\sqrt{5}b}{\sqrt{2}c} \times \frac{\sqrt{2}c}{\sqrt{5}b}$

$= \frac{5b^2}{2c^2} + \frac{2c^2}{5b^2} - 2$ **Ans**

(h) $(\sqrt{3}b - \sqrt{5}c)^2$

$= (\sqrt{3}b)^2 + (\sqrt{5}c)^2 - 2 \times \sqrt{3}b \times \sqrt{5}c$

$= 3b^2 + 5c^2 - 2\sqrt{15}bc$ **Ans**

3. Find the product, using identity :

(a) $(9b - 4)(9b - 4)$

$= (9b - 4)^2$

$= (9b)^2 + (4)^2 - 2 \times 9b \times 4$

$= 81b^2 + 16 - 72b$ **Ans**

(b) $\left(\frac{5a}{2b} + \frac{3c}{4a}\right)\left(\frac{5a}{2b} - \frac{3c}{4d}\right)$

$= \left(\frac{5a}{2b}\right)^2 - \left(\frac{3c}{4a}\right)^2$

$= \frac{25a^2}{4b^2} - \frac{9c^2}{16a^2}$ **Ans**

(c) $\left(\frac{3}{a}+\frac{a}{3}\right)\left(\frac{3}{a}-\frac{a}{3}\right)$

$=\left(\frac{3}{a}\right)^2-\left(\frac{a}{3}\right)^2$

$=\frac{9}{a^2}-\frac{a^2}{9}$ **Ans**

(d) $(15xy-4)(15xy+4)$

$=(15xy)^2-(4)^2$

$=225x^2y^2-16$ **Ans**

(e) $\left(4x^2-\frac{5}{2}y^2\right)\left(4x^2+\frac{5}{2}y^2\right)$

$=(4x^2)^2-\left(\frac{5}{2}y^2\right)^2$

$=16x^4-\frac{25}{4}y^4$ **Ans**

(f) $\left(\frac{x^2}{y^2}+\frac{y^2}{x^2}\right)\left(\frac{x^2}{y^2}-\frac{y^2}{x^2}\right)$

$=\left(\frac{x^2}{y^2}\right)^2-\left(\frac{y^2}{x^2}\right)^2$

$=\frac{x^4}{y^4}-\frac{y^4}{x^4}$ **Ans**

4. Find the value of following, using identity :

(a) $49x^2+70xy+25y^2$, **when** $x=1, y=2$

$=(7x)^2+2\times7x\times5y+(5y)^2$

$=(7x+5y)^2$

Putting the value of x and y

$=(7\times1+5\times2)^2$

$=(7+10)^2$

$=(17)^2$

$=289$ **Ans**

(b) $81x^2+54xy+9y^2$, **when** $x=-2, y=3$

$=(9x)^2+2\times9x\times3y+(3y)^2$

$=(9x+3y)^2$

Putting the value of x and y

$=(9\times-2+3\times3)^2$

$=(-18+9)^2$

$=(-9)^2$

$=81$ **Ans**

(c) $16a^2-48ab+36b^2$, **when** $a=1, b=-2$

$=(4a)^2-2\times4a\times6b+(6b)^2$

$=(4a-6b)^2$

Putting the value of a and b

$=(4\times1-6\times-2)^2$

$=(4+12)^2$

$=(16)^2$

$=256$ **Ans**

(d) $25b^2-40ba+16a^2$, **when** $a=3, b=-4$

$=(5b)^2-2\times5b\times4a+(4a)^2$

$=(5b-4a)^2$

Putting the value of a and b

$=(5\times-4-4\times3)^2$

$=(-20-12)^2$

$=(-32)^2$

$=1024$ **Ans**

5. Simplify :

(a) $(7m-8n)^2+(7m+8n)^2$

$=(7m)^2+(8n)^2-2\times7m\times8n+(7m)^2$
$+(8n)^2+2\times7m\times8n$

$=49m^2+64n^2-112mn+49m^2$
$+64n^2+112mn$

$=98m^2+128n^2$ **Ans**

(b) $(2x+7)^2-(2x-7)^2$

$=((2x)^2+(7)^2+2\times2x\times7)$
$-[(2x)^2+(7)^2-2\times2x\times7))]$

$=(4x^2+49+28x)-(4x^2+49-28x)$

$=4x^2+49+28x-4x^2-49+28x$

$=56x$ **Ans**

(c) $(ab+bc)^2-(ab-bc)^2$

$=((ab)^2+(bc)^2+2\times ab\times bc)$
$-[(ab)^2+(bc)^2-2\times a\times b\times bc))]$

$=(a^2b^2+b^2c^2+2ab^2c)$
$-(a^2b^2+b^2c^2-2ab^2c)$

$=a^2b^2+b^2c^2+2ab^2c-a^2b^2$
$-b^2c^2+2ab^2c$

$=4ab^2c$ **Ans**

(d) $(m^2-n^2)^2+2m^2n^2$

$=(m^2)^2+(n^2)^2-2m^2n^2+2m^2n^2$

$=m^4+n^4$ **Ans**

(e) $(4pq+3q)^2-(4pq-3q)^2$

$=[(4pq)^2+(3q)^2+2\times4pq\times3q]$
$-[(4pq)^2+(3q)^2-2\times3pq\times3q]$

$=[16p^2q^2+9q^2+24pq^2]$
$-[16p^2q^2+9q^2-24pq^2]$

$=16p^2q^2+9q^2+24pq^2-16p^2q^2$
$-9q^2+24pq^2$

$=48pq^2$ **Ans**

(f) $(m^2n - 6p)^2 + 24m^2np$

$= (m^2n)^2 + (6p)^2 - 2\times m^2n\times 6p + 24m^2np$

$= m^4n^2 + 36p^2 - 12m^2np + 24m^2np$

$= m^4n^2 + 36p^2 + 12m^2np$

$= (m^2n + 6p)$ **Ans**

6. Evaluate, using suitable identity :

(a) 53×58

$= (50+3)(50+8)$

$= 50\times 50 + 50\times 8 + 3\times 50 + 3\times 8$

$= 2500 + 400 + 150 + 24$

$= 3074$ **Ans**

(b) 106×108

$= (100+6)\times(100+8)$

$= 100\times 100 + 100\times 8 + 6\times 100 + 8\times 6$

$= 10000 + 1400 + 48$

$= 11448$ **Ans**

(c) $(102)^2$

$= (100+2)^2$

$= (100)^2 + (2)^2 + 2\times 100\times 2$

$= 10000 + 4 + 400$

$= 10404$ **Ans**

(d) $(98)^2$

$= (100-2)^2$

$= (100)^2 + (2)^2 - 2\times 100\times 2$

$= 10000 + 4 - 400$

$= 9604$ **Ans**

(g) $(5.2)^2$

$= (5+0.2)^2 + 2\times 5\times 0.2$

$= 25 + 0.04 + 2$

$= 27.04$ **Ans**

(f) $(600.5)^2$

$= (600+0.5)^2$

$= (600)^2 + (0.5)^2 + 2\times 600\times 0.5$

$= 360000 + 0.25 + 600$

$= 360600.25$ **Ans**

(g) $52^2 - 51^2$

$= (52+51)(52-51)$

$= 103\times 1$

$= 103$ **Ans**

(h) $153^2 - 53^2$

$= (153+53)(153-53)$

$= 206\times 100$

$= 20600$ **Ans**

7. If $x + \frac{1}{x} = 3$, find the value of :

(a) $x^2 + \frac{1}{x^2}$ **(b)** $x^4 + \frac{1}{x^4}$

(a) We have,

$$x + \frac{1}{x} = 3$$

Squarring on both sides

$$\left(x + \frac{1}{x}\right)^2 = (3)^2$$

$$x^2 + \frac{1}{x^2} + 2\times x\times \frac{1}{x} = 9$$

$$x^2 + \frac{1}{x^2} + 2 = 9$$

$$x^2 + \frac{1}{x^2} = 9 - 2$$

$$x^2 + \frac{1}{x^2} = 7$$ **Ans**

(b) From (a)

We have,

$$x^2 + \frac{1}{x^2} = 7$$

squaring on both sides

$$\left(x^2 + \frac{1}{x^2}\right)^2 = (7)^2$$

$$(x^2)^2 + \left(\frac{1}{x^2}\right)^2 + 2\times x^2 \times \frac{1}{x^2} = 49$$

$$x^4 + \frac{1}{x^4} + 2 = 49$$

$$x^4 + \frac{1}{x^4} = 49 - 2$$

$$x^4 + \frac{1}{x^4} = 47$$ **Ans**

8. If $x - \frac{1}{x} = 5$, find the value of :

(a) $x^2 + \frac{1}{x^2}$ **(b)** $x^4 + \frac{1}{x^4}$

(a) We have,

$$x - \frac{1}{x} = 5$$

Squaring on both sides

$$\left(x-\frac{1}{x}\right)^2=(5)^2$$

$$x^2+\frac{1}{x^2}-2\times x\times\frac{1}{x}=25$$

$$x^2+\frac{1}{x^2}-2=25$$

$$x^2+\frac{1}{x^2}=25+2$$

$$x^2+\frac{1}{x^2}=27$$ **Ans**

(b) From (a) we have

$$x^2+\frac{1}{x^2}=27$$

Squaring on both sides

$$\left(x^2+\frac{1}{x^2}\right)^2=(27)^2$$

$$(x^2)^2+\left(\frac{1}{x^2}\right)^2+2\times x^2\times\frac{1}{x^2}=729$$

$$x^4+\frac{1}{x^4}+2=729$$

$$x^4+\frac{1}{x^4}=729-2$$

$$x^4+\frac{1}{x^4}=727$$ **Ans**

9. If $x^2+\frac{1}{x^2}=47$, find the value of $\left(x+\frac{1}{x}\right)$.

$$x^2+\frac{1}{x^2}=47$$

adding 2 on both sides

$$x^2+\frac{1}{x^2}+2=47+2$$

$$\left(x+\frac{1}{x}\right)^2=49$$

$$x+\frac{1}{x}=\sqrt{49}$$

$$x+\frac{1}{x}=7$$ **Ans**

10. If $x^2+\frac{1}{x^2}=83$, find the value of $\left(x-\frac{1}{x}\right)$.

$$x^2+\frac{1}{x^2}=83$$

subtracting 2 on both sides

$$x^2+\frac{1}{x^2}-2=83-2$$

$$\left(x-\frac{1}{x}\right)^2=81$$

$$\left(x-\frac{1}{x}\right)=\sqrt{81}$$

$$x-\frac{1}{x}=9$$ **Ans**

Exercise-11B

1. Expand the following :

(a) $(a-b+c)^2$

$$=(a)^2+(-b)^2+(c)^2-2ab-2bc+2ca$$
$$=a^2+b^2+c^2-2ab-2bc+2ca$$

(b) $(a-b-c)^2$

$$=(a)^2+(-b)^2+(-c)^2+2\times a\times(-b)+2\times(-b)\times(-c)+2\times(-c)\times 4$$
$$=a^2+b^2+c^2-2ab+2bc-2ac$$

(c) $(5x+y+2z)^2$

$$=(5x)^2+(y)^2+(2z)^2+2\times 5x\times y+2\times y+2z+2\times 2z\times 5x$$
$$=25x^2+y^2+4z^2+10xy+4yz+20xz$$

(d) $(2x-y+3z)^2$

$$=(2x)^2+(-y)^2+(3z)^2+2\times 2x\times(-y)+2\times -y\times 2z+2\times 3z\times 2x$$
$$=4x^2+y^2+9z^2-4xy-6yz+12xz$$

(e) $(5a+b-3c)^2$

$$=(5a)^2+(b)^2+(-3c)^2+2\times 5a\times b+2\times b\times(-3c)+2\times(-3c)\times 5a$$
$$=25a^2+b^2+9c^2+10ab-6bc-30ac$$

(f) $(-a+3b+7c)^2$

$$=(-a)^2+(3b)^2+(7c)^2+2\times(-a)\times 3b+2\times 3b\times 7c+2\times 7c\times(-a)$$
$$=a^2+9b^2+49c^2-6ab+42bc-14ac$$

(g) $(-x+y+2z)^2$

$$=(-x)^2+(y)^2+(2z)^2+2\times(-x)\times y+2\times y\times 2z+2\times 2z\times(-x)$$
$$=x^2+y^2+4z^2-2xy+4yz-4xz$$

(h) $\left(\frac{1}{5}a-\frac{1}{3}b+2\right)^2$

$$=\left(\frac{1}{5}a\right)^2+\left(\frac{-1}{3}b\right)^2+(2)^2+2\times\frac{1}{5}a\times\frac{-1}{3}b+2\times\frac{-1}{3}b\times 2+2\times 2\times\frac{1}{5}a$$
$$=\frac{a^2}{25}+\frac{b^2}{9}+4-\frac{2ab}{15}-\frac{4b}{3}+\frac{4a}{5}$$

(i) $\left(6x-\frac{y}{2}+\frac{z}{3}\right)^2$

$=(6x)^2+\left(\frac{-y}{2}\right)^2+\left(\frac{z}{5}\right)^2+2\times 6x\times\left(\frac{-y}{2}\right)$

$+2\times\left(\frac{-y}{2}\right)\times\frac{z}{3}+2\times\frac{z}{3}\times 6x$

$=36x^2+\frac{y^2}{4}+\frac{z^2}{9}-6xy-\frac{yz}{3}+4xz$

(j) $\left(\frac{mn}{2}+3p+\frac{1}{3}l\right)^2$

$=\left(\frac{mn}{2}\right)^2+(3p)^2+\left(\frac{1}{3}l\right)^2+2\times\frac{mn}{2}$

$\times 3p+2\times 3p\times\frac{1}{3}l+2\times\frac{l}{3}\times\frac{mn}{2}$

$=\frac{m^2n^2}{4}+9p^2+\frac{l^2}{9}+3mnp+2pl+\frac{lmn}{3}$

(k) $\left(\frac{1}{4}x+\frac{y}{2}-\frac{z}{3}\right)^2$

$=\left(\frac{1}{4}x\right)^2+\left(\frac{y}{2}\right)^2+\left(\frac{-z}{3}\right)^2+2\times\frac{1}{4}x\times\frac{y}{2}$

$+2\times\frac{y}{2}\times\frac{-z}{3}+2\left(\frac{-z}{3}\right)\times\frac{x}{4}$

$=\frac{x^2}{16}+\frac{y^2}{4}+\frac{z^2}{9}+\frac{xy}{4}-\frac{yz}{3}-\frac{xz}{6}$

(l) $\left(6x-\frac{y}{2}-\frac{z}{4}\right)^2$

$=(6x)+\left(\frac{-y}{2}\right)^2+\left(\frac{-z}{4}\right)^2+2\times 6x\times\left(\frac{-y}{2}\right)$

$+2\times\left(\frac{-y}{2}\right)\times\left(\frac{-z}{4}\right)+2\times\left(\frac{-z}{4}\right)\times 6x$

$=36x^2+\frac{y^2}{4}+\frac{z^2}{16}-6xy+\frac{yz}{4}-3xz$

2. Simplify :

(a) $(a+2b+c)^2+(a+2b-c)^2$

$=(a^2+4b^2+c^2+4ab+4bc+2ac)$

$+(a^2+4b^2+c^2+4ab-4bc-2ac)$

$=a^2+4b^2+c^2+4ab+4bc+2ac+a^2$

$+4b^2+c^2+4ab-4bc-2ac$

$=2a^2+8b^2+2c^2+8ab$

(b) $(2x+y-z)^2-(2x+y+z)^2$

$=(4x^2+y^2+z^2+4xy-2yz-4xz)$

$-(4x^2+y^2+z^2+4xy+2yz+4xz)$

$=4x^2+y^2+z^2+4xy-2yz-4xz-4x^2$

$-y^2-z^2-4xy-2yz-4xz$

$=-4yz-8xz$

(c) $(3x-2y+z)^2-(-3x+2y-z)^2$

$=(9x^2+4y^2+z^2-12xy-4yz+6x)$

$-(9x^2+4y^2+z^2-12xy-4yz+6xz)$

$=9x^2+4y^2+z^2-12xy-4yz+6xy$

$-9x^2-4y^2-z^2+12xy+4yz-6xz$

$=0$

(d) $(2p-q+3m)^2-(2p+q+3m)^2$

$=(4p^2+q^2+9m^2-4pq-6mq+12mp)$

$-(4p^2+q^2+9m^2+4pq+6mq+12mp)$

$=4p^2+q^2+9m^2-4pq-6mq+12mp$

$-4p^2-q^2-9m^2-4pq-6mq-12mp$

$=-8pq-12mq$

(e) $\left(\frac{1}{2}m-\frac{n}{3}+\frac{p}{5}\right)^2-\left(\frac{1}{2}m+\frac{n}{3}-\frac{p}{5}\right)^2$

$=\left(\frac{m^2}{4}+\frac{n^2}{9}+\frac{p^2}{25}-\frac{mn}{3}-\frac{2pn}{15}+\frac{mp}{5}\right)$

$-\left(\frac{m^2}{4}+\frac{n^2}{9}+\frac{p^2}{25}+\frac{mn}{3}-\frac{2pn}{15}-\frac{mp}{5}\right)$

$=\frac{m^2}{4}+\frac{n^2}{9}+\frac{p^2}{25}-\frac{mn}{3}-\frac{2pn}{15}+\frac{mp}{5}-\frac{m^2}{4}$

$-\frac{n^2}{9}-\frac{p^2}{25}-\frac{mn}{3}+\frac{2pn}{15}+\frac{mp}{5}$

$=\frac{-2mn}{3}+\frac{2mp}{5}$

or $=\frac{2mp}{5}-\frac{2mn}{3}$ **Ans**

(f) $\left(mn+\frac{p}{2}+l\right)^2+\left(-mn-\frac{p}{2}+l\right)^2$

$=\left(m^2n^2+\frac{p^2}{4}+l^2+mnp+pl+2mnl\right)$

$+\left(m^2n^2+\frac{p^2}{4}+l^2+mnp-pl-2mnl\right)$

$=2m^2n^2+\frac{p^2}{2}+2l^2+2mnp$ **Ans**

3. If $x+y+z=8$ and $xy+yz+zx=18$, find the value of $x^2+y^2+z^2$.

We have,

$x+y+z=8$ ... (i)

and $xy+yz+zx=18$ ... (ii)

on squaring both sides in equation I

$(x+y+z)^2=(8)^2$

$x^2+y^2+z^2+2xy+2yz+2xz=8\times 8$

$x^2+y^2+z^2+2(xy+yz+zx)=64$

From II

$$x^2 + y^2 + z^2 + 2\times 18 = 64$$
$$x^2 + y^2 + z^2 + 36 = 64$$
$$x^2 + y^2 + z^2 = 64 - 36$$
$$x^2 + y^2 + z^2 = 28$$ **Ans**

4. If $a + b + c = 12$ and $ab + bc + ca = 30$, find the value of $a^2 + b^2 + c^2$.

We have,

$$a + b + c = 12 \quad \text{... (i)}$$

and $$ab + bc + ca = 30 \quad \text{... (ii)}$$

On squaring both sides in equation I

$$(a + b + c)^2 = (12)^2$$
$$a^2 + b^2 + c^2 + 2ab + 2bc + 2ac = 12\times 12$$
$$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 144$$

