Solutions to RMT/Set-3

1. (*d*) $p(x) = 4x^2 - 3x - 7 \Rightarrow \alpha + \beta = \frac{3}{4}, \alpha\beta = \frac{-7}{4}$

and $$\frac{1}{\alpha} + \frac{1}{\beta} + k = \frac{3}{7}$$

$\Rightarrow$ $$\frac{\alpha + \beta}{\alpha\beta} + k = \frac{3}{7}$$

$\Rightarrow$ $$\frac{\frac{3}{4}}{\frac{-7}{4}} + k = \frac{3}{7}$$

$\Rightarrow$ $$k = \frac{3}{7} + \frac{3}{7}$$

$\Rightarrow$ $$k = \frac{6}{7}$$

2. (*d*) If line intersects the *x*-axis then *y* coordinate will be zero.

Therefore putting $y = 0$ in equation $4x - 3y = 12$, we get

$$4x = 12$$

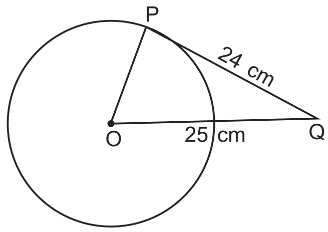
$\Rightarrow$ $x = 3$, point on the *x*-axis is (3, 0).

3. (*d*) In ΔPOQ, $\text{OQ}^2 = \text{PQ}^2 + \text{OP}^2$

$\Rightarrow$ $25^2 = 24^2 + \text{OP}^2$

$\Rightarrow$ $\text{OP}^2 = 49$

$\text{OP} = 7$ cm



Therefore radius of circle is 7 cm.

And difference of PQ and OP is PQ – OP = 24 cm – 7 cm = 17 cm

Perimeter to triangle OPQ = 7 cm + 24 cm + 25 cm = 56 cm

Therefore (*d*) is not true.

4. (*a*) $S_n = -2n^2 + 4n$

$\Rightarrow$ $S_1 = -2 + 4 = 2 \Rightarrow a_1 = 2$

$S_2 = -2 \times 4 + 4 \times 2 = 0 \Rightarrow a_1 + a_2 = 0$

Therefore $a_2 = -2$

Common difference = –2 – 2 = –4

5. (*d*) Total height = 15.5 cm

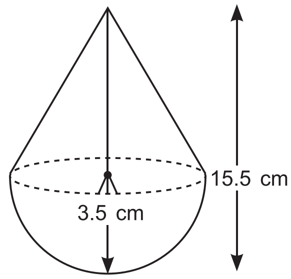
Radius of hemisphere = 3.5 cm

Height of cone = (15.5 – 3.5) cm = 12 cm

Slant height of cone $= \sqrt{r^2 + h^2}$

$= \sqrt{(3.5)^2 + (12)^2}$

$= \sqrt{156.25} = 12.5$ cm



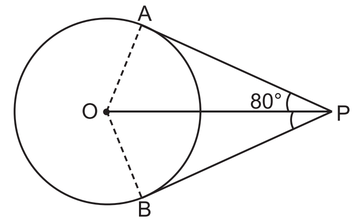
6. (*b*) $\sec A - \tan A = p$

We known, $\sec^2 A - \tan^2 A = 1$

$\Rightarrow$ $(\sec A + \tan A)(\sec A - \tan A) = 1$

$\Rightarrow$ $(\sec A + \tan A) = \frac{1}{p}$

7. (*a*) In quadrilateral PAOB, $\angle BOA + \angle PAO + \angle PBO + \angle BPA = 360°$



$\Rightarrow$ $\angle BOA + 90° + 90° + 80° = 360°$

$\Rightarrow$ $\angle BOA = 100°$

$\Rightarrow$ $\angle POA = \frac{1}{2} \times 100° = 50°$

8. (*b*) $p(x) = x^2 - (k + 6)x + 2(2k - 1)$

Since α and β are zeroes of the given quadratic polynomial,

and $\alpha + \beta = \frac{1}{2}\alpha\beta$

$\Rightarrow$ $\frac{k+6}{1} = \frac{1}{2} \times 2(2k - 1)$

$\Rightarrow$ $2k + 12 = 4k --2$

$\Rightarrow$ $2k = 14$

$\Rightarrow$ $k = 7$

9. (*a*) Mode = 3 Median – 2 Mean

10. (*b*) In ΔABC, DE || BC, $\frac{AD}{AB} = \frac{AE}{AC}$ (Basic proportionality theorem)

