## Answers & Explanations

## SECTION-A

**1. Solution:**

Let n be the no. of rational numbers.

Here, n= 4

Denominator = n + 1 = 4 + 1 = 5.

$3 = \frac{3}{1} \times \frac{5}{5} = \frac{15}{5}$ and $4 = \frac{4}{1} \times \frac{5}{5} = \frac{20}{5}$

∴ Four rational numbers between 3 and 4 are: -

$\frac{16}{5}, \frac{17}{5}, \frac{18}{5}, \frac{19}{5}.$

**2. Solution:**

$14x^2 + 25x + 6 = 0$

$\Rightarrow\ 14x^2 + 21x + 4x + 6 = 0$

$\Rightarrow\ 7x(2x + 3) + 2(2x + 3) = 0$

$\Rightarrow\ (2x + 3)(7x\ + 2) = 0$

Therefore, the value of $x = -\frac{3}{2} or -\frac{2}{7}$

**3. Solution:**

Given, a =17, d = 6, n =100.

∴ Sum of 100 terms $= \frac{n}{2}(2a\ + (n - 1)\ d)$

$= \frac{100}{2}(2 \times 17\ + (100 - 1)\ 6)$

$=\ 50\ (34\ + 99 \times 6)$

$=\ 50\ (34\ + 594)$

$=\ 50\ \times\ 628$

$= 31400$

**4. Solution:**

| | |
|---|---|
| **2nd Quadrant** (- , +) | **1st Quadrant** (+ , +) |
| **3rd Quadrant** (- , -) | **4th Quadrant** (+ , -) |

(-3,1) lies in 2nd quadrant.

(1, -2) lies in $4^{th}$ quadrant.

**5. Solution:**

$$\frac{sin\theta}{\cos(90°-\theta)} - \frac{\cos(90°-\theta)}{sin\theta} = \frac{sin\theta}{sin\theta} + \frac{sin\theta}{sin\theta} = 1 + 1 = 2$$

$$[\because \cos(90° - \theta) = \sin\theta]$$

**6. Solution:**

$120°$ can be constructed using a compass and scale only, by constructing $60°$ twice.

$30°$ can be constructed using a compass and scale only, by bisecting $60°$.

$45°$ be constructed using a compass and scale only, by constructing a $90°$ and then bisecting it.

$20°$ cannot be constructed using a compass and scale only, a protractor is needed for this construction.

**7. Solution:**

The angle extended by a chord at the centre of a circle is twice the angle extended by a chord at the circumference of a circle.

∴ The angle it makes on the circumference

$$= \frac{148°}{2} = 74°$$

**8. Solution:**

Out of 80 students, 32 are girls, 48 are boys.

∴ Probability of a boy winning = $\frac{48}{80} = \frac{3}{5}$

**SECTION-B**

**9. Solution:**

Given, $x = \sqrt{2} + 1$

$\therefore \left(x + \frac{1}{x}\right)^2 = \left((\sqrt{2} + 1) + \frac{1}{\sqrt{2}+1}\right)^2$

$= \left(\frac{(\sqrt{2}+1)^2+1}{\sqrt{2}+1}\right)^2$

$= \left(\frac{2 + 2\sqrt{2}+1+1}{\sqrt{2}+1}\right)^2$

$= \left(\frac{4+2\sqrt{2}}{\sqrt{2}+1}\right)^2$

$= \frac{16+16\sqrt{2}+8}{2+2\sqrt{2}+1}$

$= \frac{24+16\sqrt{2}}{3+2\sqrt{2}}$

Rationalizing the denominator,

$= \frac{24+16\sqrt{2}}{3 + 2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}}$

$= \frac{72+48\sqrt{2}-48\sqrt{2}-64}{((3)^2 - (2\sqrt{2})^2}$

$= \frac{8}{9-8}$

$= \frac{8}{1}$

$= 8$

**10. Solution:**

Let, $f(x) = x^4 - 3x^2 + kx - 5$

Given, $f(x)$ when divided by $(x-2)$ leaves a remainder 3, i.e. $f(2) = 3$

$\Rightarrow 2^4 - 3.2^2 + k2 - 5 = 3$

$\Rightarrow 16 - 12 + 2k - 5 = 3$

$\Rightarrow 2k - 1 = 3$

$\Rightarrow 2k = 3 + 1 = 4$

$\Rightarrow k = \frac{4}{2} = 2$

Thus, the value of k is 2 and the polynomial is

$x^4 - 3x^2 + 2x - 5$.