From II

$$a^2 + b^2 + c^2 + 2\times 30 = 144$$
$$a^2 + b^2 + c^2 + 60 = 144$$
$$a^2 + b^2 + c^2 = 144 - 60$$
$$a^2 + b^2 + c^2 = 84$$ **Ans**

5. If $a^2 + b^2 + c^2 = 70$ and $ab + bc + ca = 37$, find the value of $(a + b + c)$.

We have,

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$
$$= a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

But we have,

$$a^2 + b^2 + c^2 = 70$$

and $$ab + bc + ca = 37$$

then, $$(a + b + c)^2 = 70 + 2\times 37$$
$$= 70 + 74$$
$$(a + b + c) = \sqrt{144}$$
$$a + b + c = 12$$ **Ans**

6. If $m + n + p = 9$ and $m^2 + n^2 + p^2 = 41$, find the value of $(mn + np + pm)$.

We have,

$$m + n + p = 9 \quad \text{... (i)}$$

and $$m^2 + n^2 + p^2 = 41 \quad \text{... (ii)}$$

on squaring on both sides in I

$$(m + n + p)^2 = (9)^2$$
$$m^2 + n^2 + p^2 + 2mn + 2np + 2pm = 81$$
$$m^2 + n^2 + p^2 + 2(mn + np + pm) = 81$$

From II

$$41 + 2(mn + np + pm) = 81$$
$$2(mn + np + pm) = 81 - 41$$
$$2(mn + np + pm) = 40$$

or $$mn + np + pm = 20$$ **Ans**

MCQs

1.	(b)	**2.**	(d)	**3.**	(b)	**4.**	(b)	**5.**	(c)
6.	(b)	**7.**	(d)	**8.**	(b)	**9.**	(b)	**10.**	(c)
11.	(b)	**12.**	(d)	**13.**	(b)	**14.**	(b)	**15.**	(c)

CHAPTER 12 : FACTORIZATION

Exercise-12A

1. Find the greatest common factor of the given terms :

(a) $4x, 2y, 12xy$

gcf $= 2$ **Ans**

(b) $3x^2, 6x^2, 18x^3$

gcf $= 3x^2$ **Ans**

(c) $11abc, 33a^2b^2c^2$

gcf $= 11abc$ **Ans**

(d) $10pqr, 30qr, 40pr$

gcf $= 10r$ **Ans**

(e) $3x^2y^3, 9x^3y^2, 3x^2y^2$

gcf $= 3x^2y^2$ **Ans**

(f) $-x^3, x^3, -3x$

gcf $= x$ **Ans**

(g) $11abc^2, 13ab^2, -b^2c^3$

gcf $= b$ **Ans**

(h) $15pq^2, -20p^2q^2, 25q^2r$

gcf $= 5q^2$ **Ans**

2. Factorize the following expressions :

(a) $3p^5q - 5p^3q^3$

$= p^3q(3p^2 - 5q^2)$ **Ans**

(b) $9a^2b^2c^3 - 10a^2b^2c^2$

$= a^2b^2c^2(9c - 10)$ **Ans**

(c) $pm - pl + pn$

$= p(m - l + n)$ **Ans**

(d) $20x^{15}y^{15} - 15x^{12}y^{13}$

$= 5x^{12}y^{13}(4x^3y^2 - 3)$ **Ans**

(e) $7x^3 + 7y^3x$

$= 7x(x^2 + y^3)$ **Ans**

(f) $3x^2y^2 + 4y^2z^2 + 12x^2y^2z^2$

$= y^2(3x^2 + 4z^2 + 12x^2z^2)$ **Ans**

(g) $2a^2bc - 3ab^2c + 4abc^2$

$= abc(2a - 3b + 4c)$ **Ans**

(h) $l^4m^2 - l^2m^4 - l^4m^4$

$= l^2m^2(l^2 - m^2 - l^2m^2)$ **Ans**

(i) $50p^3 - 25p^2 + 5p$

$= 5p(10p^2 - 5p + 1)$ **Ans**

3. Factorize the following expressions :

(a) $-ax + x^2 - bx + ab$

$= x(x - a) - b(x - a)$

$= (x - a)(x - b)$ **Ans**

(b) $p^2x + q^2x - p^2y - q^2y$

$= x(p^2 + q^2) - y(p^2 + q^2)$

$= (p^2 + q^2)(x - y)$ **Ans**

(c) $c - 8 + 8ab - abc$

$= (c - 8) - ab(c - 8)$

$= (c - 8)(1 - ab)$ **Ans**

(d) $12xy - 6x + 4y - 2$

$= 6x(2y - 1) + 2(2y - 1)$

$= (2y - 1)(6x + 2)$ **Ans**

(e) $12 + 9q + 20p + 15pq$

$= 3(4 + 3q) + 5p(4 + 3q)$

$= (3q + 4)(5p + 3)$ **Ans**

(f) $2x^2y^2 + 7xy^3 - 4x^3y^4 - 14x^2y^5$

$= xy^2(2x + 7y) - 2x^2y^4(2x + 7y)$

$= (2x + 7y)(xy^2 - 2x^2y^4)$

$= (2x + 7y)xy^2(1 - 2xy^2)$ **Ans**

(g) $2b - 5a + 10 - ab$

$= 2b - ab - 5a + 10$

$= b(2 - a) - 5(2 - a)$

$= (2 - a)(b - 5)$

$= -(a - 2)(b - 5)$ **Ans**

(h) $30a^2b^2 + 50 - 10a^2 - 6a^4b^2$

$= 30a^2b^2 - 6a^4b^2 + 50 - 10a^2$

$= 6a^2b^2(5 - a^2) + 10(5 - a^2)$

$= (5 - a^2)(6a^2b^2 + 10)$

$= -(a^2 - 5) + 2(3a^2b^2 + 5)$

$= -2(a^2 - 5)(3a^2b^2 + 5)$ **Ans**

(i) $5p^2q^2r - r^2 + 7r - 35p^2q^2$

$= r(5p^2q^2 - r) - 7(5p^2q^2 - r)$

$= (5p^2q^2 - r)(r - 7)$ **Ans**

(j) $a^2b + a^2y^2 + bx + xy^2$

$= a^2b + bx + a^2y^2 + xy^2$

$= b(a^2 + x) + y^2(a^2 + x)$

$= (a^2 + x)(b + y^2)$

or $= (x + a^2)(y^2 + b)$ **Ans**

4. Factorize the following expressions :

(a) $x^4 + 2x^2y^2 + y^4$

$= (x^2)^2 + 2x^2y^2 + (y^2)^2$

$= (x^2 + y^2)^2$ **Ans**

(b) $49y^2 + 70yz + 25z^2$

$= (7y)^2 + 70yz + (5z)^2$

$= (7y + 5z)^2$ **Ans**

(c) $4a^2 + 4 - 8a$

$= (2a)^2 + (2)^2 - 8a$

$= (2a - 2)^2$ **Ans**

(d) $a^2 - 14a + 49$

$= (a)^2 - 14a + (7)^2$

$= (a - 7)^2$ **Ans**

(e) $25p^2 - 80pq + 64q^2$

$= (5p)^2 - 80pq + (8q)^2$

$= (5p - 8q)^2$ **Ans**

(f) $1 - 2x + x^2$

$= (1)^2 - 2x + (x)^2$

$= (x - 1)^2$ **Ans**

(g) $81 + 18x + x^2$

$= (9)^2 + 18x + (x)^2$

$= (x + 9)^2$ **Ans**

(h) $a^2b^2 - 2abc + c^2$

$= (ab)^2 - 2abc + (c)^2$

$= (ab - c)^2$ **Ans**

5. Factorize the following expressions :

(a) $m^2 - 25$

$= (m)^2 - (5)^2$

$= (m + 5)(m - 5)$ **Ans**

(b) $m^4 - 256$

$= (m^2)^2 - (16)^2$

$= (m^2 + 16)(m^2 - 16)$

$= (m^2 + 16)(m^2 - 4^2)$

$= (m^2 + 16)(m + 4)(m - 4)$ **Ans**

(c) $16x^2 - 49$

$= (4x)^2 - (7)^2$

$= (4x+7)(4x-7)$ **Ans**

(d) $144m^2 - 289n^2$

$= (12m)^2 - (17n)^2$

$= (12m+17n)(12m-17n)$ **Ans**

(e) $16x^5 - 144x^3$

$= 16x^3 (x^2 - 9)$

$= 16x^3 (x^2 - (3)^2)$

$= 16x^3 (x+3)(x-3)$ **Ans**

(f) $0.09a^2 - 0.25b^2$

$= (0.3a)^2 - (0.5b)^2$

$= (0.3a+0.5b)(0.3a-0.5b)$ **Ans**

(g) $(l+m)^2 - (l-m)^2$

$= (l+m+l-m)(l+m-l+m)$

$= 2l \times 2m$

$= 4lm$ **Ans**

(h) $y^2 - \frac{49}{64}$

$= (y)^2 - \left(\frac{7}{8}\right)^2$

$= \left(y+\frac{7}{8}\right)\left(y-\frac{7}{8}\right)$

or $= \frac{1}{64} \times (y+7)(8y-7)$ **Ans**

(i) $25a^2 - 4b^2 + 28bc - 49c^2$

$= 25a^2 - (4b^2 - 28bc + 49c^2)$

$= (5a)^2 - [(2b)^2 - 28bc + (7c)^2]$

$= (5a)^2 - (2b-7c)^2$

$= (5a+2b-7c)(5a-2b+7c)$

(j) $36 - a^2 - b^2 - 2ab$

$= 36 - (a^2 + b^2 + 2ab)$

$= 36 - (a+b)^2$

$= (6)^2 - (a+b)^2$

$= (6+a+b)(6-a-b)$ **Ans**

(k) $49 - x^2 + 8xy - 16y^2$

$= 49 - (x^2 - 8xy + 16y^2)$

$= (7)^2 - (x^2 - 8xy + (4y)^2)$

$= (7)^2 - (x-4y)^2$

$= (7+x-4y)(7-x+4y)$ **Ans**

(l) $25a^2 + 10ac + c^2 - 49b^2$

$= (5a)^2 + 10ac + (c)^2 - (7b)^2$

$= (5a+c)^2 - (7b)^2$

$= (5a+7b+c)(5a-7b+c)$ **Ans**

6. Factorize the following expressions :

(a) $(a+b)^2 - 4ab$

$= (a^2 + b^2 + 2ab) - 4ab$

$= a^2 + b^2 - 2ab$

$= (a-b)^2$ **Ans**

(b) $(m-2n)^2 + 8mn$

$= (m)^2 + (2n)^2 - 4mn + 8mn$

$= m^2 + 4n^2 + 4mn$

$= m^2 + (2n)^2 + 4mn$ **Ans**

$= (m+2n)^2$

(c) $(a^2 + b^2)^2 - 4a^2b^2$

$= (a^2)^2 + (b^2)^2 + 2a^2b^2 - 4a^2b^2$

$= (a^2)^2 + (b^2)^2 - 2a^2b^2$

$= (a^2 - b^2)$ **Ans**

(d) $x^4 - (y+z)^4$

$= (x^2)^2 - [(y+z)^2]^2$

$= [x^2 + (y+z)^2][x^2 - (y+z)^2]$

$= [x^2 + (y+z)^2](x+y+z)(x-y-z)$

(e) $(a^2 - b^2)^2 + 4a^2b^2$

$= (a^2)^2 + (b^2)^2 - 2a^2b^2 + 4a^2b^2$

$= (a^2)^2 + (b^2)^2 + 2a^2b^2$

$= (a^2 + b^2)^2$ **Ans**

(f) $(x-z)^4 - x^4$

$= [(x-z)^2]^2 - (x^2)^2$

$= [(x-z)^2 + x^2][(x-z)^2 - x^2]$

$= (x^2 + z^2 + 2xz + x^2)(x-z+x)$
$(x-z-x)$

$= (2x^2 + z^2 - 2xz)(2x-z) \times -z$

(g) $(mx+ny)^2 + (nx-my)^2$

$= (mx)^2 + (ny)^2 + 2mxny + (nx)^2$
$+ (my)^2 - 2mnxy$

$= m^2x^2 + n^2x^2 + m^2y^2 + n^2y^2$

$= x^2 (n^2 + m^2) + y^2 (m^2 + n^2)$

$= (m^2 + n^2)(x^2 + y^2)$ **Ans**

(h) $(ax+by)^2 - (bx+ay)^2$

$= [(ax)^2 + (by)^2 + 2axby] - [(bx)^2$
$+ (ay)^2 + 2axby]$

$= a^2x^2 + b^2y^2 + 2axby - b^2x^2$
$- a^2y^2 - 2axby$

$= a^2x^2 - b^2x^2 + b^2y^2 - a^2y^2$

$= x^2 (a^2 - b^2) - y^2 (a^2 - b^2)$

$= (a^2 - b^2)(x^2 - y^2)$

$= (a+b)(a-b)(x+y)(x-y)$ **Ans**

Exercise-12B

Factorize :

1. $x^2 + 5x + 6$

$= x^2 + 3x + 2x + 6$

$= x(x+3) + 2(x+3)$

$= (x+3)(x+2)$ **Ans**

2. $x^2 + 6x + 5$

$= x^2 + 5x + 1x + 5$

$= x(x+5) + 1(x+5)$

$= (x+5)(x+1)$ **Ans**

3. $y^2 + 13y + 40$

$= y^2 + 8y + 5y + 40$

$= y(y+8) + 5(y+8)$

$= (y+8)(y+5)$ **Ans**

4. $y^2 + 21y + 90$

$= y^2 + 15y + 6y + 90$

$= y(y+15) + 6(y+15)$

$= (y+15)(y+6)$ **Ans**

5. $x^2 - 2x - 24$

$= x^2 - 6x + 4x - 24$

$= x(x-6) + 4(x-6)$

$= (x-6)(x+4)$ **Ans**

6. $x^2 + 7x - 30$

$= x^2 + 10x - 3x - 30$

$= x(x+10) - 3(x+10)$

$= (x+10)(x-3)$ **Ans**

7. $a^2 - 29a + 100$

$= a^2 - 25a - 4a + 100$

$= a(a-25) - 4(a-25)$

$= (a-25)(a-4)$ **Ans**

8. $t^2 + 3t - 108$

$= t^2 + 12t - 9t - 108$

$= t(t+12) - 9(t+12)$

$= (t+12)(t-9)$ **Ans**

9. $40 - 3x - x^2$

$= x^2 + 3x - 40$

$= x^2 + 8x - 5x - 40$

$= x(x+8) - 5(x+8)$

$= (x+8)(x-5)$ **Ans**

10. $90 + x - x^2$

$= x^2 - x - 90$

$= x^2 - 10x + 9x - 90$

$= x(x-10) + 9(x-10)$

$= (x-10)(x+9)$ **Ans**

11. $6x^2 + 13x + 6$

$= 6x^2 + 9x + 4x + 6$

$= 3x(2x+3) + 2(2x+3)$

$= (2x+3)(3x+2)$ **Ans**

12. $20a^2 + 47a + 21$

$= 20a^2 + 35a + 12a + 21$

$= 5a(4a+7) + 3(4a+7)$

$= (4a+7)(5a+3)$ **Ans**

13. $12x^2 + 13x - 35$

$= 12x^2 + 28x - 15x - 35$

$= 4x(3x+7) - 5(3x+7)$

$= (3x+7)(4x-5)$ **Ans**

14. $5 - 9x - 18x^2$

$= 18x^2 + 9x - 5$

$= 18x^2 + 15x - 6x - 5$

$= 3x(6x+5) - 1(6x+5)$

$= (6x+5)(3x-1)$ **Ans**

15. $33 - 112b - 33b^2$

$= 33b^2 + 112b - 33$

$= 33b^2 + 121b - 9b - 33$

$= 11b(3b+11) - 3(3b+11)$

$= (3b+11)(11b-3)$ **Ans**

16. $3a^2b^2 + 17ab - 56$

$= 3a^2b^2 + 24ab - 7ab - 56$

$= 3ab(ab+8) - 7(ab+8)$

$= (ab+8)(3ab-7)$ **Ans**

17. $2 - 3ab - 2a^2b^2$

$= 2a^2b^2 + 3ab - 2$

$= 2a^2b^2 + 4ab - 1ab - 2$

$= 2ab(ab+2) - 1(ab+2)$

$= (ab+2)(2ab-1)$ **Ans**

18. $2x^2 + 5xy - 3y^2$

$= 2x^2 + 6xy - xy - 3y^2$

$= 2x(x+3y) - y(x+3y)$

$= (x+3y)(2x-y)$ **Ans**

19. $x^2 - 3xy - 40y^2$

$= x^2 - 8xy + 5xy - 40y^2$

$= x(x-8y) + 5y(x-8y)$

$= (x-8y)(x+5y)$ **Ans**

20. $(a-b)^2+7(a-b)+12$

Let $(a-b)=y$

Now $= y^2+7y+12$

$= y^2+4y+3y+12$

$= y(y+4)+3(y+4)$

$= (y+4)(y+3)$

Now putting the value of y

$= (a-b+4)(a-b+3)$ **Ans**

Exercise-12C

Divide by using factorization and identities :