$\Rightarrow$ $\frac{4}{9} = \frac{AE}{13.5}$

$\Rightarrow$ $AE = 6$

$EC = AC - AE = 13.5 \text{ cm} - 6 \text{ cm} = 7.5 \text{ cm}$

11. (*b*) Quadratic equation is $x^2 + 3x - 10 = 0$

$\Rightarrow$ $x^2 + 5x - 2x - 10 = 0$

$\Rightarrow$ $x(x + 5) - 2(x + 5) = 0$

$\Rightarrow$ $(x + 5)(x - 2) = 0$

$\Rightarrow$ $x = -5$ or $x = 2$

Hence roots are –5, 2.

12. (*c*) We have $\tan A = 1$

$\Rightarrow$ $\tan A = \tan 45°$

$\Rightarrow$ $A = 45°$

Therefore, $\sin^2 A - \cos^2(A + 15°) = \sin^2 45° - \cos^2(45° + 15°)$

$= \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$

13. (*a*) Volume of cube $= 64 \text{ cm}^3$

i.e. $\text{side}^3 = 64$

$\Rightarrow$ side of the cube, $a = 4$

Then length, breadth and height of the cuboid formed are (4 + 4)cm, 4 cm, 4 cm, i.e. 8 cm, 4 cm, 4 cm.

14. (*d*) Total sample space =

1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

P(5 will not come up either time) = $\frac{25}{36}$

15. (*c*) Abscissa of the point denotes the distance of point from the *y*-axis and ordinate denotes the distance of point from the *x*-axis.

Therefore distance from the *x*-axis is 8 units.

16. (*b*)

$$\text{Mean} = \frac{\text{sum of observations}}{\text{numer of observations}}$$

$$\Rightarrow \quad 11 = \frac{x + x + 5 + x + 1 + x + 10 + x + 4}{5}$$

$$\Rightarrow \quad 55 = 5x + 20$$

$$\Rightarrow \quad x = 7$$

17. (*a*) Point P is a point of trisection, therefore P divides line segment joining the points A and B in ratio 1: 2.

Using section formula $\quad x = \frac{1 \times 4 + 2 \times 4}{1 + 2} = 4$

and $\quad y = \frac{1 \times 6 + 2 \times (-3)}{1 + 2} = 0$

Hence, the coordinates of the point are (4, 0).

18. (*a*) We have $P(E) + P(\overline{E}) = 1$

$$\therefore \quad x = 1$$

$$x^3 - 3 = (1)^3 - 3 = -2$$

19. (*b*) Numbers are 70 – 5 = 65 and 125 – 8 = 117

HCF of 65 and 117,

$$65 = 5 \times 13$$

$$117 = 13 \times 3 \times 3$$

$$\therefore \quad \text{HCF} = 13$$

Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).

20. (*a*)

$$\text{Sector angle} = 60°$$

$$\text{Length of arc} = 2 \times \frac{22}{7} \times 10.5 \times \frac{60°}{360°} = 11 \text{ cm}$$

$$\text{Perimeter of sector} = l + 2r$$

$$= 11 \text{ cm} + 21 \text{ cm}$$

$$= 32 \text{ cm.}$$

Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

21. (*a*)

$$306 = 2 \times 3 \times 3 \times 17$$
$$= 2 \times 3^2 \times 17$$
$$306 = xy^2z$$

i.e. $2 \times 3^2 \times 17 = xy^2z$

Comparing coefficient on both sides, we get

$x = 2, y = 3$ and $z = 17$

Therefore, $z - x - 2y = 17 - 2 - 6 = 9$

OR

(*b*) Since the girl needs to walk 95 m and 171 m in exact number of minutes.

So, we have to find HCF in this case.

$$95 = 5 \times 19$$
$$171 = 3 \times 3 \times 19$$
$$\text{HCF} = 19$$

Hence, greatest possible speed is 19 m/minute.