**11. Solution:**

Given, $y = 14 - x$

$$\begin{array}{rl} x + y = 14 & \dots(i) \\ \underline{x - y = 8} & \underline{\dots(ii)} \\ 2x = 22 & \end{array}$$

$$\Rightarrow x = \frac{22}{2} = 11$$

Putting $x = 11$ in $(i)$, we get,

$11 + y = 14$

$\Rightarrow y = 14 - 11$

$\Rightarrow y = 3$

$\therefore x = 11$

$y = 3$

**12. Solution:**

$x^2 - 3x - 4 = 0 \qquad \dots(i)$

Comparing $(i)$ with standard quadratic equation

$ax^2 + bx + c = 0$, we get, $a = 1$, $b = -3$, $c = -4$

Putting these values of a, b, c in Sridhar Acharya Formula, we get,

$$x = \frac{(-b) \pm \sqrt{b^2 - 4ac}}{2a}$$

$\Rightarrow x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 1 \times (-4)}}{2 \times 1}$

$\Rightarrow x = \frac{3 \pm \sqrt{9 - 4 \times 1 \times (-4)}}{2}$

$\Rightarrow x = \frac{3 \pm \sqrt{9 + 16}}{2}$

$\Rightarrow x = \frac{3 \pm \sqrt{25}}{2}$

$\Rightarrow x = \frac{3 \pm 5}{2}$

$\Rightarrow x = \frac{3+5}{2}, \frac{3-5}{2}$

$\Rightarrow x = \frac{8}{2}, -\frac{2}{2}$

$\Rightarrow x = 4, -1.$

**13.Solution:**

Base (b) = 12cm,
Hypotenuse (h) = 13cm.
∴ Perpendicular (p) = ?
According to Pythagoras Theorem,

$p^2 + b^2 = h^2$
$\Rightarrow p^2 + 12^2 = 13^2$
$\Rightarrow p^2 + 144 = 169$
$\Rightarrow p^2 = 169 - 144$
$\Rightarrow p^2 = 25$
$\Rightarrow p = \sqrt{25}$
$\Rightarrow p = 5$

**14. Solution:**

Given, AB || CD.
In △ ABM,
∠ MAB + ∠ ABM + ∠ AMB = 180°

[Sum of all 3 angles of a △ is 180°]

$\Rightarrow$ 56° + 78° + ∠AMB = 180°
$\Rightarrow$ 134° + ∠ AMB = 180°
$\Rightarrow$ ∠ AMB = 180° − 134° = 46°
∠ AMB = ∠ CMD

[$\because$ *Vertically Opposite Angles*]

∠ CMD = 46°
In △ CDM,
∠ MCD + ∠ CMD + ∠ CDM = 180°

[Sum of all 3 angles of a △ is 180°]

$\Rightarrow$ 62° + 46° + ∠CDM= 180°
$\Rightarrow$ 108° + ∠ CDM = 180°
$\Rightarrow$ ∠ CDM = 180° − 108° = 72°
∴ ∠ AMB = 46°,
∠ CDM = 72°

**15. Solution:**

Given data: 8, 11, 23, 27, 35, 44, 67, 73, 85.

∴ Mean $= \frac{8+11+23+27+35+44+67+73+85.}{9} = \frac{373}{9}$

$= 41\frac{4}{9}$

∴ Median = $\frac{n+1}{2}$ *th observation*

[when n=odd number; here n = 9]

= $\frac{9+1}{2}$ *th observation*
= $\frac{10}{2}$ *th observation*
= 5*th observation*
= 35.