1. $(7x^2+14x)$ **by** $(x+2)$

$$= \frac{72x^2+14x}{x+2}$$

$$= \frac{7x(x+2)}{(x+2)}$$

$= 7x$ **Ans**

2. $(m^2-14m-32)$ **by** $(m-16)$

$$= \frac{(m^2-14m-32)}{(m-16)}$$

$$= \frac{m^2-16m+2m-32}{(m-16)}$$

$$= \frac{m(m-16)+2(m-16)}{(m-16)}$$

$$= \frac{(m-16)(m+2)}{(m-16)}$$

$= (m+2)$ **Ans**

3. $4yz\,(z^2+6z-16)$ **by** $2y\,(z+8)$

$$= \frac{4yz(z^2+6z-16)}{2y(z+8)}$$

$$= \frac{2z(z^2+8z-2z-16)}{(z+8)}$$

$$= \frac{2z[z(z+8)-2(z+8)]}{(z+8)}$$

$$= \frac{2z(z+8)(z-2)}{(z+8)}$$

$= 2z(3-2)$ **Ans**

4. $(21y^2-10y^3+y^4)$ **by** $(3-y)$

$$= \frac{y^2(y^2-10y+21)}{(3-y)}$$

$$= \frac{y^2(y^2-7y-3y+21)}{(3-y)}$$

$$= \frac{y^2[y(y-7)-3(y-7)]}{(3-y)}$$

$$= \frac{y^2(y-7)(y-3)}{(3-y)}$$

$$= \frac{y^2(7-y)(3-y)}{(3-y)}$$

$= 7y^2-y^3$ **Ans**

5. $14x^2\,(3x^2-19x+30)$ **by** $2\,(3x-10)$

$$= \frac{14x^2(3x^2-19x+30)}{(3x-10)}$$

$$= \frac{14x^2[3x^2-10x-9x+30]}{(3x-10)}$$

$$= \frac{14x^2[x(3x-10)-3(3x-10)]}{(3x-10)}$$

$$= \frac{14x^2(3x-10)(x-3)}{(3x-10)}$$

$= 14x^3-42x^2$ **Ans**

6. $(4y^2-2y-90)$ **by** $(2y+9)$

$$= \frac{4y^2-2y-90}{2y+9}$$

$$= \frac{4y^2-20y+18y-90}{(2y+9)}$$

$$= \frac{4y(y-5)+18(y-5)}{(2y+9)}$$

$$= \frac{(y-5)(4y+18)}{(2y+9)}$$

$$= \frac{2(y-5)(2y+9)}{(2y+9)}$$

$= 2y-10$ **Ans**

7. $5mn\,(m^2-n^{2)}$ **by** $2m\,(m-n)$

$$= \frac{5mn(m^2-n^2)}{2m(m-n)}$$

$$= \frac{5n}{2}\frac{(m+n)(m-n)}{(m-n)}$$

$$= \frac{5n}{2}(m+n)$$ **Ans**

8. $x\,(5x^2-80)$ **by** $5x\,(x+4)$

$$= \frac{x5(x^2-16)}{5x(x+4)}$$

$$= \frac{5x(x^2-(4)^2)}{5x(x+4)}$$

$$= \frac{(x+4)(x-4)}{(x+4)}$$

$= (x-4)$ **Ans**

9. $12xy\,(9x^2 - 16y^2)$ **by** $4xy\,(3x + 4y)$

$$= \frac{12xy((3x)^2 - (4y)^2}{4xy(3x+4y)}$$

$$= \frac{3(3x+4y)(3x+4y)}{(3x+4y)}$$

$$= 9x - 12y \qquad \textbf{Ans}$$

10. $13xy\,(x^2 - 49y^2)$ **by** $y^2\,(x + 7y)$

$$= \frac{13xy[(x)^2 - (7y)^2]}{y^2\,(x+7y)}$$

$$= \frac{13x}{y}\,\frac{(x+7y)(x-7y)}{(x+7y)}$$

$$= \frac{13x}{y}(x-7y) \qquad \textbf{Ans}$$

11. $52y^3\,(25y^2 - 49x^2)$ **by** $39y`(5y + 7x)$

$$= \frac{52y^3\,(25y^2 - 49x^2)}{39y(5y+7x)}$$

$$= \frac{52y^3\,[(5y)^2 - (7x)^2]}{39y(5y+7x)}$$

$$= \frac{4y^2\,(5y+7x)(5y-7x)}{(5y+7x)}$$

$$= \frac{4y^2}{3}(5y-7x) \qquad \textbf{Ans}$$

12. $28\,(50m^2 - 98n^2)$ **by** $(5m - 7n)$

$$= \frac{28(50m^2 - 98n^2)}{(5m-7n)}$$

$$= \frac{56(25m^2 - 49n^2)}{(5m-7n)}$$

$$= \frac{56[(5m)^2 - (7n)^2]}{(5m-7n)}$$

$$= \frac{56(5m+7n)(5m-7n)}{(5m-7n)}$$

$$= 56(5m+7n) \qquad \textbf{Ans}$$

13. $48\,(2y^4 - 36y^2 + 162)$ **by** $4\,(y-3)^2$

$$= \frac{48\times 2(y^4 - 18y^2 + 81)}{(y-3)(y-3)}$$

$$= \frac{96(y^4 - 9y^2 - 9y^2 + 81)}{(y-3)(y-3)}$$

$$= \frac{96[y^2\,(y^2-9) - 9(y^2-9)]}{(y-3)(y-3)}$$

$$= \frac{96(y^2-9)(y^2-9)}{(y-3)(y-3)}$$

$$= \frac{96(y^2 - 3^2)(y^2 - 3^2)}{(y-3)(y-3)}$$

$$= \frac{96(y+3)(y-3)(y+3)(y-3)}{(y-3)(y-3)}$$

$$= 96(y+3)^2 \qquad \textbf{Ans}$$

14. $(x^2 - 2xy + y^2 - 9z^2)$ **by** $(x - y - 3z)$

$$= \frac{(x^2 - 2xy + y^2 - 9z^2)}{(x - y - 3z^2)}$$

$$= \frac{(x-y)^2 - (3z)^2}{(x-y-3z)}$$

$$= \frac{(x-y+3z)(x-y-3z)}{(x-y-3z)}$$

$$= (x-y+3z) \qquad \textbf{Ans}$$

15. $44\,(5x^2 - 20x - 8y + 2xy)$ **by** $(5x + 2y)$

$$= \frac{44\,(5x^2 - 20x - 8y + 2xy)}{(5x+2y)}$$

$$= \frac{44[5x(x-4) + 2y(x-4)]}{(5x+2y)}$$

$$= \frac{44(x-4)(5x+2y)}{(5x+2y)}$$

$$= 44(x-4) \qquad \textbf{Ans}$$

16. $(16c^2 - 4a^2 - 12ab - 9b^2)$ **by** $(2a + 3b + 4c)$

$$= \frac{16c^2 - (4a^2 + 12ab + 9b^2)}{(2a+3b+4c)}$$

$$= \frac{(4c)^2 - [(2a)^2 + 12ab + (3b)^2]}{(2a+3b+4c)}$$

$$= \frac{(4c)^2 - (2a+3b)^2}{(2a+3b+4c)}$$

$$= \frac{(4c+2a+3b)(4c-2a-3b)}{(2a+3b+4c)}$$

$$= (4c-2a-3b) \qquad \textbf{Ans}$$

MCQs

1.	(b)	**2.**	(d)	**3.**	(b)	**4.**	(b)	**5.**	(c)
6.	(b)	**7.**	(d)	**8.**	(b)	**9.**	(b)	**10.**	(c)
11.	(b)	**12.**	(d)	**13.**	(b)				

CHAPTER 13 : LINEAR EQUATION IN ONE VARIABLE

Exercise-13A

Solve the following equations :

1. $3x+5=20$

$3x=20-5$

$3x=15$

$x=\frac{15}{3}$

$x=5$ **Ans**

2. $7=2x+5$

$2x=7-5$

$2x=2$

$x=\frac{2}{2}$

$x=1$ **Ans**

3. $\frac{1}{3}x+2=\frac{7}{3}$

$x+6=7$

$x=7-6$

$x=1$ **Ans**

4. $\frac{2x}{5}=28$

$2x=28\times 5$

$x=\frac{28\times 5}{2}$

$x=14\times 5$

$x=70$ **Ans**

5. $2x+\frac{1}{2}=\frac{17}{2}$

$4x+1=17$

$4x=17-1$

$4x=16$

$x=\frac{16}{4}$

$x=4$ **Ans**

6. $\frac{x}{7}+5=\frac{29}{7}$

$x+35=29$

$x=29-35$

$x=-6$ **Ans**

7. $\frac{3x}{10(2-x)-3(x+2)}=\frac{-6}{40}$

$\frac{3x}{20-10x-3x-6}=\frac{-6}{40}$

$\frac{3x}{14-13x}=\frac{-6}{40}$

$3x\times 40=-6(14-13x)$

$120x=-84+78x$

$42x=-84$

$x=\frac{-84}{42}$

$x=-2$ **Ans**

8. $\frac{2x-(3-4x)}{3x-(8-x)}=\frac{15}{4}$

$\frac{2x-3+4x}{3x-8+x}=\frac{15}{4}$

$\frac{6x-3}{4x-8}=\frac{15}{4}$

$4(6x-3)=15(4x-8)$

$24x-12=60x-120$

$60x-24x=-12+120$

$36x=108$

$x=\frac{108}{36}$

$x=3$ **Ans**

9. $x+(2+3x)-5=1-\frac{1+x}{4}$

$x+2+3x-5=1-\left(\frac{1+x}{4}\right)$

$4x-3=1-\left(\frac{1+x}{4}\right)$

or $16x-12=4-1-x$

$16x+x=3+12$

$17x=15$

$x=\frac{15}{17}$ **Ans**

10. $\frac{(x-3)}{4}-\frac{(x+2)}{3}=1-\frac{x+1}{5}$

$\frac{3(x-3)-4(x+2)}{12}=\frac{5-x-1}{5}$

$\frac{3x-9-4x-8}{12}=\frac{4-x}{5}$

$\frac{-x-17}{12}=\frac{4-x}{5}$

$$5(-x-17)=12(4-x)$$
$$-5x-85=48-12x$$
$$-5x+12x=48+85$$
$$7x=133$$
$$x=\frac{133}{7}$$
$$x=19$$ **Ans**

11. $\dfrac{-5(x+12)+17(2-x)}{8}=1-7x$

$$-5x-60+34-17x=8(1-7x)$$
$$-22x-26=8-56x$$
$$-22x+56x=8+26$$
$$34x=34$$
$$x=\frac{34}{34}$$
$$x=1$$ **Ans**

12. $\dfrac{5x-7}{15x-2}=1$

$$5x-7=15x-2$$
$$5x-15x=-2+7$$
$$-10x=5$$
$$x=\frac{-5}{10}$$
$$x=\frac{-1}{2}$$ **Ans**

13. $\dfrac{3x+4}{2x-3}=\dfrac{2}{3}$

$$3(3x+4)=2(2x-3)$$
$$9x+12=4x-6$$
$$9x-4x=-6-12$$
$$5x=-18$$
$$x=\frac{-18}{5}$$ **Ans**

14. $\dfrac{-x+7}{x-9}=\dfrac{1}{5}$

$$5(-x+7)=1(x-9)$$
$$-5x+35=x-9$$
$$-5x-x=-9-35$$
$$6x=-44$$
$$x=\frac{-44}{6}$$
$$x=\frac{-22}{3}$$ **Ans**

15. $\dfrac{3(2x-5)}{7-x}=\dfrac{3}{2}$

$$3\times 2(2x-5)=3(7-x)$$
$$12x-30=21-3x$$
$$12x+3x=21+30$$
$$15x=51$$
$$x=\frac{51}{15}$$
or $$x=\frac{17}{5}$$ **Ans**

16. $\dfrac{x+4}{x-4}=\dfrac{4}{5}$

$$5(x+4)=4(x-4)$$
$$5x+20=4x-16$$
$$5x-4x=-16-20$$
$$x=-36$$ **Ans**

17. $\dfrac{0.3x+0.2}{1.2x+1.6}=\dfrac{2}{5}$

$$5(0.3x+0.2)=2(1.2x+1.6)$$
$$1.5x+1.0=2.4x+3.2$$
$$1.5x-2.4x=3.2-1.0$$
$$0.9x=2.2$$
$$x=\frac{2.2}{0.9}$$
$$x=\frac{22}{9}$$ **Ans**

18. $\dfrac{3(x-5)-(3x-1)}{5x-2}=2$

$$3x-15-3x+1=2(5x-2)$$
$$-14=10x-4$$
$$10x=-14+4$$
$$10x=-10$$
$$x=\frac{-10}{10}$$
$$x=-1$$ **Ans**

19. $2y+\dfrac{3}{5}=\dfrac{25}{3}-y$

$$2y+y=\frac{25}{3}-\frac{3}{5}$$
$$3y=\frac{25}{3}-\frac{3}{5}$$
$$45y=125-9$$
$$45y=116$$
$$y=\frac{116}{45}$$ **Ans**

20. $2x=-\dfrac{2}{2}(x-1)$

$$2x=-1(x-1)$$
$$2x=-x+1$$
$$2x+x=1$$
$$3x=1$$
$$x=\frac{1}{3}$$ **Ans**

Exercise 13B

1. The sum of two consecutive even natural numbers is 46. Find the numbers.

Let first number be = x

and second number be = $x+2$

Then, A.C.Q.

$$x+x+2=46$$
$$2x+2=46$$
$$2x=46-2$$
$$2x=44$$
$$x=\frac{44}{2}$$
$$x=22$$

So, first number is 22

and second number is $22+2=24$ **Ans**

2. The sum of three consecutive odd natural numbers is 81. Find the numbers.

Let first number be = x

and second number be = $x+2$

and third number = $x+4$

Then, A.C.Q.

$$x+x+2+x+4=81$$
$$3x+6=81$$
$$3x=81-6$$
$$3x=75$$
$$x=\frac{75}{3}$$
$$x=25$$

So, first number is 25, second number is $25+2=27$ and third number will be $25+4=29$.

3. Two numbers are in the ratio of 5 : 6. If the sum of the numbers is 154, find the numbers.

Let first number be = $5x$

and second number be = $6x$

Then A.C.Q.

$$5x+6x=154$$
$$11x=154$$
$$x=\frac{154}{11}$$
$$x=14$$

So, first number is $5\times14=70$

and the second number is $6\times14=84$ **Ans**

4. Two numbers are in the ratio 7 : 9. If their difference is 22. Find the numbers.

Let first number be $7x$

and second number be = $9x$

Then, A.C.Q.

$$9x-7x=22$$
$$2x=22$$
$$x=\frac{22}{2}$$
$$x=11$$

So, the first number is $7\times11=77$

and the second number is $9\times11=99$ **Ans**

5. One number is 3 times the other number. If 15 is added to both the numbers, then one number becomes the twice of the other number. Find the numbers.

Let first number be x

and second number be = $3x$

Then A.C.Q.

$$5x+15=2(x+15)$$
$$3x+15=2x+30$$
$$3x-2x=30-15$$
$$x=15$$

So, first number is 15

and second number will be $3\times15=45$ **Ans**

6. Priya is five times older than her daughter Reeta. Five years ago, Priya was nine times older than her daughter Reeta. Find their present ages.

Let the age of Reeta = x years

and age of Priya = $5x$ years

Then A.C.Q.

$$5x-5=9(x-5)$$
$$5x-5=9x-45$$
$$9x-5x=-5+45$$
$$4x=40$$
$$x=\frac{40}{4}$$
$$x=10$$

So, age of Reeta = 10 years

and age of Priya = $5 \times 10 = 50$ years **Ans**

7. The present age of Nakul's mother is three times the present age of Nakul. After 5 years their ages will add to 66 years. Find their present ages.

Let the present age of Nakul = x years

and Nakul mother age = $3x$

Then ACQ

$$3x + 5 + x + 5 = 66$$
$$4x + 10 = 66$$
$$4x = 66 - 10$$
$$4x = 56$$
$$x = \frac{56}{4}$$
$$x = 14$$

So the age of Nakul = 14 years

and his mother's age = $14 \times 3 = 42$ years **Ans**

8. The breadth of a rectangle is 5 more than one third of the length. The perimeter of the rectangle is 42 cm. Find the length of the rectangle.

Let the length of rectangle = $3x$

Then breadth = $x + 5$ cm

ACQ

$$\text{Perimeter} = 42$$

or $2(3x + x + 5) = 42$

$$2(4x + 5) = 42$$
$$8x + 10 = 42$$
$$8x = 42 - 10$$
$$8x = 32$$
$$x = \frac{32}{8}$$
$$x = 4$$

So, length = $3 \times x = 3 \times 4 = 12$ cm

and breadth = $4 + 5 = 9$ cm **Ans**

9. The present age of Sunita's mother is three times the present age of Sunita. After 6 years, the sum of their ages will be 64 years. Find their present ages.

Let the present age of Sunita = x years

and the present age of her mother = $3x$ years

Then, ACQ

$$3x + 6 + x + 6 = 64$$
$$4x + 12 = 64$$
$$4x = 64 - 12$$
$$4x = 52$$
$$x = \frac{52}{4}$$
$$x = 13$$

So, the age of Sunita = 13 years

and the age of Sunita's mother = $3 \times 13 = 39$ years

10. The ages of Rahul and Haroon are in the ratio 3 : 5. Seven years later the sum of their ages will be 62 years. What are their present ages ?

Let the age of Rahul = $3x$ years

and the age of Haroon = $5x$ years

Then, ACQ

$$3x + 7 + 5x + 7 = 62$$
$$8x + 14 = 62$$
$$8x = 62 - 14$$
$$8x = 48$$
$$x = \frac{48}{8}$$
$$x = 6$$

So, age of Rahul = $3 \times x = 3 \times 6 = 18$ years

and age of Haroon = $5 \times x = 5 \times 6 = 30$ years

11. A's father is 35 years younger than his grandfather and 63 years older than him. The sum of the ages of all the three is 112 years. Find the ages of each one of them.

Let the age of $A = x$ years

then his grandfather age = $x + 63$ years

then his father age = $x + 63 - 35 = x + 28$ years

ACQ

$$x + x + 63 + x + 28 = 112$$
$$3x + 91 = 112$$
$$3x = 112 - 91$$
$$3x = 21$$
$$x = \frac{21}{3}$$
$$x = 7$$

So, age of $A = 7$ years

his father age = $7 + 28 = 35$ years

and his grandfather's age = $7 + 63 = 70$ years

12. Twenty four years from now Kavita will be three times her present age. What is her present age ?

Let Kavita's present age = x years

ACQ

$$x+24=3x$$
$$3x-x=24$$
$$2x=24$$
$$x=\frac{24}{2}$$
$$x=12$$

So the present age of Kavita = 12 years

13. Mahesh is thrice as old as Tarun. Two years ago his age was four times Tarun's age. Find their present ages.

Let the age of Tarun = x years

and the Age of Mahesh = $3x$ years

ACQ

$$3x-2=4(x-2)$$
$$3x-2=4x-8$$
$$4x-3x=-2+8$$
$$x=6$$

So, the age of Tarun = 6 years

and the age of Mahesh = $6\times 3=18$ years

14. In a rational number, numerator is 3 less than the denominator. If 3 is added to the numerator, fraction becomes 1. Find the fraction.

Let the numerator = x

The is denominator = $x+3$

ACQ

$$\frac{x+3}{x+3}=1$$
$$x+3=x+3$$
$$x=x$$

So numerator = 1

and denominator = $1+3=4$

So, fraction = $\frac{1}{4}$ or $\frac{2}{5}$ or $\frac{3}{6}$ or $\frac{4}{5}$ or $\frac{5}{8}$ **Ans**

15. In a rational number, denominator is 5 more than the numerator. If 2 is added to the numerator and 2 is subtracted from the denominator the rational number becomes 5/6. Find the fraction.

Let the numerator of fraction = x

then denominator of fraction = $x+5$

ACQ

$$\frac{x+2}{x+5-2}=\frac{5}{6}$$
$$\frac{x+2}{x+3}=\frac{5}{6}$$
$$6(x+2)=5(x+3)$$
$$6x+12=5x+15$$
$$6x-5x=15-12$$
$$x=3$$

So the fraction will be = $\frac{x}{x+5}=\frac{3}{3+5}$

$=\frac{3}{8}$ **Ans**

16. The sum of the digits of a two-digit number is 7. The number obtained by interchanging the digits exceeds the original number by 27. Find the number.