22. (*a*) S = {HHH, HHT, HTH, THH, TTH, THT, HTT, TTT}

At least one head = {HHH, HHT, HTH, THH, TTH, THT, HTT}

At most one tail = {HHH, HHT, HTH, THH}

(*i*) P(At least one head) $= \dfrac{7}{8}$

(*ii*) P(At most one tail) $= \dfrac{4}{8} = \dfrac{1}{2}$

OR

(*b*) $x^2 \leq 4$

Therefore $(-2)^2 = 4$, $(-1)^2 < 4$, $(1)^2 < 4$, $(0)^2 < 4$, $(2)^2 = 4$

Favourable outcomes = 5

Total outcomes = 7

$$\text{Therefore } P(x^2 \leq 4) = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$$

$$\text{Therefore } P(x^2 \leq 4) = \frac{5}{7}$$

23.
$$\frac{2\sin^2 30° + \cot^2 30°}{\text{cosec}^2 60° - \cos^2 30°} = \frac{2 \times \left(\frac{1}{2}\right)^2 + (\sqrt{3})^2}{\left(\frac{2}{\sqrt{3}}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2}$$

$$= \frac{2 \times \frac{1}{2} \times \frac{1}{2} + \sqrt{3} \times \sqrt{3}}{\frac{2}{\sqrt{3}} \times \frac{2}{\sqrt{3}} - \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}}$$

$$= \frac{\frac{1}{2} + 3}{\frac{4}{3} - \frac{3}{4}}$$

$$= \frac{7}{2} \times \frac{12}{7}$$

$$= 6$$

24. Let point on the y-axis be P(0, y) and the given points be A(5, 3) and R(–1, 6).

Using distance formula, distance between two points = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

According to question point P(0, y) is equidistant from points A(5, 3) and R(–1, 6).

i.e. $PA = PR$

$\Rightarrow$ $PA^2 = PR^2$

$\Rightarrow$ $(0-5)^2 + (y-3)^2 = (0+1)^2 + (y-6)^2$

$\Rightarrow$ $25 + y^2 + 9 - 6y = 1 + y^2 + 36 - 12y$

$\Rightarrow$ $6y = 3$

$\Rightarrow$ $y = \frac{1}{2}$

Therefore point on the y-axis is $\left(0, \frac{1}{2}\right)$

25. Point P(–4, 6) divides the line segment joining the points A(–6, 10) and B(3, –8) in the ratio $m : n$.

Using section formula, $x = \frac{m_1x_2+m_2x_1}{m_1+m_2}, y = \frac{m_1y_2+m_2y_1}{m_1+m_2}$

$\Rightarrow$ $-4 = \frac{m\times 3+n\times(-6)}{m+n}$

$\Rightarrow$ $-4m - 4n = 3m - 6n$

$\Rightarrow$ $2n = 7m$

$\Rightarrow$ $\frac{m}{n} = \frac{2}{7}$

Now, the value of $2m + n = 2 \times 2 + 7 = 11$

26. (*a*) **Given:** $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$

To Prove: $\Delta PQS \sim \Delta TQR$

Proof: In ΔPQR, $\angle 1 = \angle 2$ [Given]

$PQ = PR$ [Sides opposite to equal angles]

$\frac{QR}{QS} = \frac{QT}{PR}$ [Given]

or $\frac{QR}{QS} = \frac{QT}{PQ}$ [$\therefore$ PQ = PR]

In ΔPQS and ΔTQR,

$\frac{QR}{QS} = \frac{QT}{PQ}$ (Proved)

$\Rightarrow$ $\frac{QR}{QT} = \frac{QS}{QP}$

$\angle 1 = \angle 1$ [Common]

$\therefore$ $\Delta PQS \sim \Delta TQR$ [SAS]

OR

(*b*) In ΔABC and ΔPQR,

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM} \quad \text{[Given]}$$

or
$$\frac{AB}{PQ} = \frac{\frac{1}{2}BC}{\frac{1}{2}QR} = \frac{AD}{PM}$$

$\Rightarrow$
$$\frac{AB}{PQ} = \frac{BD}{QM} = \frac{AD}{PM}$$

$\Rightarrow$ $\Delta ABD \sim \Delta PQM$ [SAS]

$\therefore$ $\angle B = \angle Q$ [Corresponding angles of similar triangles]

In ΔABC and ΔPQR,

$$\frac{AB}{PQ} = \frac{BC}{QR} \quad \text{[Given]}$$

$\angle B = \angle Q$ [As proved]

$\therefore$ $\Delta ABC \sim \Delta PQR$ [SAS]