∴ Mean $= 41\frac{4}{9}$
∴ Median = 35

**16. Solution:**

Let H be the event of hitting a boundary.

Then P(H) $= \frac{No.of\ times\ he\ hits\ boundary}{Total\ no.of\ balls\ he\ plays}$

$= \frac{12}{30} = \frac{2}{5}$

∴ Probability of not hitting boundary = 1 – P(H)

$= 1 - \frac{2}{5}$

$= \frac{5-2}{5} = \frac{3}{5}$

## SECTION -C

**17. Solution:**

Given the common difference (d) is 3.

$T_n = 35$, $2S_n = 430 \Rightarrow S_n = \frac{430}{2} = 21$

Let the first term be a

We know,

$T_n = a + (n-1)d$

$\Rightarrow 35 = a + (n-1)3$

$\Rightarrow 35 = a + (n-1)3$

$\Rightarrow (n-1)3 = 35 - a$ ....(i)

$\Rightarrow 3n - 3 = 35 - a$

$\Rightarrow 3n = 35 + 3 - a$

$\Rightarrow n = \frac{38-a}{3}$ ...(ii)

and $S_n = \frac{n}{2}(2a + (n-1)\,3)$

$\Rightarrow 215 = \frac{n}{2}(2a + 35 - a)$ [From (i)]

$\Rightarrow 215 = \frac{n}{2}(a + 35)$

$\Rightarrow 215 = \frac{38-a}{2\times 3}(a+35)$ [From (ii)]

$\Rightarrow 215 \times 6 = (38-a)(a+35)$

$\Rightarrow 1290 = 38a - a^2 + 1330 - 35a$

$\Rightarrow a^2 - 3a - 40 = 0$

$\Rightarrow a^2 - 8a + 5a - 40 = 0$

$\Rightarrow a(a-8) + 5(a-8) = 0$

$\Rightarrow (a-8)(a+5) = 0$

Either

$(a-8) = 0$

$a = 8$

Putting

a = 8 in (ii), we get,

$\Rightarrow n = \frac{38-8}{3}$

$\Rightarrow n = \frac{30}{3}$

$\Rightarrow n = 10$

Or

$a = -5$

$a = -5$ in (ii), we get,

$\Rightarrow n = \frac{38-(-5)}{3}$

$\Rightarrow n = \frac{43}{3}$

$\Rightarrow n = 14\frac{1}{3}$

As no. of terms is whole number, and cannot be fraction, $\therefore n = 10 \quad and \quad a = 8.$

**18. Solution:**

In △ ABC and △ BDC,

∠ ABC = ∠ BDC = 90°

BC is common for both △

∴ △ ABC ~ △ BDC        [A.S. Axiom]

$\therefore \frac{AB}{CD} = \frac{BC}{BD} = \frac{AC}{BC}$

Given, BC = 20cm, AB =15 cm, BD = 12cm.

$\frac{AB}{CD} = \frac{BC}{BD} \quad \Rightarrow \frac{15}{CD} = \frac{20}{12}$

$\Rightarrow CD = \frac{15 \times 12}{20} = 9\ cm$

and, $\frac{BC}{BD} = \frac{AC}{BC} \quad \Rightarrow \frac{20}{12} = \frac{AC}{20}$

$\Rightarrow AC = \frac{20 \times 20}{12} = 33.33\ cm$

$\therefore AD = AC + CD = 33.33cm + 9\ cm$

$= 42.33\ cm$

**Or**

**Solution:**

Distance between 2 points is given by

= $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(i) Distance between (2,3) and (1,4)