Let the digits of once place = x

and the digit of tens place = $7-x$

then ACQ

$$(7-x)\times 10+x+27=(x\times 10)+7-x$$
$$70-10x+x+27=10x+7-x$$
$$97-9x=9x+7$$
$$9x+9x=97-7$$
$$18x=90$$
$$x=\frac{90}{18}$$
$$x=5$$

So, the digit at once place = 5

and digits at tens place = $7-5=2$

and the number will be = 25 **Ans**

17. The sum of the digits of a two-digit number is 5. The number obtained by reversing the order of digit diminished the original number by 9. Find the number.

Let the digit of once place = x

then the digit of tens place = $5-x$

ACQ

$$(5-x)\times 10+x-9=(x\times 10)+(5-x)$$
$$50-10x+x-9=10x+5-x$$
$$41-9x=ax+5$$
$$9x+9x=41-5$$
$$18x=36$$
$$x=\frac{36}{18}$$
$$x=2$$

So, the digit of once place = 2

and the digit of tens place = $5-2=3$

and the number will be = 32 **Ans**

18. The tens place digit of two-digit number is twice the digit of unit place digit. The number obtained by interchanging the digits diminished the original number by 36. Find the number.

Let the length of once place = x

then the digit of tens place = $2x$

ACQ

$$2x\times 10+x-36=x\times 10+2x$$
$$20x+x-36=10x+2x$$
$$21x-36=12x$$
$$21x-12x=36$$
$$9x=36$$
$$x=\frac{36}{9}$$
$$x=4$$

So, the digit of once place = 4

and the digit of tens place = $2\times 4=8$

So, the will be = 84 **Ans**

MCQs

1.	(b)	**2.**	(d)	**3.**	(b)	**4.**	(b)	**5.**	(c)
6.	(b)	**7.**	(d)	**8.**	(b)	**9.**	(b)	**10.**	(c)

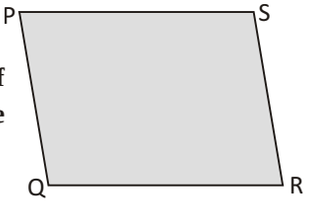
CHAPTER-14 : QUADRILATERAL

Exercise-14A

1. In the adjoining figure *PQRS* is a quadrilateral :

(a) How many pairs of adjacent sides are there ? Name them.

(b) How many pairs of adjacent angles are there ? Name them.



(c) How many diagonals are there ? Name them.

(a) Four pairs :

PQ, QR; QR, RS; RS, SP; SP, PQ

(b) Four pairs :

$\angle PQR, \angle QRS$; $\angle QRS, \angle RSP$; $\angle RSP, \angle SPQ$;

$\angle SPQ, \angle PQR$

(c) Two diagonals

PR and SQ

2. The measure of three angles of a quadrilateral are 105°, 35° and 70°. Find the measure of fourth angle.

Let $\angle 1=105°$, $\angle 2=35°$

$\angle 3=70°$, $\angle 4=?$

We know that in quadrilateral

$$\angle 1+\angle 2+\angle 3+\angle 4=360°$$
$$105°+35°+70°+\angle 4=360°$$
$$210°+\angle 4=360°$$
$$\angle 4=360°-210°$$
$$\angle 4=150°$$ **Ans**

3. The measure of two angles of a quadrilateral are 40° and 180°. Find the measure of each of other remaining angles, if the measure of those are same.

Let $\angle 1=40°$, $\angle 2=180°$

$\angle 3=x°$, $\angle 4=x°$

We know that in quadrilateral

$$\angle 1+\angle 2+\angle 3+\angle 4=360°$$
$$40°+180°+x°+x°=360°$$
$$220°+2x°=360°$$
$$2x°=360°-220°$$
$$2x°=140°$$
$$x=\frac{140°}{2}$$
$$x=70°$$

So, $\angle 3=70°$ and $\angle 4=70°$ **Ans**

4. The measure of one angle of a quadrilateral is 150° and other three angles are equal in measure. Find the measure of each of the equal angle.

Let $\angle 1=150°$, $\angle 2=x°$,

$\angle 3=x°$, $\angle 4=x°$

We know that in quadrilateral

$$\angle 1+\angle 2+\angle 3+\angle 4=360°$$
$$150°+x°+x°+x°=360°$$
$$150°+3x°=360°$$
$$3x°=360°-150°$$
$$3x=210°$$
$$x=\frac{210°}{3}$$
$$x=70°$$

So, $\angle 2=70°$, $\angle 3=70°$ and $\angle 4=70°$.

5. The angles of a quadrilateral are in the ratio 3 : 4 : 6 : 7. Find the measure of each angle.

Let $\angle 1 = 3x°$, $\angle 2 = 4x°$,

$\angle 3 = 6x°$, $\angle 4 = 7x°$

We know that in quadrilateral

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 = 360°$$

$$3x° + 4x° + 6x° + 7x° = 360°$$

$$20x° = 360°$$

$$x° = \frac{360°}{20}$$

$$x = 18°$$

So, $\angle 1 = 3 \times 18° = 54°$; $\angle 2 = 4 \times 18° = 72°$;

$\angle 1 = 6 \times 18° = 108°$; $\angle 4 = 7 \times 18° = 126°$

6. The angles of a quadrilateral are in the ratio 4 : 4 : 5 : 5. Find the measure of each angle.

Let $\angle 1 = 4x$, $\angle 2 = 4x$,

$\angle 3 = 5x$, $\angle 4 = 5x$

Since, sum of the angles of a quadrilateral is 360°.

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 = 360°$$

$$4x + 4x + 5x + 5x = 360°$$

$$18x = 360°$$

$$x = \frac{360°}{18}$$

$$x = 20°$$

So, $\angle 1 = 4 \times 20° = 80°$; $\angle 2 = 4 \times 20° = 80°$;

$\angle 1 = 5 \times 20° = 100°$; $\angle 4 = 5 \times 20° = 100°$

7. Find the measure of each exterior angles of a regular polygon of :

(a) 18 sides

$$\text{Exterior angle} = \frac{360°}{\text{sides}}$$

$$= \frac{360°}{18} = 20°$$ **Ans**

(b) 10 sides

$$\text{Exterior angle} = \frac{360°}{\text{sides}}$$

$$= \frac{360°}{10} = 36°$$ **Ans**

(c) 9 sides

$$\text{Exterior angle} = \frac{360°}{\text{sides}}$$

$$= \frac{360°}{9} = 40°$$ **Ans**

(d) 6 sides

$$\text{Exterior angle} = \frac{360°}{\text{sides}}$$

$$= \frac{360°}{6} = 60°$$ **Ans**

8. How many sides does a regular polygon have if the measure of an exterior angle is 24° ?

Exterior angle = 24°

$$\text{Number of sides} = \frac{360°}{\text{exterior angle}}$$

$$= \frac{360°}{24} = 15 \text{ sides}$$ **Ans**

9. How many sides does a regular polygon have if each of its interior angles is 165° ?

Interior angle = 165°

Exterior angle = 180° − 165° = 15°

$$\text{Number of sides} = \frac{360°}{\text{exterior angle}}$$

$$= \frac{360°}{15} = 24 \text{ sides}$$ **Ans**

10. How many sides does a regular polygon have if each of its interior angles is 140° ?

Interior angle = 140°

Exterior angle = 180° − Interior angle

$$= 180° - 140° = 40°$$

$$\text{Number of sides} = \frac{360°}{\text{exterior angle}}$$

$$= \frac{360°}{40} = 9 \text{ sides}$$ **Ans**

Exercise-14B

1. *PQRS* is a parallelogram in which $\angle Q = 70°$. Find the measure of each remaining angle.

$$\angle Q = 70°$$

$\angle Q + \angle R = 180°$ (Adjacent angle)

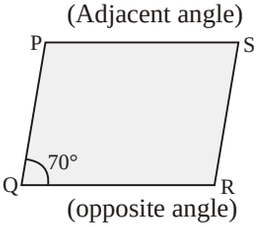
$70° + \angle R = 180°$

$\angle R = 180° - 70°$

$\angle R = 110°$

and $\angle P = \angle R = 110°$ (opposite angle)

$\angle S = \angle Q = 70°$ (opposite angle)



So, $\angle P = 110°$, $\angle Q = 70°$,

$\angle R = 110°$, $\angle S = 70°$ **Ans**

2. Ratio of two adjacent angles of a parallelogram is 5 : 7. Find the measure of each angle.

Let adjacent angles of parallelogram are $5x$ and $7x$.

We know,

$$5x + 7x = 180° \quad \text{(adjacent angle)}$$

$$12x = 180°$$

$$x = \frac{180°}{12}$$

$$x = 15°$$

So, First angles $= 5 \times 15° = 75°$

Second angle $= 7 \times 15° = 105°$

Third angle $= 5 \times 15° = 75°$

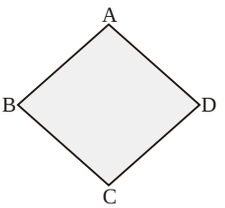
Fourth angle $= 7 \times 15° = 105°$

3. The sum of two opposite angles of a rhombus is 160°. Find the measure of each angle.

Given sum of opposite angles of rhombus is 160°.

We know that,

Opposite angles are equal is rhombus.



So, $\angle A = x$ and $\angle C = x$

$\angle B = y$ and $\angle D = y$

Then, $A + C = 160°$

$$x + x = 160°$$

$$2x = 160°$$

$$x = \frac{160°}{2}$$

$$x = 80°$$

In rhombus we have

Sum all angles = 360°

$$\angle A + \angle B + \angle C + \angle D = 360°$$

$$80° + y + 80° + y = 360°$$

$$2y + 160° = 360°$$

$$2y = 360° - 160°$$

$$2y = 200°$$

$$y = \frac{200°}{2}$$

$$y = 100°$$

So, Angles are 80°, 100°, 80°, 100° **Ans**

4. The perimeter of a parallelogram *ABCD* is 140 cm. If one of the sides is greater than the other by 10 cm, find the lengths of all the sides of the parallelogram.

Let one side of parallelogram = x cm

Then other sides will be = $x + 10$ cm

Perimeter given = 140 cm

$$\text{Perimeter} = 2(x + x + 10)$$

$$140 = 2(2x + 10)$$

$$4x + 20 = 140$$

$$4x = 120$$

$$x = \frac{120}{4}$$

$$x = 30$$

So, one side will be = 30 cm

and other sides will be = $30 + 10 = 40x$ cm **Ans**

5. Two opposite angles of a parallelogram are $(3x - 2)°$ and $(50 - x)°$. Find the measure of each angle of the parallelogram.

We know that opposite angles of parallelogram are equal.

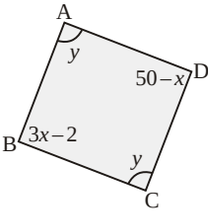
So, $(3x - 2)° = (50 - x)°$

$$3x + x = 50 + 2$$

$$4x = 52°$$

$$x = \frac{52°}{4}$$

$$x = 13°$$



So, $\angle B = 3 \times 13 - 2 = 37°$

$\angle D = 50 - 13 = 37°$

Since sum of all angles in parallelogram is 360°.

$$\angle A + \angle B + \angle C + \angle D = 360°$$

$$y + 37° + y = 37° = 360°$$

$$2y + 74° = 360°$$

$$2y = 360° - 74°$$

$$2y = 286°$$

$$y = \frac{286°}{2}$$

$$y = 143°$$

So, $\angle A = 143°$, $\angle B = 37°$,

$\angle C = 143°$, $\angle D = 37°$ **Ans**

6. Ratio of two adjacent sides of a parallelogram is 3 : 5. If its perimeter is 64 cm. Find the length of each side.

Let one side of parallelogram = $3x$

and other side of parallelogram = $5x$

Perimeter = 64 cm

or $2(3x+5x)=64$

$2\times 8x=64$

$16x=64$

$x=\frac{64}{18}$

$x=4$

So, one side $=3\times 4=12$ cm

other side $=5\times 4=20$ cm **Ans**

7. Perimeter of a rhombus is 36 cm, find its side.

Perimeter of rhombus = 36 cm

$$\text{Side of rhombus}=\frac{\text{Perimeter}}{4}$$

$$=\frac{36}{4}=9 \text{ cm}$$ **Ans**

8. Find the perimeter of the rhombus, if lengths of its diagonals are 12 cm and 16 cm.

Given $AC=12$ cm

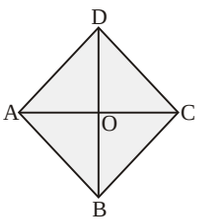
and $BC=16$ cm

We know diagonal bisect each other at 90° in rhombus.

$$AO=\frac{AC}{2}=\frac{12}{2}=6\text{cm}$$

$$OB=\frac{BD}{2}=\frac{16}{2}=8\text{cm}$$

In ΔAOB,



$AB^2=(OA)^2+(OB)^2$

$AB^2=(6)^2+(8)^2$

$AB^2=36+64$

$AB^2=100$

$AB=\sqrt{100}$

$AB=10$ cm

So, side of rhombus = 10 cm

and perimeter $=4\times$ side

$=4\times 10$ cm

$=40$ cm **Ans**

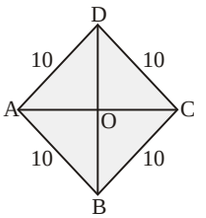
9. If the length of one diagonal of a rhombus is 16 cm and measure of each side is 10 cm. Find the length of other diagonal.

Let $AC=16$ cm

Let diagonal $BD=2x$ cm

Then, $OB=x$ cm

$\therefore$ $AO=\frac{AC}{2}=\frac{16}{2}=8$ cm



In ΔAOB

$AB^2=OA^2+OB^2$

$100=64+x^2$

$x^2=100-64$

$x^2=36$

$x=\sqrt{36}$

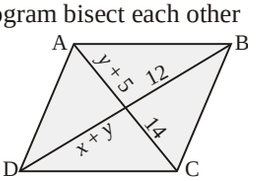
$x=6$ cm

So, diagonal $BD=2\times x=2\times 6=12$ cm **Ans**

10. In the given figure, *ABCD* is a parallelogram, find the value of *x* and *y*.

Given, *ABCD* is a parallelogram

We know that diagonal of parallelogram bisect each other



So, $AO=OC$

$y+5=14$

$y=14-5$

$y=9$ cm

or $OB=OD$

$x+y=12$

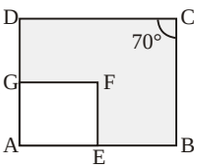
$x+9=12$

$x=12-9$

$x=3$cm **Ans**

11. In parallelogram *ABCD*

We know that,



Opposite angles of parallelogram are equal

So, $\angle A=\angle C=70°$

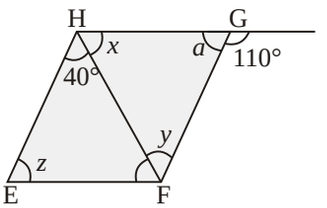
Now, In parallelogram *AEFG*

We know that opposite angles of parallelogram are equal.

$\angle F=\angle A$

$\angle F=70°$ **Ans**

12. In the given figure



$\angle y=40°$ (co-interior angle)

or $\angle G=x+y$

(Exterior angle equal is to sum of opposite interior angle)

$$110° = x + 40°$$

$$x = 110° - 40°$$

$$x = 70°$$

In ΔFGH

$$\angle x + \angle y + \angle a = 180°$$

$$70° + 40° + \angle a = 180°$$

$$\angle a = 180° - 110°$$

$$\angle a = 70°$$

and $\angle z = \angle a$

(opposite angle of parallelogram)

$$\angle z = 70°$$

So, $x = 70°$, $y = 40°$ and $\angle z = 70°$ **Ans**

MCQs

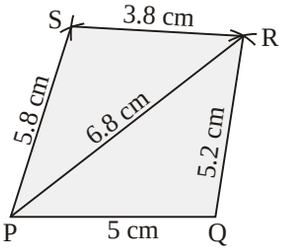
1. (b) **2.** (d) **3.** (b) **4.** (b) **5.** (c)

6. (b) **7.** (d) **8.** (b) **9.** (b) **10.** (c)

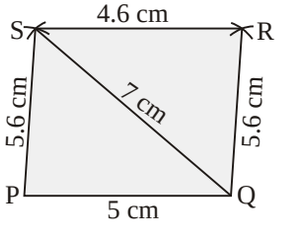
CHAPTER15 : PRACTICAL GEOMETRY

Exercise-15A

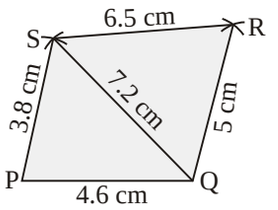
1. Construct a quadrilateral *PQRS* in which *PQ* = 4 cm, *QR* = 5.2 cm, *RS* = 3.8 cm, *PS* = 5.8 cm and *PR* = 6.8.



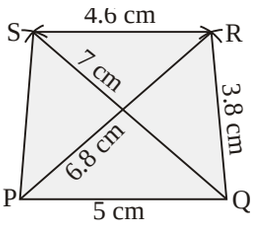
2. Construct a quadrilateral *PQRS* in which *PQ* = 5 cm, *QR* = 5.6 cm, *RS* = 4.6 cm, *PS* = 5.6 and *QS* = 7 cm.



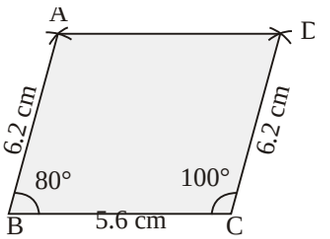
3. Construct a quadrilateral *ABCD* in which *AB* = 4.6 cm, *BC* = 5 cm, *CD* = 6.5 cm, *DA* = 3.8 cm and *BD* = 7.2 cm.



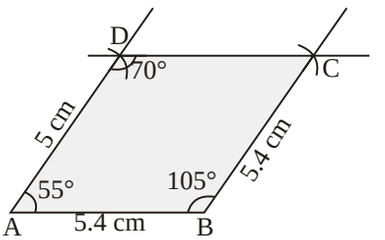
4. Construct a quadrilateral *PQRS* in which *PQ* = 5 cm, *QR* = 3.8 cm, *RS* = 4.6 cm, *PR* = 6.8 cm, and *QS* = 7 cm.



5. Construct a quadrilateral *ABCD* in which *AB* = 6.2 cm, *BC* = 5.6 cm, *CD* = 6.2 cm, $\angle B = 80°$ and $\angle C = 100°$.

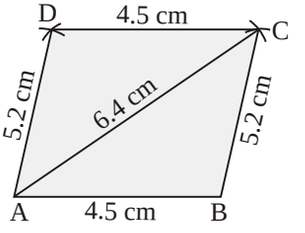


6. Construct a quadrilateral *ABCD* in which *AB* = 5.4 cm, *BC* = 4 cm, *AD* = 5 cm, $\angle A = 55°$, $\angle B = 105°$ and $\angle D = 70°$.

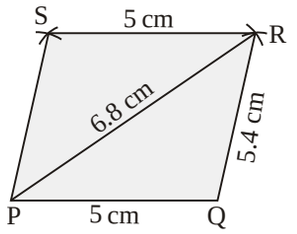


Exercise-15B

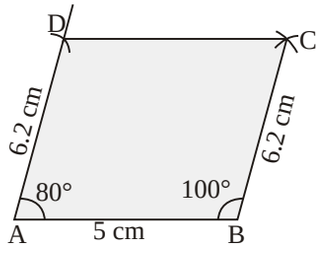
1. Construct a parallelogram *ABCD* in which *AB* = 4.5 cm, *BC* = 5.2 and *AC* = 6.4 cm.