27. Quadratic equation is $(k + 1)x^2 - 6(k + 1)x + 3(k + 9) = 0, k \neq -1$

Discriminant,
$$\begin{aligned} D &= b^2 - 4ac \\ &= \{-6(k + 1)\}^2 - 4(k + 1)\{3(k + 9)\} \\ &= 36(k + 1)^2 - 12(k + 1)(k + 9) \\ &= 12(k + 1)(3k + 3 - k - 9) \\ &= 12(k + 1)(2k - 6) \end{aligned}$$

For real and equal roots, D = 0

$\Rightarrow$ $12(k + 1)(2k - 6) = 0$

$\Rightarrow$ $2k - 6 = 0$ or $k + 1 = 0$

Either $k = 3$ or $k = -1$ (rejected)

Therefore $k = 3$

28. Since α and β are the zeroes of the polynomial $x^2 + x - 2$.

Therefore, $\alpha + \beta = -1$ and $\alpha\beta = -2$

Now,
$$\begin{aligned} \frac{\alpha}{\beta} + \frac{\beta}{\alpha} &= \frac{\alpha^2 + \beta^2}{\alpha\beta} \\ &= \frac{(\alpha + \beta)^2 - 2\alpha\beta}{\alpha\beta} = \frac{1 + 4}{-2} = \frac{-5}{2} \end{aligned}$$

$$\begin{aligned} (\alpha - \beta)^2 &= (\alpha + \beta)^2 - 4\alpha\beta \\ &= (-1)^2 - 4 \times (-2) \\ &= 1 + 8 \\ &= 9 \end{aligned}$$

29.
$$\begin{aligned} \text{LHS} &= \frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} \\ &= \frac{\cos\theta(\tan\theta - 1 + \sec\theta)}{\cos\theta(\tan\theta + 1 - \sec\theta)} \\ &= \frac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta} \end{aligned}$$

$$= \frac{\tan\theta + \sec\theta - (\sec^2\theta - \tan^2\theta)}{\tan\theta + 1 - \sec\theta} \qquad (\because 1 = \sec^2\theta - \tan^2\theta)$$

$$= \frac{(\tan\theta + \sec\theta) - (\sec\theta + \tan\theta)(\sec\theta - \tan\theta)}{\tan\theta + 1 - \sec\theta}$$

$$= \frac{(\tan\theta + \sec\theta)(1 - \sec\theta + \tan\theta)}{\tan\theta + 1 - \sec\theta}$$

$$= \tan\theta + \sec\theta$$

$$= (\tan\theta + \sec\theta) \times \frac{\sec\theta - \tan\theta}{\sec\theta - \tan\theta} \qquad \{\text{Multiplying numerator and denominator by } (\sec\theta - \tan\theta)\}$$

$$= \frac{\sec^2\theta - \tan^2\theta}{\sec\theta - \tan\theta}$$

$$= \frac{1}{\sec\theta - \tan\theta} = \text{RHS}$$

30. (*a*)

Diameter = 7 m

Radius (r) = 3.5 m

Outer radius (R) = 3.5 m + 0.7 m = 4.2 m

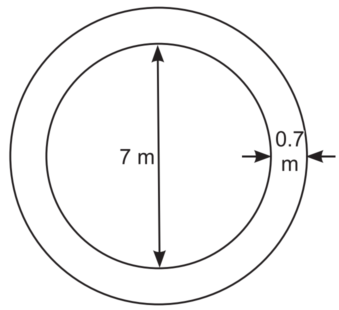
Area of path = area of ring

$= \pi(R^2 - r^2)$

$= \frac{22}{7}\{(4.2)^2 - (3.5)^2\}$

$= \frac{22}{7} \times 7.7 \times 0.7$

$= 16.94\ m^2$



Cost of cementing = rate × area

= ₹ 110 × 16.94 = ₹ 1863.40

OR

(*b*)

Radius = 6 cm

Central angle = 60°

Area of sector $= \pi r^2 \frac{\theta}{360°}$

$= 3.14 \times 6 \times 6 \times \frac{60°}{360°} = 3.14 \times 6 = 18.84\ cm^2$

We know that area of sector $= \frac{1}{2} \times l \times r$

$\Rightarrow \qquad 18.84 = \frac{1}{2} \times l \times 6$

$l = 6.28$ cm

Hence, length of arc is 6.28 cm.