= $\sqrt{(1-2)^2 + (4-3)^2}$

=$\sqrt{(-1)^2 + 1^2}$ =$\sqrt{1+1}$

= $\sqrt{2}$ units

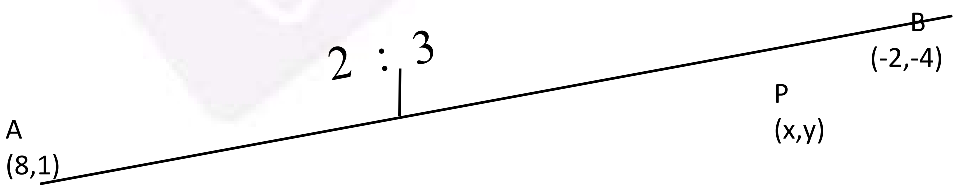
(ii) Distance between (-5,1) and (2,-7)

= $\sqrt{(2-(-5))^2 + (-7-1))^2}$

=$\sqrt{7^2 + (-8)^2}$ =$\sqrt{49+64}$

=$\sqrt{113}$ units

**19. Solution:**




Let, $m_1 : m_2$ = 2:3,

$(x_1, y_1)$ = (8,1)  and $(x_2, y_2)$ = (-2,-4)

According to Section Formula

$(x, y) = \frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}$

$\Rightarrow (x, y) = \frac{2\times(-2)+3\times8}{2+3}, \frac{2\times(-4)+3\times1}{2+3}$

$\Rightarrow (x, y) = \frac{-4+24}{5}, \frac{-8+3}{5}$

$\Rightarrow (x, y) = \frac{20}{5}, \frac{-5}{5}$

$\Rightarrow (x, y) = (4, -1)$

**Or**

**Solution:**

Given, $\sin A = \frac{6}{10}$ *and* $\cos A = \frac{8}{10}$

(i) R.H.S→ $\sin^2 A + \cos^2 A = 1$

L.H.S → $\sin^2 A + \cos^2 A = \left(\frac{6}{10}\right)^2 + \left(\frac{8}{10}\right)^2$

$= \frac{36}{100} + \frac{64}{100} = \frac{36+64}{100} = \frac{100}{100} = 1$ =R.H.S

[Hence Proved.]

(ii) Given → $1 + \tan^2 A = \sec^2 A$

L.H.S → $1 + \tan^2 A = 1 + \left(\frac{\sin A}{\cos A}\right)^2 = 1 + \left(\frac{\frac{6}{10}}{\frac{8}{10}}\right)^2$

$= 1 + \left(\frac{6}{8}\right)^2$

$= 1 + \frac{36}{64}$

$= \frac{64+36}{64} = \frac{100}{64}$

$= \left(\frac{10}{8}\right)^2$

$\left[\because \cos A = \frac{8}{10} \quad \therefore \sec A = \frac{1}{cosA} = \frac{10}{8}\right]$

$= \sec^2 A$ =R.H.S [Hence Proved.]

**20. Solution:**

Given, $5\, tan\theta = 12$

$\Rightarrow\; tan\theta = \frac{12}{5}$

We know, $1 + \tan^2\theta = \sec^2\theta$

$\Rightarrow 1 + \left(\frac{12}{5}\right)^2 = sec^2\,\theta$

$\Rightarrow 1 + \frac{144}{25} = sec^2\,\theta$

$\Rightarrow sec^2\,\theta = \frac{25+144}{25}$

$\Rightarrow sec^2\,\theta = \frac{169}{25}$

$\Rightarrow sec\theta = \sqrt{\frac{169}{25}} = \frac{13}{5}$

$\therefore cos\theta = \frac{1}{sec\theta} = \frac{1}{\frac{13}{5}} = \frac{5}{13}$

$\therefore sin\theta = tan\theta \times cos\theta \qquad \left[\because tan\theta = \frac{sin\theta}{cos\theta}\right]$

$= \frac{12}{5} \times \frac{5}{13}$

$= \frac{12}{13}$

$\therefore cot\theta = \frac{1}{tan\theta} = \frac{1}{\frac{12}{5}} = \frac{5}{12}$

$\therefore \frac{sin\theta - cos\theta}{cot\theta} = \frac{\frac{12}{13}-\frac{5}{13}}{\frac{5}{12}} = \frac{\frac{12-5}{13}}{\frac{5}{12}} = \frac{\frac{7}{13}}{\frac{5}{12}} = \frac{7}{13} \div \frac{5}{12}$

$= \frac{7}{13} \times \frac{12}{5} = \frac{84}{65}$

**21. Solution:**

Given, $(1 - sin\theta)(\sec\theta + \tan\theta) = cos\theta$

L.H.S.