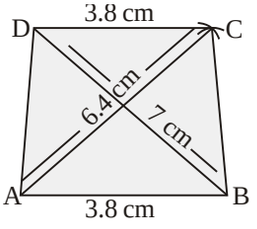
2. Construct a parallelogram *PQRS* in which *PQ* = 5 cm, *QR* = 5.4 cm and *PR* = 6.8 cm.



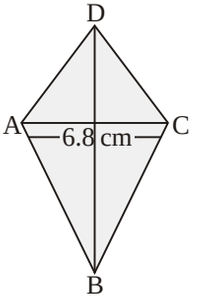
3. Construct a parallelogram whose two sides and one angle are 5 cm, 6.2 cm and 80°.



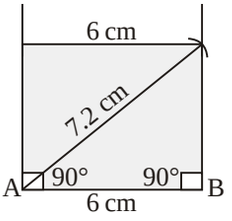
4. Construct a parallelogram whose diagonals are 6.4 cm, 7 cm and one side is 3.8 cm.



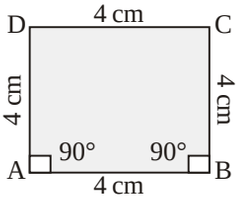
5. Construct a rhombus whose diagonals are 8 cm and 6.8 cm long.



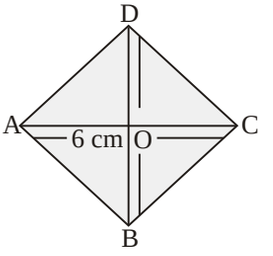
6. Construct a rectangle whose one side is 6 cm and one diagonal is 7.2 cm.



7. Construct a square whose one side is 4 cm.



8. Construct a square whose diagonal is 6 cm long.



MCQs

1. (b) **2.** (d) **3.** (b) **4.** (b) **5.** (c)
6. (b) **7.** (d) **8.** (b) **9.** (b) **10.** (c)

CHAPTER 16 : VISUALIZING SOLID SHAPES

Exercise-16A

1. Write the names of the solid for each picture.

(a) Cuboid **(b)** Cone **(c)** Cube
(d) Cylinder **(e)** Cone **(f)** Cube
(g) Cylinder **(h)** Cylinder **(i)** Cylinder

2. Do yourself.

Exercise16-B

1. Fill in the blanks :

(a) 6 **(b)** 8, 6
(c) Cuboid **(d)** 2, 3
(e) Rectangle **(f)** Tetrahedron
(g) 4 **(h)** Triangular pyramid
(i) 5 **(j)** equal

2. Dice, Brick, Box, Almirah, Ice cube etc. **Ans**

MCQs

1. (b) **2.** (d) **3.** (b) **4.** (b) **5.** (c)
6. (sb) **7.** (d) **8.** (b) **9.** (b) **10.** (c)

CHAPTER 17 : AREA OF A TRAPEZIUM AND A POLYGON

Exercise-17A

1. Find the area of a trapezium, lengths of whose parallel sides are 24 cm and 16 cm and the distance between them is 5 cm.

$a = 24\,\text{cm}, b = 16\,\text{cm}, h = 5\,\text{cm}$

$$\text{Area of trapezium} = \frac{1}{2}[l+b]\times h$$

$$= \frac{1}{2}(24+16)\times 5$$

$$= \frac{1}{2}\times 40\times 5$$

$$= 100\,\text{cm}^2$$ **Ans**

2. Calculate the area of a trapezium in cm^2, lengths of whose parallel sides (represented by *a* and *b*) and distance between them (*h*) are :

(a) $a = 4$ dm, $b = 8$ cm, $h = 1$ m

or $a = 40\,\text{cm}, b = 8\,\text{cm}, h = 100\,\text{cm}$

$$\text{Area of Trapezium} = \frac{1}{2}(a+b)\times h$$

$$= \frac{1}{2}(40+8)\times 100$$

$$= \frac{1}{2}\times 48\times 100$$

$$= 2400\,\text{cm}^2$$ **Ans**

(b) $a = 14$ cm, $b = 18$ cm, $h = 15$ cm

$$\text{Area of Trapezium} = \frac{1}{2}(a+b)\times h$$

$$= \frac{1}{2}(14+18)\times 15$$

$$= \frac{1}{2}\times 32\times 15$$

$$= 240\,\text{cm}^2$$ **Ans**

(c) $a = 8.5$ cm, $b = 3.4$ cm, $h = 6$ cm,

$$\text{Area of Trapezium} = \frac{1}{2}(a+b)\times h$$

$$= \frac{1}{2}(8.5+3.4)\times 6$$

$$= \frac{1}{2}\times 11.9\times 6$$

$$= 35.7\,\text{cm}^2$$ **Ans**

(d) $a = 5$ m, $b = 50$ cm, $h = 50$ dm

$a = 500\,\text{cm}, b = 50\,\text{cm}, h = 500\,\text{cm}$

$$\text{Area of Trapezium} = \frac{1}{2}(a+b)\times h$$

$$= \frac{1}{2}(500+50)\times 500$$

$$= \frac{1}{2}\times 550\times 500$$

$$= 275\times 500$$

$$= 137500\,\text{cm}^2$$ **Ans**

3. Calculate the area of a trapezium if the distance between its parallel is 19 cm and the two parallel sides measures 27 cm and 23 cm.

$$\text{Area of Trapezium} = \frac{1}{2}(a+b)\times h$$

$$= \frac{1}{2}(27+23)\times 19$$

$$= \frac{1}{2}\times 50\times 19$$

$$= 475\,\text{cm}^2$$ **Ans**

4. The area of a trapezium is 45 cm^2. If its heights is 6 cm and the length of one of its bases is 9 cm. Find the length of its other base.

$\text{Area of trapezium} = 45\,\text{cm}^2$

$h = 6\,\text{cm}$

$a = 9\,\text{cm}$

$b = ?$

$$\text{Area of Trapezium} = \frac{1}{2}(a+b)\times h$$

$$45 = \frac{1}{2}(9+b)\times 6$$

$$45 = 3(9+b)$$

$$15 = 9+b$$

$$b = 15-9$$

$$b = 6\,\text{cm}$$ **Ans**

5. The area of a trapezium is 210 cm^2 and its height is 14 cm. If one of the parallel sides is double that of the other, find the two parallel sides.

$\text{Area of Trapezium} = 210\,\text{cm}^2$

$b = 14\,\text{cm}$

Let $a = x$

then $b = 2x$

Area of Trapezium $= \frac{1}{2}(a+b)\times h$

$$210 = \frac{1}{2}(x+2x)\times 14$$

$$210 = 7(x+2x)$$

$$210 = 7\times 3x$$

$$21x = 210$$

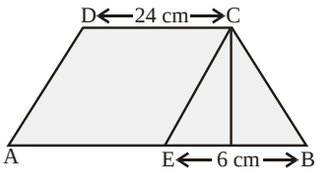
$$x = \frac{210}{21}$$

$$x = 10$$

So, Side $a = x = 10\,\text{cm}$

Side $b = 2x = 2\times 10 = 20\,\text{cm}$ **Ans**

6. In the given figure, *ABCD* is a trapezium, *ECB* is a triangle and *AECD* is a parallelogram. Area of Δ *BCE* = 210 cm^2, *EB* = 6 cm, *CD* = 24 cm. Find the area of the trapezium *ABCD*.



Given Area of $\Delta BCF = 210\,\text{cm}^2$

Base $(b) = 6\,\text{cm}$

We know that

Area of triangle $= \frac{1}{2}(a+b)\times h$

$$210 = \frac{1}{2}\times 6\times h$$

$$3h = 210$$

$$h = \frac{210}{3}$$

$$h = 70\,\text{cm}$$

Now In trapezium *ABCD*

$$a = 24\,\text{cm}$$

$$b = AE + EB = 24 + 6 = 30$$

$$h = 70\,\text{cm}$$

So, Area of Trapezium $= \frac{1}{2}(a+b)\times h$

$$= \frac{1}{2}(24+30)\times 70$$

$$= \frac{1}{2}\times 54\times 70$$

$$= 27\times 70$$

$$= 1890\,\text{cm}^2$$ **Ans**

7. The ratio of the parallel sides of a trapezium is 5 : 3. The distance between them is 16 cm. If the area of the trapezium is 960 cm^2, find the lengths of parallel sides.

Let $a = 5x\,\text{cm}$

$b = 3x\,\text{cm}$

$h = 16\,\text{cm}$

Area trapezium $= 960\,\text{cm}^2$

Area of trapezium $= \frac{1}{2}(a+b)\times h$

$$960 = \frac{1}{2}(5x+3x)\times 16$$

$$960 = 8(8x)$$

$$64x = 960$$

$$x = \frac{960}{64}$$

$$x = 15$$

So, $a = 5\times x = 5\times 15 = 75\,\text{cm}$

ans $b = 3\times x = 3\times 15 = 45\,\text{cm}$ **Ans**

8. Find the distance between two parallel sides of a trapezium if its area is 440 cm^2 and the parallel sides 30 cm and 14 cm.

$h = ?$

Area of trapezium $= 440\,\text{cm}^2$

$a = 30\,\text{cm}$, $b = 14\,\text{cm}$

Area of trapezium $= \frac{1}{2}(a+b)\times h$

$$440 = \frac{1}{2}(30+14)\times h$$

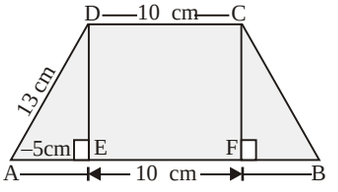
$$880 = 44\times h$$

$$h = \frac{880}{44}$$

$h = 20$ cm **Ans**

9. The parallel sides of a trapezium are 20 cm and 10 cm. Its non-parallel sides are equal in length, each is 13 cm long. Find the area of the trapezium.

$a = 20\,\text{cm}$, $b = 10\,\text{cm}$



In Δ *ADE*

$$AD^2 = DE^2 + AE^2$$

$$13^2 = DE^2 + (50)^2$$

$$169 = DE^2 + 25$$

$$DE^2 = 169 - 25$$

$$DE^2 = 144$$

$$DE = \sqrt{144}$$

$$DE = 12\,\text{cm}$$

Now, $a = 20$ cm

$b = 10$ cm

and $h = 12$ cm

$$\text{Area of trapezium} = \frac{1}{2}(a+b)\times h$$

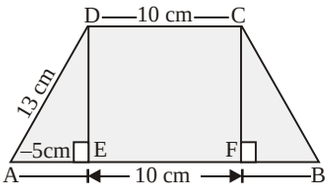
$$= \frac{1}{2}(20+10)\times 12$$

$$= \frac{1}{2}\times 30\times 12$$

$$= 180\,\text{cm}^2$$ **Ans**

10. The parallel sides of a trapezium are 20 cm and 10 cm. Its non-parallel sides are equal in length, each is 13 cm long. Find the area of the trapezium.

$a = 20\,\text{cm}$, $b = 10\,\text{cm}$



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$b = 10$ cm

and $h = 12$ cm

$$\text{Area of trapezium} = \frac{1}{2}(a+b)\times h$$

$$= \frac{1}{2}(20+10)\times 12$$

$$= \frac{1}{2}\times 30\times 12$$

$$= 180\,\text{cm}^2$$ **Ans**

Exercise-17B

1. Find the area of a regular polygon whose side and radius of inscribed circle is given :

(a) $n = 5$, $a = 6$ cm, $r = 5$ cm

$$\text{Area of 5-sided regular polygon} = \frac{nar}{2}$$

$$= \frac{5\times 6\times 5}{2}$$

$$= 75\,\text{cm}^2$$ **Ans**

(b) $n = 4$, $a = 4$ cm, $r = 3.5$ cm

$$\text{Area of 4 sided regular polygon} = \frac{nar}{2}$$

$$= \frac{4\times 4\times 3.5}{2}$$

$$= 28\,\text{cm}^2$$ **Ans**

2. Find the area of a regular polygon whose side and radius of circumscribed circle is given :

(a) $n = 7$, $a = 5$ cm, $R = 6$ cm

$$\text{Area of Polygon} = \frac{n}{2}\times a\sqrt{R^2 - \frac{a^2}{4}}$$

$$= \frac{7\times 5}{2}\sqrt{6^2 - \frac{5^2}{4}}$$

$$= \frac{35}{2}\sqrt{\frac{144-25}{4}}$$

$$= \frac{35}{2}\times\sqrt{\frac{119}{4}}$$

$$= \frac{35}{4}\sqrt{119}\,\text{cm}^2$$ **Ans**

(b) $n = 6$, $a = 8$ cm, $R = 7$ cm

$$\text{Area of Polygon} = \frac{n}{2}\times a\sqrt{R^2 - \frac{a^2}{4}}$$

$$= \frac{6\times 8}{2}\sqrt{7^2 - \frac{8^2}{4}}$$

$$= 24\sqrt{49-16}$$

$$= 24\sqrt{33}$$ **Ans**

3. Find the area of a regular hexagon each of whose side measure 8 cm.

$$a = 8\text{ cm}$$

$$\text{Area of regular hexagon} = \frac{3\sqrt{3}}{2}a^2$$

$$= \frac{3\sqrt{3}}{2}\times 8\times 8$$

$$= 96\sqrt{3}\,\text{cm}^2$$ **Ans**

4. Find the area of a regular hexagon each of whose side measure 7 cm.

$$a = 7\,\text{cm}$$

$$\text{Area of regular hexagon} = \frac{3\sqrt{3}}{2}a^2$$

$$= \frac{3\sqrt{3}}{2} \times 7 \times 7$$

$$= \frac{147}{2}\sqrt{3} \quad \textbf{Ans}$$

5. Find the area of a regular octagon each of whose side measure 5 cm.

$$a = 5\,\text{cm}$$

$$\text{Area of regular Octagon} = 2a^2\,(1+\sqrt{2})$$

$$= 2 \times (5)^2\,(1+\sqrt{2})$$

$$= 2 \times 25(1+\sqrt{2})$$

$$= 50(1+\sqrt{2}) \quad \textbf{Ans}$$

6. Find the area of a regular octagon each of whose side measure 6 cm.

$$a = 6\,\text{cm}$$

$$\text{Area of regular Octagon} = 2a^2\,(1+\sqrt{2})$$

$$= 2 \times (6)^2\,(1+\sqrt{2})$$

$$= 2 \times 36(1+\sqrt{2})$$

$$= 72(1+\sqrt{2}) \quad \textbf{Ans}$$

MCQs

1. (b) **2.** (c) **3.** (a) **4.** (b) **5.** (a)

6. (b) **7.** (c) **8.** (a) **9.** (b) **10.** (a)

11. (b)

CHAPTER 18 : SURFACE AREA AND VOLUME AND SOLIDS

Exercise-18A

1. Find the surface area of a cuboid whose :

(a) length = 10 cm; breadth = 12 cm, height = 14 cm

Surface area of cuboid

$$= 2(lb + bh + hl)$$

$$= 2(16 \times 12 + 12 \times 14 + 14 \times 10)$$

$$= 2(120 + 168 + 140)$$

$$= 2 \times 428$$

$$= 856\,\text{cm}^2 \quad \textbf{Ans}$$

(b) length = 3.2 m; breadth = 30 dm; height = 250 cm

$l = 3.2\,\text{m}$, $b = 3\,\text{m}$, $h = 2.5\,\text{m}$

Surface Area of Cuboid

$$= 2(3.2 \times 3 + 3 \times 2.5 \times 2.5 \times 3.2)$$

$$= 2(9.6 + 7.5 + 8.0)$$

$$= 2 \times (25.1)$$

$$= 50.2\,\text{m}^2 \quad \textbf{Ans}$$

2. Find the surface area of a cube of side 2.1 m.

Side of cube $(a) = 2.1\,\text{m}$

$$\text{Surface Area} = 6a^2$$

$$= 6 \times (2.1)^2$$

$$= 6 \times 4.41$$

$$= 26.46\,\text{m}^2 \quad \textbf{Ans}$$

3. Find the surface area of a cube whose 40 m.

$$\text{Side of cube} = 40\,\text{m}$$

$$\text{Surface Area} = 6a^2$$

$$= 6 \times (40)^2$$

$$= 6 \times 40 \times 40$$

$$= 9600\,\text{m}^2 \quad \textbf{Ans}$$

4. The dimensions of a cuboid are in the ratio 5 : 3 : 1 and its total surface area is 414 m^2. Find the dimensions of the cuboid.

Let $l = 5x$ m

$b = 3x$ m

$h = x$ m

Surface area = 414 m^2

Surface Area of cuboid $= 2(lb + bh + hl)$

$$414 = 2(5x \times 3x + 3x \times x + x \times 5x)$$

$$207 = (15x^2 + 3x^2 + 5x^2)$$

$$207 = 23x^2$$

$$x^2 = \frac{207}{23}$$

$$x^2 = 9$$

$$x = \sqrt{9}$$

$$x = 3$$

So, $l = 5 \times 3 = 15\,\text{m}$

$b = 3 \times 3 = 9\,\text{m}$

$h = x = 3\,\text{m}$ **Ans**

5. The area of four walls of a room is 51 m^2. If the room is 5 m long and 3.5 m wide, find the height of the room.

Area of wall of room $= 51\,m^2$

$l = 5\,m,\ b = 3.5\,m,\ h = ?$

Area of four walls $= 2(l+b)\times h$

$51 = 2(5+3.5)\times h$

$51 = 2\times 8.5\times h$

$17h = 51$

$h = \frac{51}{17}$

$h = 3\,m$ **Ans**

6. An aquarium is in the shape of cuboid whose external measures are 60 cm × 40 cm × 30 cm. The base, side faces and back faces are to be covered with a coloured paper. Find the area of the paper needed.

$l = 60\,cm,\ b = 40\,cm,\ h = 30\,cm$

Area of the Paper $= 2h\times(l+b)+l\times b$

$= 2\times 30(60+40)+60\times 40$

$= 60\times 100+2400$

$= 6000+2400$

$= 8400\,cm^2$ **Ans**

7. A box with measures 50 cm × 40 cm × 32 cm is to be covered with a tarpaulin cloth. How many metres of tarpaulin of width 64 cm is required to cover 100 such boxes ?

Area of tarpaulin $= 2h(l+b)+l\times b$

$= 2\times 32(50+40)+50\times 40$

$= 64\times 90+2000$

$= 5760+2000$

$= 7760\,cm^2$

Area of Tarpaulin required for 100 boxes

$= 7760\times 100\,cm^2$

So, Length of tarpaulin $= \frac{7760\times 100}{64}$

$= 12125\,cm$

$= 121.25\,m$ **Ans**

8. The paint in a container is sufficient to paint an area equal to 9.375 m^2. How many tiles of dimensions 22.5 m × 10 m × 7.5 m can be painted by this paint ?