Perimeter of sector $= l + 2r$

= 6.28 cm + 12 cm = 18.28 cm.

31.

144 = 2 × 2 × 2 × 2 × 3 × 3

216 = 2 × 2 × 2 × 3 × 3 × 3

HCF = 2 × 2 × 2 × 3 × 3 = 72

LCM = 2 × 2 × 2 × 2 × 3 × 3 × 3 = 432

Therefore m = 72 and n = 432

Now, $3n - 2m = 3 \times 432 - 2 \times 72$

$= 1296 - 144$

$= 1152$

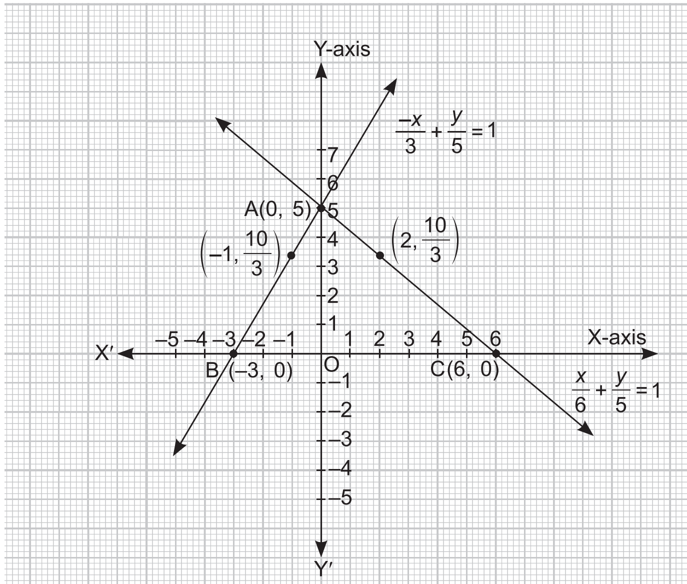
32. (*a*) $\frac{x}{6}+\frac{y}{5}=1,$ $\qquad \frac{-x}{3}+\frac{y}{5}=1$

Table for $\frac{x}{6}+\frac{y}{5}=1$

x	0	6	2
y	5	0	$\frac{10}{3}$

Table for $\frac{-x}{3}+\frac{y}{5}=1$

x	0	–3	–1
y	5	0	$\frac{10}{3}$



The line represented by $\frac{x}{6}+\frac{y}{5}=1$ and $\frac{-x}{3}+\frac{y}{5}=1$ intersect at A(0, 5).

Therefore $x = 0$ and $y = 5$ is solution of given equations.

From graph, area of triangle ABC = $\frac{1}{2}$ × base × height

$$= \frac{1}{2}\times 9\times 5 = \frac{45}{2} \text{ sq units}$$

OR

(*b*) Let ten's digit be x and units digit be y.

Then number = $10x + y$

Number obtained by interchanging the digits = $10y + x$

According to the question,

$$x + y = 12 \qquad ...(i)$$

and $\quad 10y + x = 18 + 10x + y$

⇒ $\quad 9y - 9x = 18$

⇒ $\quad y - x = 2 \qquad ...(ii)$

Adding equations (*i*) and (*ii*), we get

$$2y = 14 \Rightarrow y = 7$$

Substituting the value of y in eq (*i*), we get

$$x = 5$$

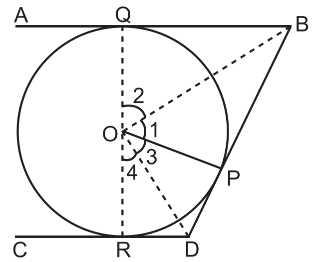
Hence, number = 10 × 5 + 7 = 57

33. **Given:** AB and CD are two tangents to a circle and AB || CD.

Tangent BD intercepts an angle BOD at the centre.

To Prove: $\angle BOD = 90°$.

Construction: Join OQ, OB, OD and OR.



Proof: $OP \perp BD$.

[A tangent at any point of a circle is perpendicular to the radius through the point of contact.]