$(1 - sin\theta)(\sec\theta + \tan\theta)$

$= (sec\theta - sin\theta sec\theta + tan\theta - sin\theta\, tan\theta)$

$= \left(sec\theta - \frac{sin\theta}{cos\theta} + tan\theta - sin\theta\, tan\theta\right)$

$\left[\because sec\theta = \frac{1}{cos\theta}\right]$

$= (sec\theta - tan\theta + tan\theta - sin\theta\, tan\theta)$

$[\because \frac{sin\theta}{cos\theta} = tan\theta]$

$= (sec\theta - sin\theta\, tan\theta)$

$= \left(sec\theta - sin\theta\, \frac{sin\theta}{cos\theta}\right)$ $\left[\because tan\theta = \frac{sin\theta}{cos\theta}\right]$

$= \left(\frac{1}{cos\theta} - \frac{\sin^2\theta}{cos\theta}\right)$ $\left[\because sec\theta = \frac{1}{cos\theta}\right]$

$= \frac{1-\sin^2\theta}{cos\theta} = \frac{\cos^2\theta}{cos\theta}$ $[\because \sin^2\theta + \cos^2\theta = 1$

$\therefore [1 - \sin^2\theta = \cos^2\theta]$

$= cos\theta =$ R.H.S

[Hence Proved]

**22. Solution:**

Given, $\angle CDB = 65°$ and $\angle ABD = 35°$.

BD is the diameter of the circle.

We know, angle in a semi-circle is right angle.

$\therefore \angle CBD = 90°$

In $\triangle$ DCB

$\angle CDB = 65°$

$\angle CBD = 90°$

$\therefore \angle DCB = 180° - (\angle CDB + \angle CBD)$

[$\because$ Sum of all 3 angles of a $\triangle$ is 180°.]

$= 180° - (65° + 90°)$

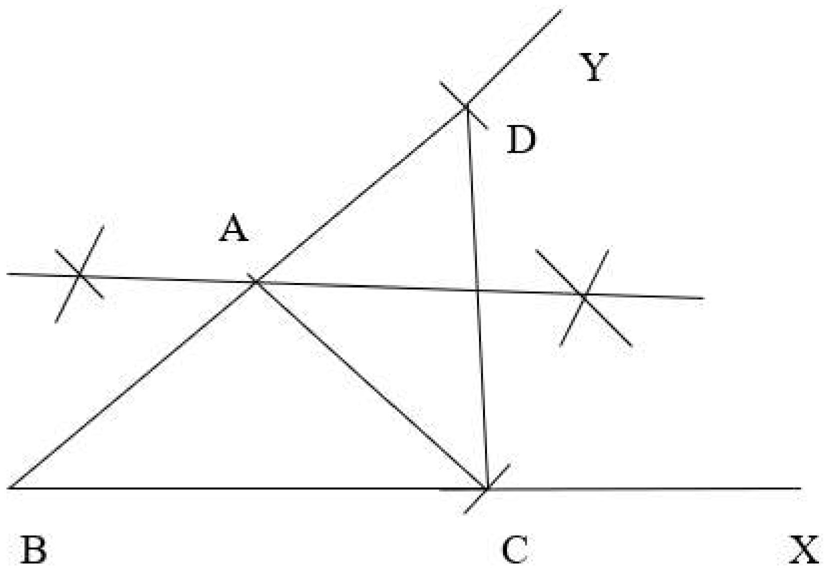
$= 180° - 155°$

$= 25°$

$\therefore \angle BAD = \angle DCB = 25°$

[Angles in the same segment of a circle are equal.]

23.