$l = 22.5\,m,\ b = 10\,m,\ h = 7.5\,m$

Surface area of tile $= 2(lb+bh+hl)$

$= 2(22.5\times 10+10\times 7.5+7.5\times 22.5)$

$= 2(225+75+168.75)$

$= 2\times 468.75$

$= 937.5\,m^2$

Box of paint of required $= \frac{937.5\,m^2}{9.375\,m^2}$

$= 100$ **Ans**

9. The paint in a container is sufficient to paint an area equal to 18.56 cm^2. How many bricks of dimensions 12 cm × 10 cm × 8 cm can be painted by this paint ?

$l = 12\,cm,\ b = 10\,cm,\ h = 8\,cm$

Surface area of brick $= 2(lb+bh+hl)$

$= 2(12\times 10+10\times 8+8\times 12)$

$= 2(120+80+96)$

$= 2\times 296$

$= 592\,cm^2$

No. of UP brick $= \frac{18.56\times 10000\,cm^2}{59^2}$

$= 313$ brick **Ans**

10. The length, breadth and height of a cubical box are in the ratio 5 : 3 : 2 and its total surface area is 1550 cm^2. Find the dimensions of the cubical box.

Let $l = 5x\,cm,\ b = 3x\,cm$ and $h = 2x\,cm$

and T.S.A $= 1550\,cm^2$

T.S.A $= 2(lb+bh+hl)$

$1550 = 2(5x\times 3x+3x\times 2x+2x\times 5x)$

$1550 = 2(15x^2+6x^2+10x^2)$

$1550 = 2(31x^2)$

$62x^2 = 1550$

$x^2 = \frac{1550}{62}$

$x^2 = 25$

$x = \sqrt{25}$

$x = 5$

So, $l = 5\times 5 = 25\,cm$

$b = 3\times 5 = 15\,cm$

$h = 2\times 5 = 10\,cm$ **Ans**

11. The ratio of length, breadth and height of a box is 4 : 2 : 1 and its total surface area is 2800 cm^2. Find the dimensions of the box.

Let $l = 4x$ cm, $b = 2x$ cm, $h = x$ cm

$$\text{T.S.A} = 2800\,cm^2$$

$$\text{T.S.A} = 2(lb + bh + hl)$$

$$2800 = 2(4x \times 2x + 2x \times x + x \times 4x)$$

$$2800 = 2(8x^2 + 2x^2 + 4x^2)$$

$$2800 = 2 \times 14^2$$

$$28^2 = 2800$$

$$x^2 = \frac{2800}{28}$$

$$x^2 = 100$$

$$x = \sqrt{100}$$

$$x = 10$$

So, $l = 4 \times 10 = 40$ cm

$b = 2 \times 10 = 20$ cm

$h = 10 \times 1 = 10$ cm **Ans**

12. Find the length of the longest pole that can be placed in a room, whose length, breadth and height are 10 m, 8 m and 4 m respectively.

$l = 10$ m, $b = 8$ m, $h = 4$ m

Length of longest pole $= \sqrt{l^2 + b^2 + h^2}$

$$= \sqrt{10^2 + 8^2 + 4^2}$$

$$= \sqrt{100 + 64 + 16}$$

$$= \sqrt{180}$$

$$= 13.42$$ **Ans**

Exercise-18B

1. Find the volume of cubical box whose edge is 7 cm.

Edge $(a) = 7$cm

Volume of cube $= a^3$

$$= a \times a \times a$$

$$= 7 \times 7 \times 7$$

$$= 343\,cm^2$$ **Ans**

2. Find the length of the cuboid whose volume is 380 cm^3, breadth is 10 cm and height is 2 cm.

$v = 380\,cm^3$, $b = 10$ cm, $h = 2$ cm, $l = ?$

$$v = l \times b \times h$$

$$380 = l \times 10 \times 2$$

$$l = \frac{380}{10 \times 2}$$

$$l = 19\,cm$$ **Ans**

3. Capacity of a rectangular tank is 200 kl. If the length and breadth of tank are 20 m and 5 m respectively, find its depth.

$l = 20$ m, $b = 5$ m, $h = ?$

Volume $= 200$ kl $= 200\,m^3$

$$v = l \times b \times h$$

$$200 = 20 \times 5 \times h$$

$$h = \frac{200}{20 \times 5}$$

$$h = 2\,m$$

So, depth $= 2$ m **Ans**

4. A rectangular tank is 10 m long and 6 m deep. How much should it wide to hold 480 m^3 of water ?

$v = 480\,m^3$, $l = 10$ m $= h = 6$ m, $b = ?$

$$v = l \times b \times h$$

$$= 480 \times 10 \times b \times 6$$

$$b = \frac{480}{10 \times 6}$$

$$b = 8m$$ **Ans**

5. The volume of a cube is 512 cm^3. Find the surface area and lateral surface area of the cube.

Volume of cube $= 512\,cm^2$

$$a^3 = 512\,cm^2$$

$$a = \sqrt[3]{512}\,cm$$

$$a = 8\ cm$$

Lateral surface area $= 4a^2$

$$= 4 \times 8 \times 8$$

$$= 256\,cm^2$$

Surface area $= 6a^2$

$$= 6 \times 8 \times 8$$

$$= 384\,cm^2$$ **Ans**

6. The surface area of a cube is 600 cm^3. Find its volume.

Surface area of cube $= 600\,cm^2$

$$6a^2 = 600\,cm^2$$

$$a^2 = 100\,cm^2$$

$$a = \sqrt{100}\,cm$$

$$a = 10\,cm$$

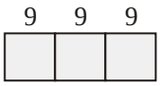
Volume $= a^3$

$$= 10 \times 10 \times 10$$

$$= 1000\,cm^3$$ **Ans**

7. Three equal cubes of side 9 cm are joined end to end. Find :

(a) The volume of resulting cuboid.



So $l = 27$ cm

$b = 9$ cm

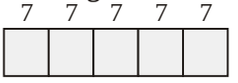
$h = 9$ cm

$\text{Volume} = l \times b \times h$

$= 27 \times 9 \times 9$

$= 2187\,\text{cm}^3$ **Ans**

(b) The total surface area of the resulting cuboid.



$\text{T.S.A of cuboid} = 2(lb + bh + hl)$

$= 2(27 \times 9 + 9 \times 9 + 9 \times 27)$

$= 2(243 + 81 + 243)$

$= 2 \times 567$

$= 1134\,\text{cm}^2$ **Ans**

8. Four equal cubes of side 7 cm are joined end to end. Find :

(a) The ratio of volume of new cuboid to original cube.

So, $l = 28\,\text{cm}$

$b = 7\,\text{cm}$

$h = 7\,\text{cm}$

$$\frac{\text{Volume of cube}}{\text{Volume of cuboid}} = \frac{7 \times 7 \times 7}{28 \times 7 \times 7}$$

$$= \frac{1}{4}$$ **Ans**

(b) The ratio of surface area of new cuboid to original cube.

$$\frac{\text{Surface area of cube}}{\text{Surface area of cuboid}} = \frac{6a^2}{2(lb + bh + hl)}$$

$$= \frac{6 \times 7 \times 7}{2(28 \times 7 + 7 \times 7 \times 7 \times 28)}$$

$$= \frac{6 \times 7 \times 7}{2(196 + 49 + 196)}$$

$$= \frac{6 \times 7 \times 7}{2 \times 441}$$

$$= \frac{294}{882}$$

$$= \frac{1}{3}$$ **Ans**

9. The dimensions of a metal block are 2 m × 1.8 m × 80 cm. It is melted and recast into small cubes, each of side 20 cm. How many cubes will be formed ?

$$\text{Number of cubes} = \frac{\text{Volume of cuboid}}{\text{Volume of cube}}$$

$$= \frac{2\,\text{m} \times 1.8\,\text{m} \times 80\,\text{cm}}{20\,\text{cm} \times 20\,\text{cm} \times 20\,\text{cm}}$$

$$= \frac{200 \times 180 \times 80\,\text{cm}^3}{20 \times 20 \times 20\,\text{cm}^3}$$

$$= 10 \times 9 \times 4$$

$= 360$ cubes **Ans**

10. The measure of edge of a cubical metal block is 4 m. It is melted and recast into block of dimension 20 cm × 10 cm × 5 cm are formed, how many such blocks can be formed ?

$$\text{Number of blocks} = \frac{\text{Volume of cubical metal block}}{\text{Volume of 1 small block}}$$

$$= \frac{4\,\text{m} \times 4\,\text{m} \times 4\,\text{m}}{20\,\text{cm} \times 10\,\text{cm} \times 5\,\text{cm}}$$

$$= \frac{400 \times 400 \times 400\,\text{cm}^3}{20 \times 10 \times 5\,\text{cm}^3}$$

$$= 20 \times 40 \times 80$$

$= 64000$ **Ans**

11. How many wooden cubical blocks of edge 15 cm can be cut from a log of wood size 6 m by 4 m by 90 cm, assuming there is no wastage ?

$$\text{Number of block} = \frac{\text{Volume of log}}{\text{Volume of 1 block}}$$

$$= \frac{6\,\text{m} \times 4\,\text{m} \times 90\,\text{cm}}{15 \times 15 \times 15\,\text{cm}^3}$$

$$= \frac{600 \times 400 \times 90\,\text{cm}^3}{15 \times 15 \times 15\,\text{cm}^3}$$

$= 6400$ **Ans**

12. A godown is in the form of a cuboid of measures 60 m × 40 m × 30 m. How many cubical boxes can be stored in it, if the volume of one box is 0.6 m^3 ?

$$\text{Number of cubical boxes} = \frac{\text{Volume of godown}}{\text{Volume of 1 box}}$$

$$= \frac{60 \times 40 \times 30\,\text{m}^3}{0.6\,\text{m}^3}$$

$= 720000$ boxes **Ans**

13. A box with lid is made up of wood which is 1.8 cm thick. Its external dimensions are 60 cm × 40 cm × 32 cm. Find :

(a) The capacity of box.

External dimension of a box

$= 60\,\text{cm} \times 40\,\text{cm} \times 32\,\text{cm}$

$= 76800\,\text{cm}^3$

Thickness of wood $= 1.8\,\text{cm}$

So, Internal dimension of box

$= 56.4 \times 36.4 \times 28.4$

$= 58304.064$ **Ans**

(b) The volume of the wood used in making the box.

Volume of wood $= 76800 - 58304.064$

$= 18495.936$

(c) The weight of the empty box, if 1 cm^3 of wood weighs 2.8 gm.

Total width of wood $= 18495.936 \times 2.8\,\text{gm}$

$= 51788.621\,\text{gm}$

$= 51.789\,\text{kg}$

14. A box without lid is made up of steel which is 1 cm thick. Its internal dimensions are 80 cm × 60 cm × 40 cm. Find :

(a) The capacity of the box.

Internal dimension of box

$= 80\,\text{cm} \times 60\,\text{cm} \times 40\,\text{cm}$

Internal volume $= 192000\,\text{cm}^3$ **Ans**

(b) The weight of the empty box, if 1 cm^3 of steel weighs 9.8 gm.

Thickness of box $= 1\,\text{cm}$

So, external dimension of box

$= 82 \times 62 \times 41 = 208444\,\text{cm}^3$

(because box is without lid)

Volume of steel $= 208444 - 192000$

$= 16444\,\text{cm}^3$

and weight of steel $= 16444 \times 9.8$ gm

$= 161151.2\,\text{gm}$

$= 161.15\,\text{kg}$ **Ans**

15. A cube of edge 8 cm is immersed completely in a vessel containing water. If the dimensions of the vessel 30 cm × 24 cm × 20 cm, find the rise of water level in the vessel.

Edge of cube $= 8\,\text{cm}$

Volume of cube $= 8\,\text{cm} \times 8\,\text{cm} \times 8\,\text{cm}$

$= 512\,\text{cm}^2$

Dimension of vessel $= 30 \times 24 \times 20\,\text{cm}^3$

Volume of vessel $= 14400\,\text{cm}^3$

Let rise of water level in vessel be x

Then, volume of cube $= 30 \times 24 \times x$

$512 = 30 \times 24 \times x$

$x = \dfrac{512}{30 \times 24}$

$x = \dfrac{32}{45}$

$= 0.711\,\text{cm}$ **Ans**

16. A cuboid of dimension 8 cm × 6 cm × 4 cm is immersed completely in a vessel containing water. If the dimensions of the vessel are 24 cm × 16 cm × 12 cm. Find the rise in water level in the vessel.

Let rise of water level in the vessel $= x$ cm

Then, $x = \dfrac{\text{Volume of Cuboid}}{\text{length} \times \text{breadth of vessel}}$

$= \dfrac{8 \times 6 \times 4\,\text{cm}^2}{24 \times 16\,\text{cm}^2}$

$= \dfrac{1}{2}\,\text{cm}$

$= 0.50\,\text{cm}$ **Ans**

17. If each edge of a cube is triplet.

(a) How many times will its surface area increase ?

Let edge $= x$

and becomes $= 3x$

Surfaces area $= 6x^2$

New surface area $= 6(3x)^2$

$= 6 \times 9x^2$

$= 9 \times 6x^2$

So, Its surface area is 9 times increased.

(b) How many times will its volume increase ?

Volume $= x^3$

New volume $= (3x)^3 = 27x^3$

So, Now volume will be 27 times of previous one.

Exercise-18C

1. $r = 14$ cm, $h = 18\,\text{cm}$

Volume of cylinder $= \pi r^2 h$

$= \dfrac{22}{7} \times 14 \times 14 \times 18$

$= 11088\,\text{cm}^3$ **Ans**

Curved surface area $= 2\pi rh$

$= 2\times\frac{22}{7}\times 14\times 18$

$= 1584\,\text{cm}^2$ **Ans**

2. Curved surface area $= 6600\,\text{cm}^2$

Circumference $= 220\,\text{cm}$

$\text{height} = \frac{\text{curved surface area}}{\text{circumference}}$

$= \frac{6600}{220} = 30\,\text{cm}$

circumference $= 220$

$2\pi r = 220$

$2\times\frac{22}{7}\times r = 220$

$r = \frac{210\times 7}{2\times 22}$

$r = 35\,\text{cm}$

Volume of cylinder $= \pi r^2 h$

$= \frac{22}{7}\times 35\times 35\times 30$

$= 115500\,\text{cm}^3$ **Ans**

3. Volume of cylinder $5390\,\text{cm}^3$

$d = 14\,\text{cm}$ or $r = 7\,\text{cm}$

$h = ?$

Volume $= 5390$

$\pi r^2 h = 5390$

$\frac{22}{7}\times 7\times 7\times h = 5390$

$h = \frac{5390}{22\times 7}$

$h = 35\,\text{cm}$ **Ans**

4. Volume of cylinder $= 47432\,\text{cm}^3$

$h = 77\,\text{cm}$

Volume $= 47432$

$\pi r^2 h = 47432$

$\frac{22}{7}\times r^2\times 77 = 47432$

$r^2 = \frac{47432}{22\times 11}$

$r^2 = 196$

$r = \sqrt{196}$

$r = 14\,\text{cm}$

Now, Total surface area $= 2\pi r(h+r)$

$= 2\times\frac{22}{7}\times 14(77+14)$

$= 2\times 22\times 14\times 91$

$= 56056\,\text{cm}^2$ **Ans**

5. $d = 5\,\text{m},\ r = 2.5\,\text{m},\ h = 21\,\text{m}$

Volume of tank $= \pi r^2 h$

$= \frac{22}{7}\times 2.5\times 2.5\times 21$

$= 22\times 2.5\times 2.5\times 3$

$= 412.5\,\text{m}^3$

or 412500 l **Ans**

So, 412500 litre petrol can be stored in a tank.

6. $h = 3\,\text{m},\ r = 63\,\text{cm} = 0.63\,\text{m}$

T.SA of cylinder $= 2\pi r(h+r)$

$= 2\times\frac{22}{7}\times 63(3+0.63)$

$= 3.96\times 3.63$

$= 14.374\,\text{m}^2$

Cost of steel $= ₹\,14.3748\times 185$

$= ₹\,2659.338$

or ₹ 2659.34 **Ans**

7. $d_1 = 24\,\text{cm}\ \ r = 12\,\text{cm}$

$d_2 = 28\,\text{cm}\ \ R = 14\,\text{cm}\qquad h = 42\,\text{cm}$

Volume of iron $= \pi(R^2 - r^2)\times h$

$= \frac{22}{7}\times[(14)^2 - (12)^2]\times 42$

$= \frac{22}{7}\times 26\times 2\times 42$

$= 6864\,\text{cm}^3$

Mass of iron $= 6864\times 12\,\text{g}$

$= 82368\,\text{gm}$

or 82.368 kg **Ans**

8. $r = 2.5\,\text{m},\ h = 63\,\text{m}$

Volume of soil of well = Area of field × height of soil (level)

$\pi r^2 h = 30\times 28\times h$

$\frac{22}{7}\times 2.5\times 2.5\times 63 = 30\times 28\times h$

$h = \frac{22\times 2.5\times 2.5\times 63}{30\times 28\times 7}$

$= 1.47\,\text{m}$ **Ans**

9. Let $d = 28\,\text{cm}$ or $r = 14\,\text{cm}$,

Let height of water = h

Volume of rectangle or vessel = Volume of water in cylinder vessel

$$40\times 36\times 8 = \pi r^2 h$$

$$40\times 36\times 8 = \frac{22}{7}\times 14\times 14\times h$$

$$h = \frac{40\times 36\times 8\times 7}{22\times 14\times 14}$$

$$h = 18.70\,\text{cm}$$ **Ans**

10. Volume of rainfall = Volume of cylinder vessel

$$0.08\times 60\times 40 = \pi r^2 h$$

$$.08\times 60\times 40 = \frac{22}{7}\times 3.5\times 3.5\times h$$

$$h = \frac{8\times 6\times 4\times 7}{22\times 3.5\times 3.5}$$

$$h = 4.98\,\text{m}$$

So, the water level is 4.98 m in cylindrical vessel.