In right angled Δs OQB and OPB,

$$OQ = OP \qquad \text{[Radii]}$$
$$OB = OB \qquad \text{[Common]}$$
$$BQ = BP \qquad \text{[Tangents drawn from an external point to a circleare equal]}$$
$$\Rightarrow \quad \Delta OQB \cong \Delta OPB \qquad \text{(SSS)}$$
$$\Rightarrow \quad \angle 2 = \angle 1 \qquad \text{(CPCT)}$$

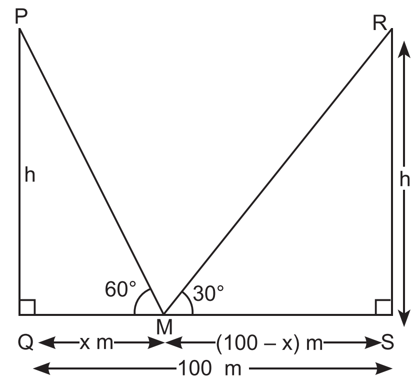
Similarly in right angled Δs OPD and ORD

$$\angle 3 = \angle 4$$
$$\therefore \quad \angle BOD = \angle 1 + \angle 3$$
$$= \frac{1}{2}[2\angle 1 + 2\angle 3)]$$
$$= \frac{1}{2}(\angle 1 + \angle 1 + \angle 3 + \angle 3)$$
$$= \frac{1}{2}(\angle 1 + \angle 2 + \angle 3 + \angle 4)$$
$$= \frac{1}{2}(180°) = 90°.$$

34. Let PQ and RS be two pillars of equal height h (say) and M is the point on the road.

Angle of elevations of two pillars are 60° and 30°

Let QM = x m then MS = $(100 - x)$m



In ΔPQM, $\frac{PQ}{QM} = \tan 60°$

$$\Rightarrow \quad \frac{h}{x} = \sqrt{3}$$
$$\Rightarrow \quad h = x\sqrt{3} \qquad ...(i)$$

In ΔRMS, $\frac{RS}{MS} = \tan 30°$

$$\Rightarrow \quad \frac{h}{100 - x} = \frac{1}{\sqrt{3}}$$
$$\Rightarrow \quad 100 - x = h\sqrt{3} \qquad ...(ii)$$

From equations (i) and (ii), we get

$$100 - x = 3x$$

$\Rightarrow \qquad 4x = 100$

$\Rightarrow \qquad x = 25$ m

Therefore position of the point on the road is 25 m from the pillar which makes as angle of 60°.

Height of each pillar is $25\sqrt{3}$ m = 25 × 1.73 = 43.25 m.

35. (*a*) Let A = 37.5, here h = 5

Minimum pocket allowance is ₹ 20, therefore

Class intervals	Frequency (f_i)	x_i	$u_i = \frac{x_i - A}{h}$	f_iu_i	cf
20-25	7	22.5	–3	–21	7
25-30	6	27.5	–2	–12	13
30-35	9	32.5	–1	–9	22
35-40	13	37.5	0	0	35
40-45	6	42.5	1	6	41
45-50	4	47.5	2	8	45
50-55	5	52.5	3	15	50
Total	$\Sigma f_i = 50$			$\Sigma f_iu_i = -13$	

From formula, mean, $\bar{x} = A + \frac{\Sigma f_iu_i}{\Sigma f_i} \times h$, we get

$$\bar{x} = 37.5 + \frac{(-13)}{50} \times 5$$

$$= 37.5 - 1.3 = 36.2$$

Mean = 36.2

Median class = 35 – 40

From formula median $= l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$

$$\text{Median} = 35 + \frac{(25-22)}{13} \times 5$$

Median = 35 + 1.15

Median = 36.15

OR

(*b*) $\Sigma f_i = 30$

$\therefore \quad 2 + 7 + x + 3 + 4 + 5 = 30$

$\Rightarrow \quad 21 + x = 30 \Rightarrow x = 9$

Class intervals	Frequency (f_i)	*cf*
0-5	2	2
5-10	7	9
10-15	9	18
15-20	3	21
20-25	4	25
25-30	5	30

Modal class = 10 – 15

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

Here, $l = 10, h = 5, f_1 = 9, f_0 = 7, f_2 = 3$

$$\text{Mode} = 10 + \frac{9-7}{18-7-3} \times 5$$

$$\text{Mode} = 10 + \frac{10}{8}$$

$$\text{Mode} = 11.25$$

Median class = 10-15

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

$$\text{Median} = 10 + \left(\frac{15-9}{9}\right) \times 5$$

$$\text{Median} = 10 + \frac{10}{3}$$

$$\text{Median} = 13.33$$

36. (*i*) According to the information

AP = 1, 2, 3, 4,. . . . .

and $a_n = a + (n-1)d$

$\therefore \quad a_8 = 1 + (8-1)1$

$= 8$

Hence 8 coins were added to the piggy bank on 8^{th} day.