Steps of Construction: -

i) Draw a line BX of length greater than BC and cut off line segment BC = 9.2 cm from it.
ii) Construct $\angle CBY = 45°$.
iii) From BY, cut off a line segment BD = 16.4 cm.
iv) Join CD.
v) Draw perpendicular bisector of CD, Intersecting BY at a point A.
vi) Join AC.
Hence, the required Triangle ABC.

**24. Solution:**

We know, angle in a semi-circle is right angle.

$\therefore\ \angle PRQ = 90°$

Given, PQ(h) = 12 cm, PR(b) = 5 cm

Applying Pythagoras Theorem,

$QR^2 = PQ^2 + PR^2$

$\Rightarrow\ QR^2 = 12^2 + 5^2$

$\Rightarrow\ QR^2 = 144 + 25 = 169$

$\Rightarrow QR\ = \sqrt{169}\ = 13$ cm.

$\therefore$ Radius (r) = OR = $\frac{13}{2}$ cm.

$\therefore$ Area of shaded region = Area of circle – Area of Triangle PQR

$$= (\pi r^2) - \left(\frac{1}{2} \times b \times h\right)$$

$$= \left(\frac{22}{7} \times \left(\frac{13}{2}\right)^2\right) - \left(\frac{1}{2} \times 5 \times 12\right)$$

$$= \left(\frac{1859}{14}\right) - (30)$$

$$= \frac{1859-420}{14} = \frac{1439}{14}$$

$$= 102\frac{11}{14}\ cm^2$$

**Or**

**Solution:**

Given, Circumference = 44 cm

$\Rightarrow 2\pi r = 44cm$

$\Rightarrow 2 \times \frac{22}{7} \times r = 44cm$

$\Rightarrow r = \frac{44 \times 7}{2 \times 22} cm$

$\Rightarrow r = 7cm$

$\therefore$ Sum of the area of one semicircle and area of one quadrant of the circle

= Area of one semicircle + Area one quadrant of the circle

$= \frac{1}{2}\pi r^2 + \frac{1}{4}\pi r^2$

$= \pi r^2 \left(\frac{1}{2} + \frac{1}{4}\right)$

$= \frac{\pi r^2 (2+1)}{4}$

$= \frac{3}{4} \times \frac{22}{7} \times 7 \times 7\ cm^2$

$= \frac{231}{2} cm^2 = 115\frac{1}{2} cm^2.$

**SECTION-D**

**25. Solution:**

Let the numerator be x.

And, the denominator be y.

So, the fraction = $\frac{x}{y}$

Given, $\frac{x-5}{y+3} = \frac{6}{15} = \frac{2}{5}$

$\Rightarrow\ 5(x-5) = 2(y+3)$

$\Rightarrow\ 5x - 25 = 2y + 6$

$\Rightarrow\ 5x - 2y = 31 \quad \ldots..(i)$

and $2x + 3y = 58 \quad \ldots\ldots(ii)$

(ii) × 2 → $4x + 6y = 116$

(i) × 3 → $15x - 6y = 93$

$19x = 209$

$\Rightarrow x = \frac{209}{19} = 11$

Putting $x = 11$, in (i), we get,

$5 \times 11 - 2y = 31$

$\Rightarrow\ 55 - 31 = 2y$

$\Rightarrow\ 2y = 24$

$\Rightarrow\ y = \frac{24}{2} = 12.$

Hence, the fraction is $\frac{x}{y} = \frac{11}{12}.$

Reciprocal of the fraction = $\frac{12}{11}.$

**Or**

**Solution:**

Let, Cost of 1 shirt be Rs x

Cost of 1 pant be Rs y.

Given, $2x + 3y = 4250 \quad \ldots(i)$

$3x + 2y = 3500 \quad \ldots(ii)$

$(ii) \times 3 \rightarrow \quad 9x + 6y = 10500$

$(i) \times 2 \rightarrow \quad 4x + 6y = 8500$

Subtracting, - - -

$5x = 2000$

$\Rightarrow x = \frac{2000}{5} = 400$

Putting $x = 400$ in $(i)$, we get,

$2 \times 400 + 3y = 4250$

$\Rightarrow 800 + 3y = 4250$

$\Rightarrow 3y = 4250 - 800$

$\Rightarrow 3y = 3450$

$\Rightarrow y = \frac{3450}{3} = 1150$

∴ Cost of 1 shirt = Rs 400.