11. $h = 12\,\text{cm}$, $r = 10.5\,\text{cm}$,

or $h_1 = 120\,\text{mm}$, $r_1 = 105\,\text{mm}$

diameter of water = 2 mm, $r_2 = 1\,\text{mm}$

Volume of cylinder = Volume of wire

$$\pi r_1^2 h_1 = \pi r_2^2 h_2$$

$$105\times 105\times 120 = 1\times 1\times h$$

$$h = 105\times 105\times 120\,\text{milimitre}$$

$$h = 1323000$$

$$h = 1323\,\text{metre}$$ **Ans**

12. Volume of cube = Volume of wire

$$40\times 40\times 40\,\text{mm}^3 = \pi r^2 h$$

$$40\times 40\times 40 = \frac{22}{7}\times 2\times 2\times h$$

$$h = \frac{40\times 40\times 40\times 7}{2\times\times 2\times 22}\,\text{mm}$$

$$h = 5090.90\,\text{mm}$$

$$h = 5.09\,\text{m}$$ **Ans**

13. A rectangle paper is rolling along its width and a cylinder is formed.

So, $h = 14\,\text{cm}$

and circumference = 33 cm

$$2\pi r = 33$$

$$2\times\frac{22}{7}\times r = 33$$

$$r = \frac{33\times 7}{2\times 22}$$

$$r = \frac{21}{4}\,\text{cm}$$

Volume of cylinder = $\pi r^2 h$

$$= \frac{22}{7}\times\frac{21}{4}\times\frac{21}{4}\times 14$$

$$= 1212.75\,\text{cm}^3$$ **Ans**

14. A rectangular paper dimension 28 cm and 22 cm is rolling along its length

So, $h = 28\,\text{cm}$

and circumference = 22 cm

$$2\pi r = 22\,\text{cm}$$

$$2\times\frac{22}{7}\times r = 22\,\text{cm}$$

$$r = \frac{7}{2}\,\text{cm}$$

Volume of cylinder = $\pi r^2 h$

$$= \frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\times 28$$

$$= 1078\,\text{cm}^3$$ **Ans**

MCQs

1.	(b)	**2.**	(c)	**3.**	(a)	**4.**	(b)	**5.**	(a)
6.	(b)	**7.**	(c)	**8.**	(a)	**9.**	(b)	**10.**	(a)
11.	(b)	**12.**	(c)	**13.**	(a)	**14.**	(b)	**15.**	(a)
16.	(b)	**17.**	(c)	**18.**	(a)	**19.**	(b)	**20.**	(a)

CHAPTER 19 : DATA HANDLING

Exercise-19A

1. (a)

Class-Interval (wags)	Tally Marks	Frequency
1000-1250	|||| |||	8
1250-1500	|||	3
1500-1750	$\cancel{\text{\|\|\|\|}}$ |||	8
1750-2000	||||	4
2000-2250	$\cancel{\text{\|\|\|\|}}$	5
2250-2500	||	2
		$n = 30$

(b) 17 worker get less than ₹ 1700 11 workers get more than ₹ 1700 **Ans**

(c) 11 workers **Ans**

(d) 100 – 1250 and 1500 – 1750 **Ans**

2.

Class Interval	Tally Marks	Frequency
10-15	𝍸	5
15-20	𝍸 𝍸 ||||	14
20-25		
25-30	||	2
30-35	||	2
35-40	|||	3
40-45	||||	2
45-50	𝍸	5
50-55	||	2
55- 60	𝍸	5
		$n = 40$

(a) Class mark of their class $= \frac{20+25}{2}$

$= \frac{45}{2} = 22.5$

(b) Class (15 – 20) has the maximum number of weight.

(c) Lower limit of second class = 15

Class Interval	Tally Marks	Frequency
300-400	||||	4
400-500	||||	4
500-600	||||	4
600-700	𝍸	5
700-800	||	2
800-900	𝍸	5
900-1000	|||	3
1000-1100	|||	3
		$n = 30$

(a) Class mark of fourth class $= \frac{20+25}{2}$

$= \frac{45}{2} = 22.5$

(b) Lower class limit of third class = 500

(c) Class size = 100

(d) (600 – 700) and (800 – 900) has higher number of wages

4.

Class Interval	Tally Marks	Frequency
10-20	𝍸 𝍸 ||	12
20-30	𝍸 ||||	9
30-40	𝍸 |||	8
40-50	𝍸 𝍸	10
50-60	|	1
		$n = 40$

(a) Class size = 10 **Ans**

(b) Upper class limit of third class interval = 40 **Ans**

(c) Class mark of third class $= \frac{30+40}{2}$

$= 35$ **Ans**

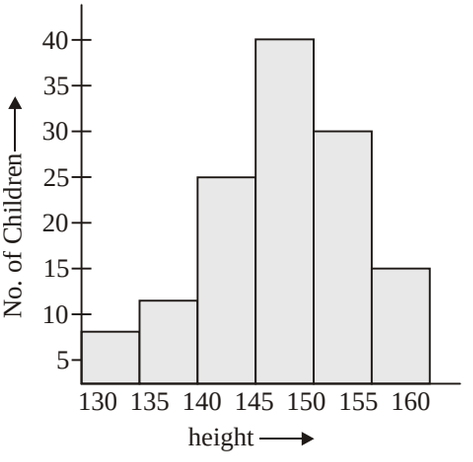
Class mark of fourth class $= \frac{40+50}{2}$

$= 45$ **Ans**

(d) (10 – 20) has maximum rainfall **Ans**

Exercise-19B

1.



(a) This histogram shows height of the students

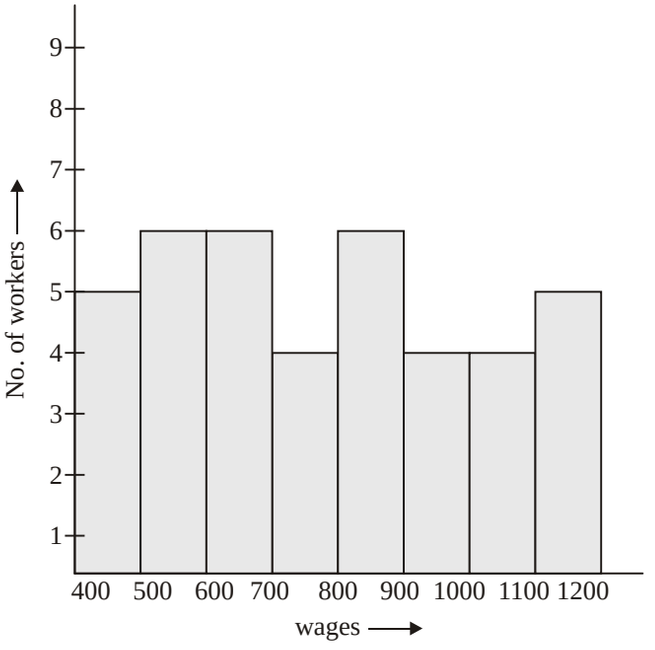
(b) 145 – 150 group contains maximum students

(c) 30 + 15 = 45 students

(d) (145 – 150) **Ans**

2.

Class-Interval	Tally Marks	Frequency
400-500	𝍸	5
500-600	𝍸 |	6
600-700	𝍸 |	6
700-800	||||	4
800-900	𝍸 |	6
900-1000	||||	4
1000-1100	||||	4
1100-1200	𝍸	5



(a) (500 – 600), (600 – 700) and (800 – 900) group has maximum numbers of workers.

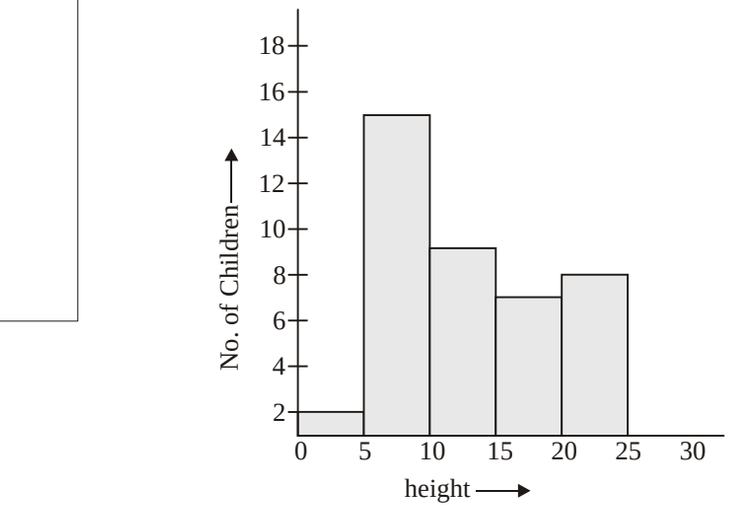
(b) (700 – 800), (900, 1000) and (1000 – 1100) group has minimum numbers of workers.

(c) 23 workers

(d) 17 worker **Ans**

3.

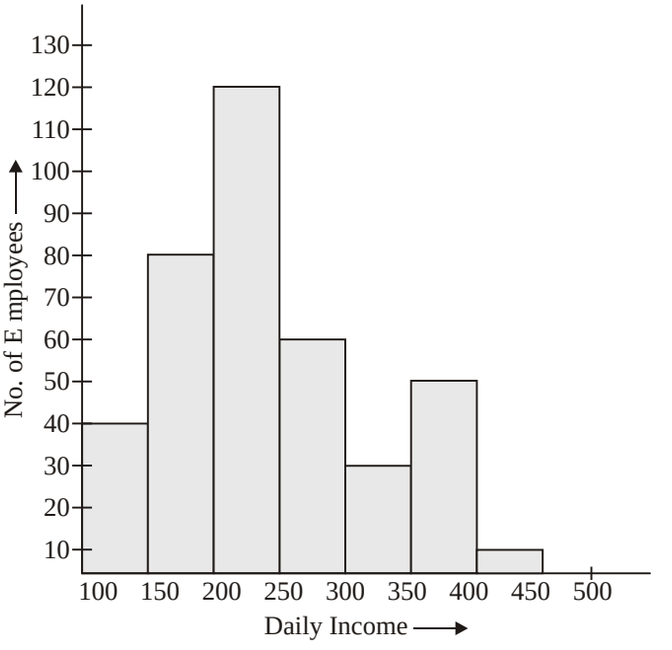
Class Interval	Tally Marks	Frequency
0-5	|	1
5-10	𝍸 𝍸	15
10-15	𝍸 ||||	9
15-20	𝍸 ||	7
20-25	𝍸 |||	8



(a) (5 – 10) **(b)** (0 – 5)

(c) 15 children **(d)** 16 children

4.



(a) (200 – 250) **(b)** (400 – 500)

(c) 90 employer **(d)** 240 employers

5. **(a)** (5 – 6) hours **(b)** 75 children

(c) 45 children **(d)** 10 children

6. **(a)** 230 students **(b)** (130 – 135) **Ans**

Exercise-19C

1. Number of students in Bus = 450

So, $\text{angle} = \frac{450}{1080} \times 360°$

$= 150°$

Number of students in scooter/Bikes = 255

So, $\text{angle} = \frac{255}{1080} \times 360°$

$= 85°$

Number of students in auto-rickshaws = 270

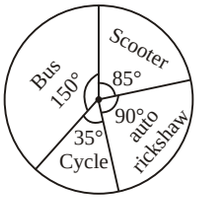
So, $\text{angle} = \frac{270}{1080} \times 360°$

$= 90°$

Number of students in cycles = 105

So, $\text{angle} = \frac{105}{1080} \times 360°$

$= 35°$



Ans

2. Angle of food $= \frac{3200}{14400} \times 360°$

$= 80°$

Angle of clothes $= \frac{1800}{14400} \times 360°$

$= 45°$

Angle of education $= \frac{2200}{14400} \times 360°$

$= 55°$

Angle of rent $= \frac{3000}{14400} \times 360°$

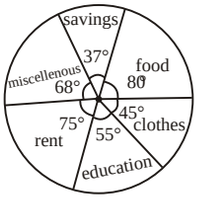
$= 75°$

Angle of miscellaneous $= \frac{2720}{14400} \times 360°$

$= 68°$

Angle of Savings $= \frac{1480}{14400} \times 360°$

$= 37°$



3. Angle of Hindi $= \frac{72}{432} \times 360°$

$= 60°$

Angle of English $= \frac{90}{432} \times 360°$

$= 75°$

Angle of Mathematics $= \frac{96}{432} \times 360°$

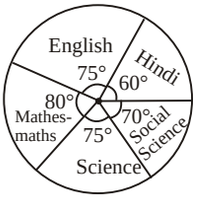
$= 80°$

Angle of Science $= \frac{90}{432} \times 360°$

$= 75°$

Angle of Social Science $= \frac{84}{432} \times 360°$

$= 70°$



4. Total votes = 54000

Angle of congress $= \frac{13500}{54000} \times 360°$

$= 90°$

Angle of BJP $= \frac{22500}{54000} \times 360°$

$= 150°$

Angle of BSP $= \frac{10500}{54000} \times 360°$

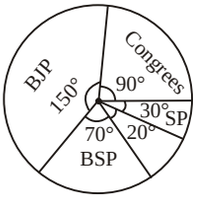
$= 70°$

Angle of SP $= \frac{4500}{54000} \times 360°$

$= 30°$

Angle of Lok Dal $= \frac{3000}{54000} \times 360°$

$= 20°$



5. Angle of brick $= \frac{25}{100} \times 360°$

$= 90°$

Angle of cement $= \frac{20}{100} \times 360°$

$= 72°$

Angle of Iron $= \frac{15}{100} \times 360°$

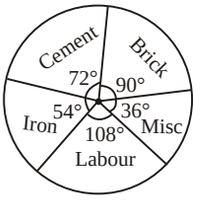
$= 54°$

Angle of Labour $= \frac{30}{100} \times 360°$

$= 108°$

Angle of Miscellaneous $= \frac{10}{100} \times 360°$

$= 36°$



6. **(a)** On food the expenditure was maximum

(b) Rent and clothes; saving and education

(c) Let total expenditure = x

Then, $\frac{15}{100} \times x = 6000$

$$x = \frac{6000 \times 100}{15}$$

$$x = ₹\ 40000$$

So, Expenditure on food $= \frac{30}{100} \times 40000$

$$= ₹\ 12000$$

(d) House rent $= \frac{10}{100} \times 40000$

$$= ₹\ 4000$$

7. **(a)** Hindi

(b) Marathi = 45°

$$= \frac{45}{360} \times 216 = 27 \text{ students}$$

(c) English $= \frac{60°}{360°} \times 216 = 36$ students

(d) Students who speak Tamil $= \frac{20°}{360°} \times 216$

$$= 12$$

(e) Students who speak Marathi $= \frac{45}{360°} \times 216$

$$= 27$$

$$\text{Tamil : Marathi} = 12 : 27$$

$$= 4 : 9 \quad \textbf{Ans}$$

MCQs

1. (b) **2.** (c) **3.** (a) **4.** (b) **5.** (a)

6. (b) **7.** (c) **8.** (a) **9.** (b) **10.** (a)

11. (b) **12.**

CHAPTER 20 :

1. **(a)** most likely **(b)** equally likely

(c) Impossible **(d)** equally likely

(e) Impossible **(f)** certain

(g) Impossible **(h)** not likely

2. **(a)** Probability = 1

(b) Probability = 0

(c) Probability = 1

(d) Probability = 0

3. Fair to Both = (a), (b), (c) and (e)

4. **(a)** Probability of a green ball $= \frac{5}{15} = \frac{1}{3}$ **Ans**

(b) Probability of a black or red ball $= \frac{10}{15}$

$$= \frac{2}{3} \quad \textbf{Ans}$$

(c) Probability of a ball that is not black $= \frac{8}{15}$

5. **(a)** (H), (T); (H), (H); (T)(H); (T)(T)

(b) (H)(T); (T), (H); (T)(T)

(c) (H), (T); (T), (H)

(d) Probability of (a) $= \frac{4}{4} = 1$

Probability of (b) $= \frac{3}{4}$

Probability of (c) $= \frac{2}{4} = \frac{1}{2}$ **Ans**

6. **(a)** Probability of getting $M = \frac{2}{11}$ **Ans**

(b) Probability of getting $A = \frac{2}{11}$ **Ans**

(c) Probability of getting $S = \frac{1}{11}$ **Ans**

(d) Probability of getting vowel $= \frac{4}{11}$ **Ans**

7. **(a)** Probability of a black card $= \frac{26}{52} = \frac{1}{2}$

(b) Probability of a king $= \frac{4}{52} = \frac{1}{13}$

(c) Probability of getting not a spade $= \frac{39}{52} = \frac{3}{4}$

(d) Probability of getting an ace $= \frac{4}{52} = \frac{1}{13}$

(e) Probability of getting an ace of spade $= \frac{1}{52}$

MCQs

1. (b) **2.** (c) **3.** (a) **4.** (b) **5.** (a)

6. (b) **7.** (c) **8.** (a) **9.** (b) **10.** (a)

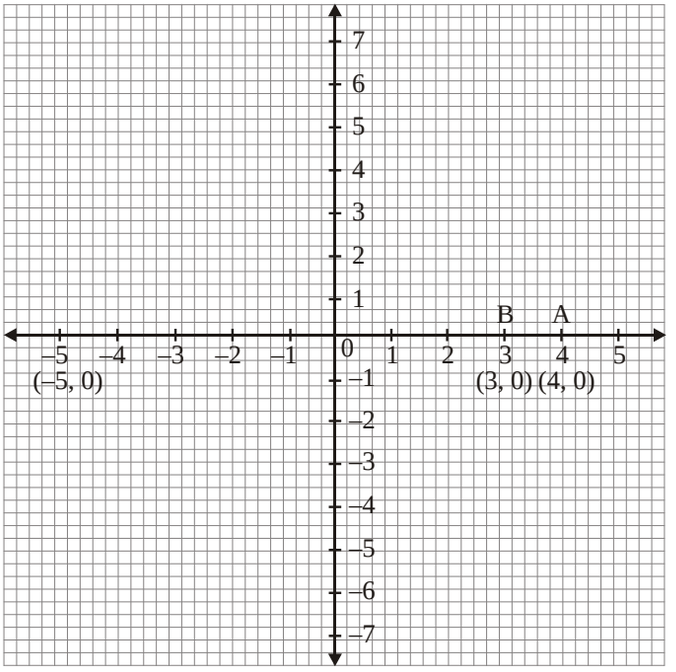
11. (b) **12.**

CHAPTER 21 : INTRODUCTION TO GRAPH

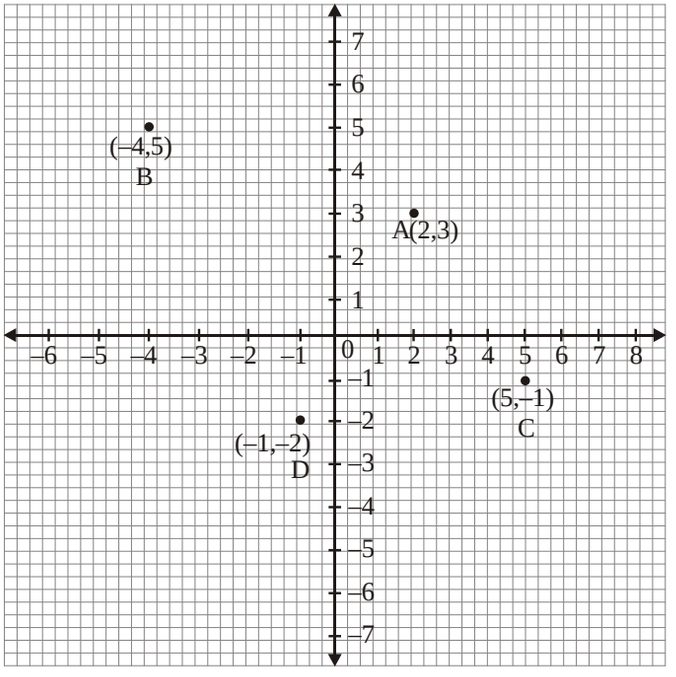
Exercise-21A

1. **(a)** First **(b)** Third **(c)** Second **(d)** Fourth

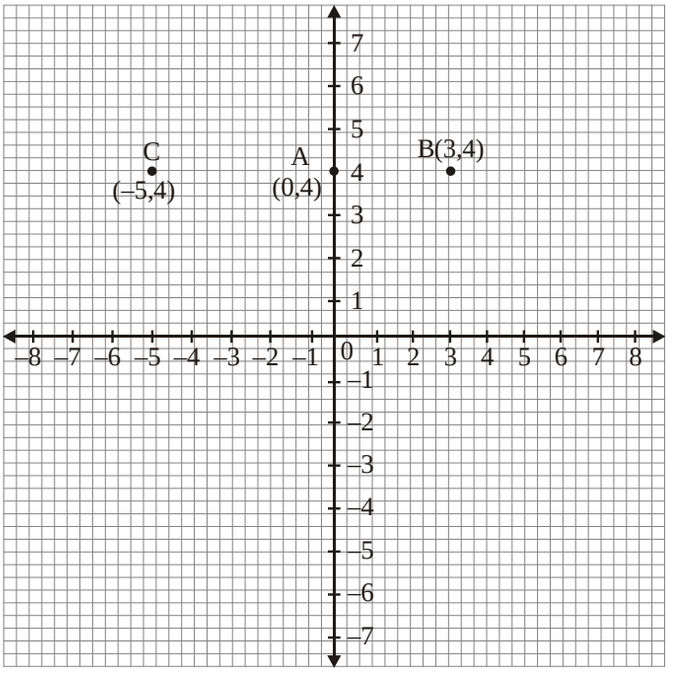
2. (a)