(*ii*) $$S_n = \frac{n}{2}\{2a + (n-1)d\}$$

$$S_8 = \frac{8}{2}\{2 + (8-1)1\}$$

$S_8 = 36$ coins

Therefore, money = ₹ 5 × 36 = ₹ 180

(*iii*) (*a*) $S_n = \frac{n}{2}\{2a + (n-1)d\}$

$\Rightarrow$ $210 = \frac{n}{2}\{2 + (n-1)1\}$

$\Rightarrow$ $420 = n^2 + n$

$\Rightarrow$ $n^2 + n - 420 = 0$

$\Rightarrow$ $n^2 + 21n - 20n - 420 = 0$

$\Rightarrow$ $n(n + 21) - 20(n + 21) = 0$

$\Rightarrow$ $(n + 21)(n - 20) = 0$

$n = 20$ or $n = -21$(rejected)

Number days = 20

OR

(*iii*) (*b*) $S_n = \frac{n}{2}\{2a + (n-1)d\}$

$S_{15} = \frac{15}{2}\{2 + (15-1)1\}$

$S_{15} = 15 \times 8 = 120$

Hence total coins = 120

Therefore total money saved in 15 days = ₹ 5 × 120 = ₹ 600

37. (*i*) In ΔOAC and ΔOBD.

$\angle AOC = \angle BOD$ (Vertically opposite angles)

$\angle OAC = \angle OBD$ (Alternate angles)

Therefore, $\Delta OAC \sim \angle OBD$ (AA criterion)

(*ii*) Since, $\Delta OAC \sim \Delta OBD$ (As proved)

$\Rightarrow$ $\frac{OA}{OB} = \frac{AC}{BD}$ (Corresponding parts of similar triangles)

Or, $\frac{OA}{AC} = \frac{OB}{BD}$ (Alternendo)

(*iii*) (*a*) $\Delta OAC \sim \Delta OBD$ (As proved above)

$\Rightarrow$ $\frac{OA}{OB} = \frac{OC}{OD}$ (Corresponding parts of similar triangles)

Or, $\frac{3x+4}{x} = \frac{3x+19}{x+3}$

$\Rightarrow$ $3x^2 + 4x + 9x + 12 = 3x^2 + 19x$

$\Rightarrow$ $6x = 12$

$\Rightarrow$ $x = 2$

$OC = 3 \times 2 + 19 = 25$

OR

(*iii*) (*b*) $\Delta OAC \sim \Delta OBD$ (As proved)

$$\frac{OA}{OB} = \frac{AC}{BD} = \frac{OC}{OD}$$ (Corresponding parts of similar triangles)

$$\Rightarrow \frac{BD}{AC} = \frac{OB}{OA} = \frac{OD}{OC}$$ (Invertendo)

$$\Rightarrow \frac{BD}{AC} = \frac{2}{10} = \frac{1}{5}$$

38. (*i*) For mallet: height = 10 cm and radius = 2 cm.

Volume of material used in making the mallet = $\pi r^2 h$ = 3.14 × 2 × 2 × 10 = 125.6 cm^3

(*ii*) Hemispherical bowl has of mallet inner radius 5 cm.

Inner curved surface area = $2\pi r^2$ = 2 × 3.14 × 5 × 5

Inner curved surface area = 157 cm^2

(*iii*) (*a*) Hemispherical bowl has outer radius 6 cm and inner radius 5 cm.

Volume of metal used to make the bowl = $\frac{2}{3}\pi(R^3 - r^3)$ = $\frac{2}{3} \times 3.14 \times (6^3 - 5^3)$

Volume of metal used to make the bowl = 190.49 cm^3

OR

(*iii*) (*b*) For mallet: height is 10 cm and radius is 2 cm.

Total surface area = $2\pi r(r + h)$ = 2 × 3.14 × 2(2 + 10)

Total surface area = 150.72 cm^2