Cost of 1 pant = Rs 1150.

**26. Solution:**

In Δ XYZ, XY= XZ =14cm (Given)

$\therefore \angle Y = \angle Z$ .....(i)

(Angles opposite to equal sides)

Again

YZ= XZ =14cm (Given)

$\therefore \angle Y = \angle X$ .....(ii)

(Angles opposite to equal sides)

From (i) and (ii)

$\angle X = \angle Y = \angle Z$

And in Δ XYZ, we have,

$\angle X + \angle Y + \angle Z = 180°$

$\therefore \angle X = \angle Y = \angle Z = \frac{180°}{3} = 60°.$

Hence, Δ XYZ is an Equilateral Triangle.

∴ Area of Δ XYZ = $\frac{\sqrt{3}}{4} side^2 = \frac{\sqrt{3}}{4} \times 14^2 = \frac{1.732}{4} \times 14 \times 14$

$= 84.868\ cm^2$

**Or**

**Solution:**

In Δ TBC;

$\angle TBC = 40°,$

$\angle BTC = 90°,$

$\angle TCB = x$

$\angle TBC + \angle BTC + \angle TCB = 180°$

(Sum of angles in a triangle = 180°)

$40° + 90° + x = 180°$
$x = 50°$

**27. Solution:**

Given l = 5m, b = 4m, h = 3m

∴ Surface area of the box $= 2(lb + bh + lh)$

$= 2(5.4 + 4.3 + 5.3)m^2$

$= 2(20 + 12 + 15)m^2 = 94\ m^2$

Cost of wrapping $1m^2 = Rs\ 2.$

Cost of wrapping $94m^2 = Rs\ 2\ \times\ 94.$

$= Rs\ 188$

**Or**

**Solution:**

Given,

Dimensions of cuboid = $80m \times 70m \times 60m$

Dimension of cube = $5m \times 5m \times 5m$

∴ No. of cubes = $\frac{80m \times 70m \times 60m}{5m \times 5m \times 5m} = 16 \times 14 \times 12$

$= 2688$

Dimension of box = $4m \times 3m \times 2m = 24m^2$

∴ No. of boxes = $\frac{2688}{24} = 112$

**28. Solution:**

| **Number of hours ($x_i$)** | **Number of people ($f_i$)** | **$f_ix_i$** |
|---|---|---|
| 5 | 10 | 50 |
| 10 | 14 | 140 |
| 15 | 10 | 150 |
| 20 | 6 | 120 |
| TOTAL | 40 | 460 |

∴ Mean working hours per person $= \frac{\Sigma fixi}{\Sigma fi} = \frac{460}{40}$

$= 11\frac{1}{2}\,hours$

**Or**

**Solution:**

| **Weight (in kg)($x_i$)** | **Number of children ($f_i$)** | **$f_ix_i$** |
|---|---|---|
| 15 | 4 | 60 |
| 22 | 5 | 110 |
| 27 | 7 | 189 |
| 30 | 8 | 240 |
| 32 | 6 | 192 |
| TOTAL | 30 | 791 |

$\therefore$ Mean weight $= \frac{\Sigma \text{fixi}}{\Sigma \text{fi}} = \frac{791}{30} = 26.367\ kg$ (Ans.)

$\therefore$ Median $= \frac{\frac{n}{2}th\ observation + \left(\frac{n}{2}+1\right)th\ observation}{2}$

$= \left(\frac{15th\ observation + 16th\ observation}{2}\right)$

$= \frac{27+27}{2} = 27$ (Ans.)

$\therefore$ Mode $=$ $x_i$ with maximum $f_i$ value = 30. (Ans.)