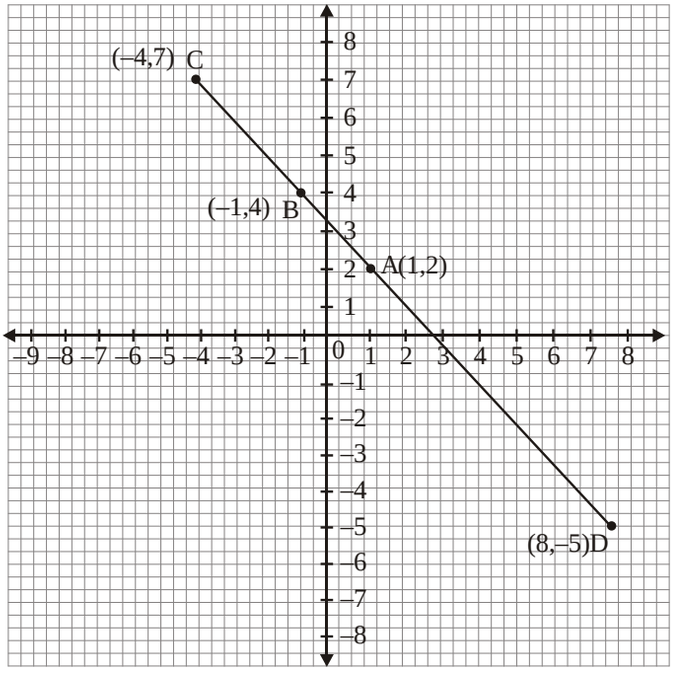
(b)



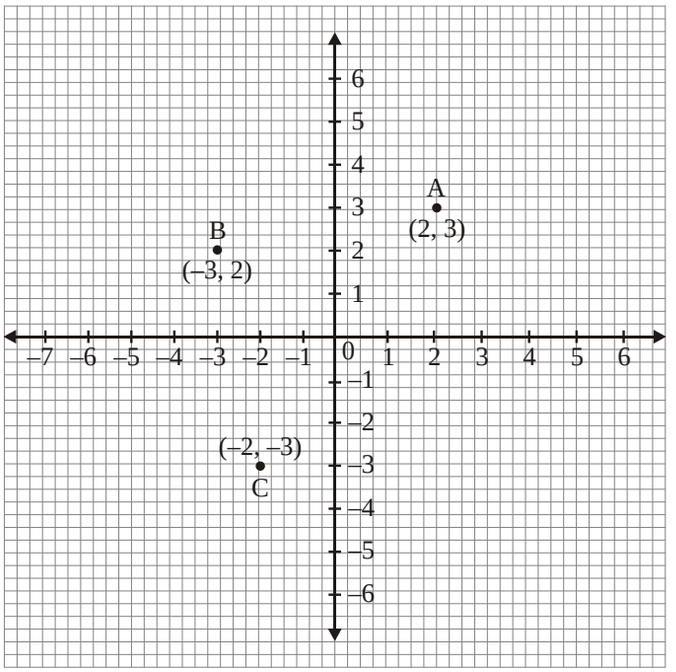
(c)



3. (a)

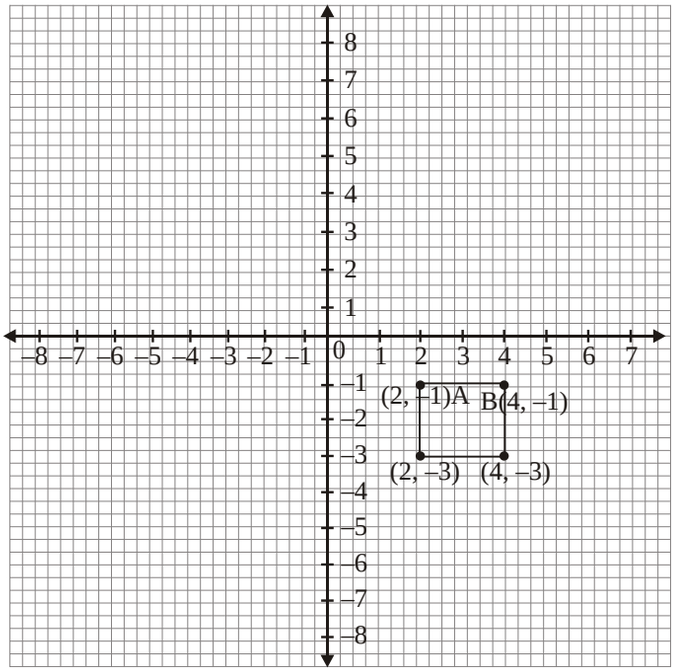


(b)



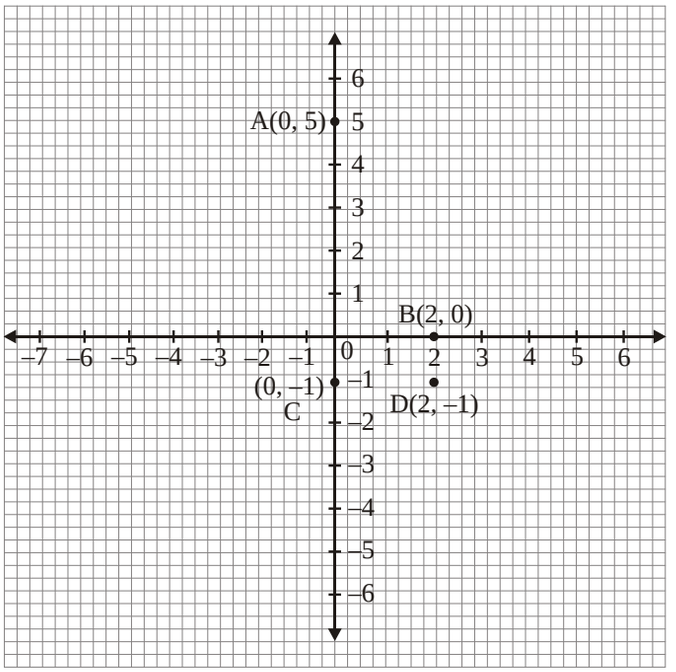
No, These are not collinear

4. (a)



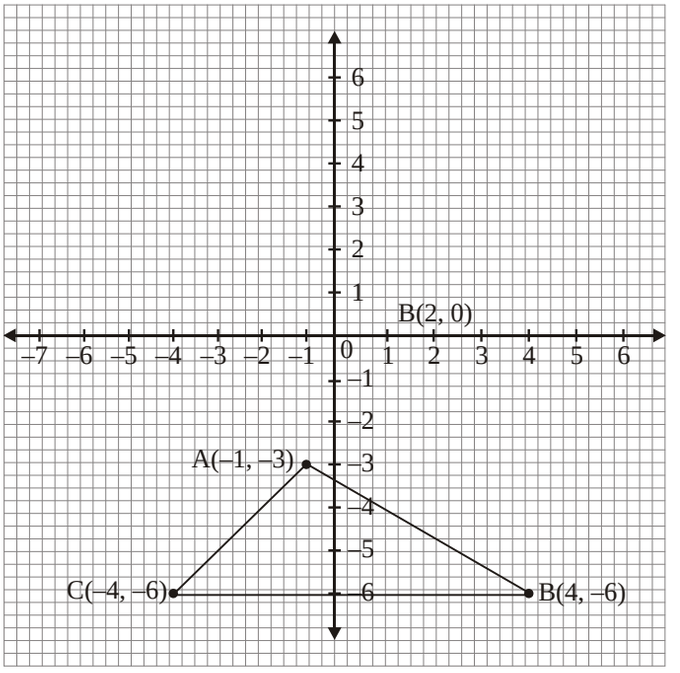
This figure is square **Ans**

(c)



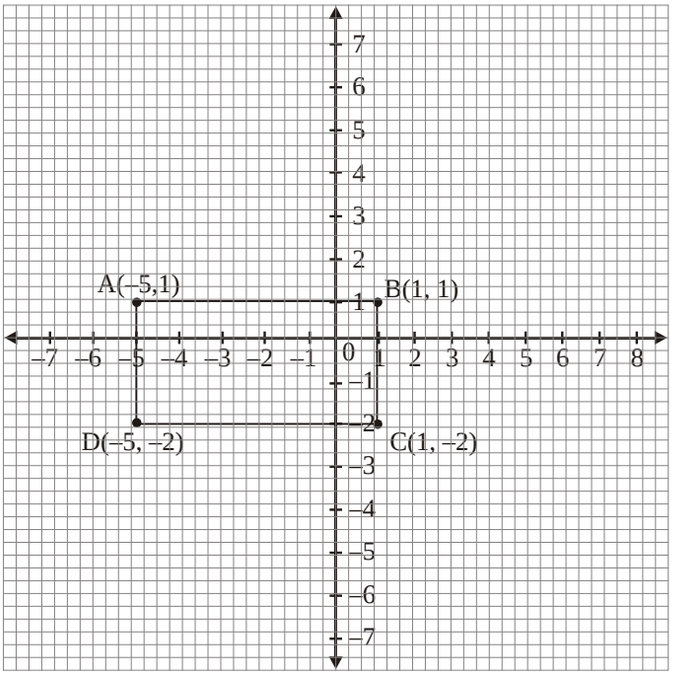
No, These are not collinear

(b)



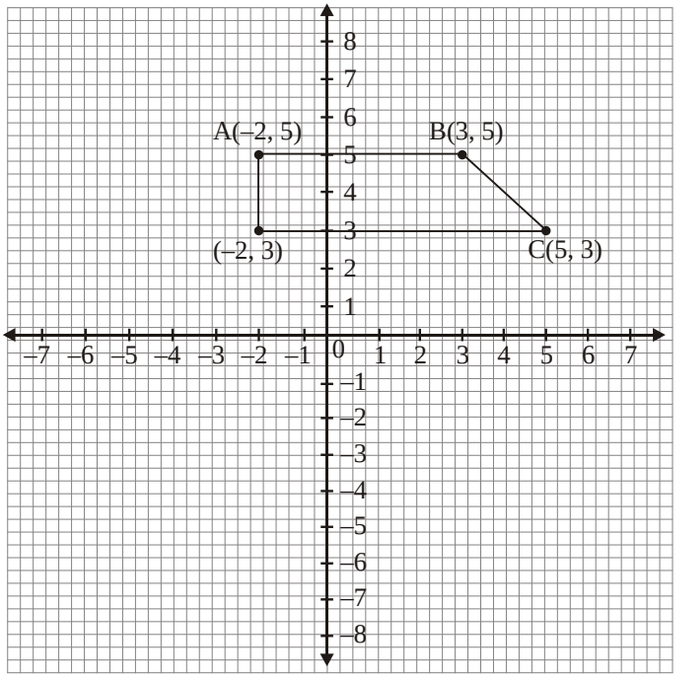
This is a triangle. **Ans**

(c)



This figure is rectangle. **Ans**

5.



(a) No, It is not parallelogram.

(b) Because its both sides are not parallel.

6. **(a)** $C(3, 2)$ **(b)** $-a, 0$

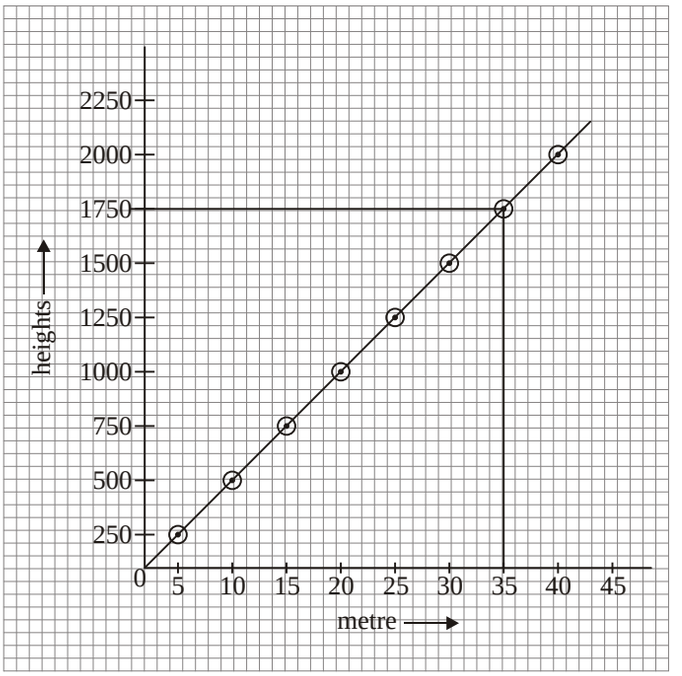
(c) F **(d)** C

(e) (0, 4) **(f)** (A, B)

(g) $(2, -5)$

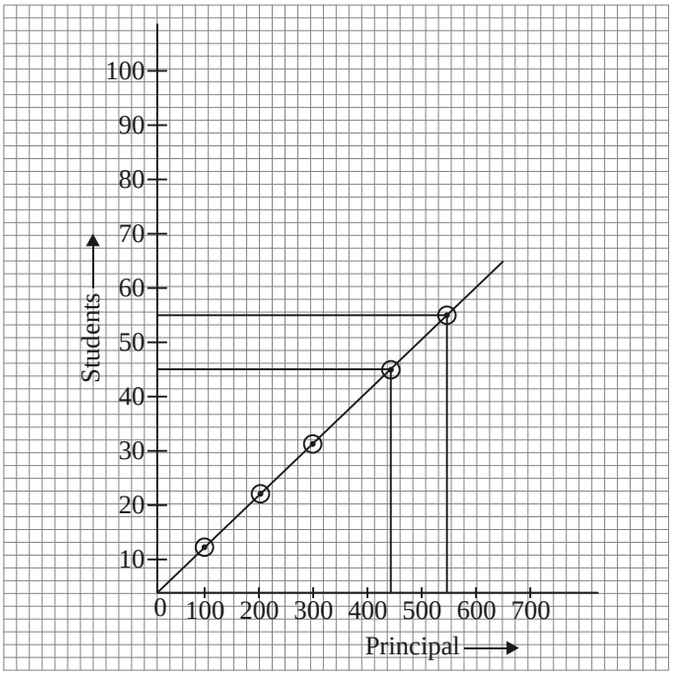
Exercise-21B

1.



This cost of 35*l* of petrol with the help of graph is ₹ 1750.

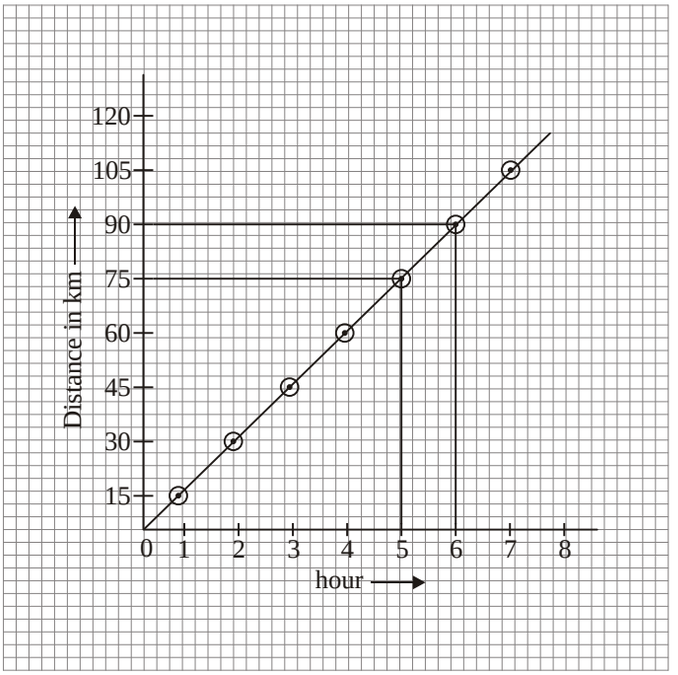
2.



(a) Interest on sum of ₹ 450 is ₹ 45.

(b) Sum on which interest is ₹ 65 is ₹ 650.

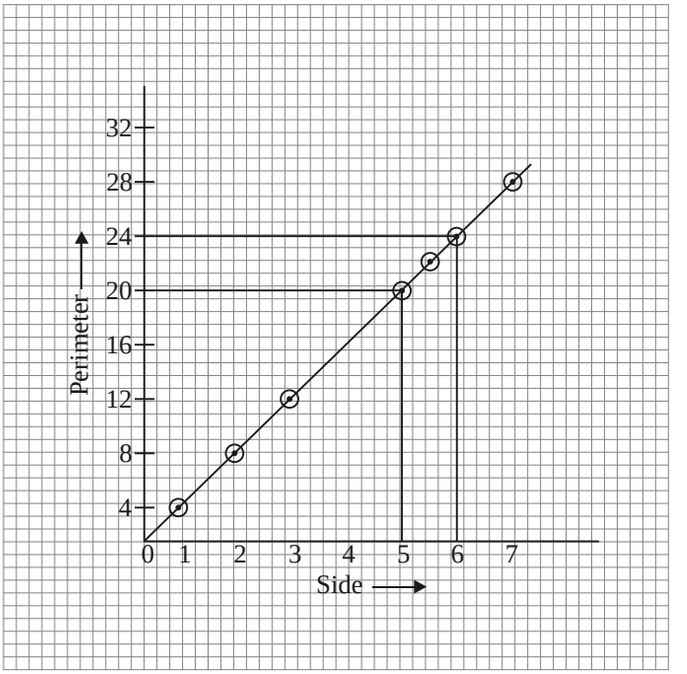
3.



(a) Distance travelled in 5 hour is 75 km.

(b) It took 6 hr to cover 90 km.

4.



(a) $p = 14$ cm when $x = 3.5$ cm

(b) $p = 22$ cm when $x = 5.3$ cm.