# ICSE Mathematics
# Class X
# Sample Paper 1

Time: **2½** hour | Total Marks: 80

## Solutions

## SECTION – A (40 Marks)

**Q. 1**
**Solution**
(a)
Put x – 2 = 0 ⇒ x = 2 in $kx^2 - 3x + 6$ [1]
So by Factor Theorem, the remainder obtained by
dividing $kx^2 - 3x + 6$ by x – 2 = $k(2)^2 - 3(2) + 6$
Put $x + 3 = 0 \Rightarrow x = -3$ in $3x^2 + 5x - k$ [1]
And similarly, the remainder obtained by
dividing $3x^2 + 5x - k$ by x + 3 = $3(-3)^2 + 5(-3) - k$
Now, $k(2)^2 - 3(2) + 6 = 2[3(-3)^2 + 5(-3) - k]$
4k – 6 + 6 = 2[27 – 15 – k]
⇒ 4k = 2(12-k) ⇒ 4k = 24 – 2k
⇒ 4k + 2k = 24 ⇒ 6k = 24
So, k = 4. [1]

(b)

$$AB = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 0+0 & 1+0 \\ 0-1 & 0+0 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$ [1]

$$BA = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 0+0 & 0-1 \\ 1+0 & 0-0 \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$ [1]

Thus, AB ≠ BA, proved. [1]

(c)

Let the sum of money lent out = Rs. x

Amount received after one year $=\left(1+\frac{r}{200}\right)^{2n}$ [1]

$$= x\left(1+\frac{8}{200}\right)^{2\times 1}$$

$$= x\left(1+\frac{1}{25}\right)^{2}$$

$$= x\left(\frac{26}{25}\right)^{2}$$

$$= \frac{676}{625}x$$ [1]

$\therefore$ Compound interest (C.I.) = $\frac{676}{625}x - x = \frac{676x-625x}{625} = \text{Rs.}\frac{51x}{625}$

And, Simple interest (S.I.) = $\text{Rs.}\frac{x\times 8\times 1}{100} = \text{Rs.}\frac{2x}{25}$

Given, difference between C.I. and S.I. = Rs. 16 [1]

$\Rightarrow \frac{51}{625}x - \frac{2}{25}x = 16 \Rightarrow \frac{51x-50x}{625} = 16 \Rightarrow x = 16\times 625 = 10{,}000$ [1]

$\therefore$ The sum lent out = Rs. 10,000

**Q. 2**

**Solution**

(a)

No. of cards removed = 3(face cards of clubs)

Remaining no. of cards = 52 – 3 = 49 [1]

(i) a club

Remaining no. of cards = 13 – 3 = 10 [1]

$\therefore$ P(a club) = $\frac{10}{49}$

(ii) a red face card

P(a red face card) = $\frac{6}{49}$ [1]

(b)

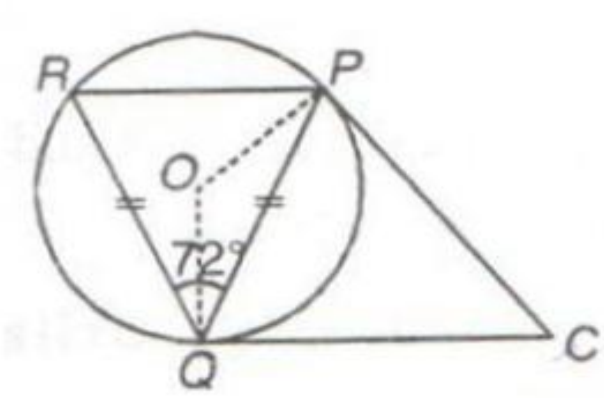
$2x - \frac{3}{x} = 5 \Rightarrow 2x^2 - 5x - 3 = 0$ [1]

$\Rightarrow 2x + 1 = 0$ or $x - 3 = 0$

$\Rightarrow 2x^2 - 6x + x - 3 = 0$

$\Rightarrow 2x(x - 6) + 1(x - 3) = 0 \Rightarrow x = \frac{-1}{2}$ or $x = 3$ [1]

(c)




(i) Given: QR = QP

$\Rightarrow \angle QPR = \angle QRP$ $\left[\frac{1}{2}\right]$

$\angle QPR + \angle RPQ + \angle PQR = 180°$
$2\angle QPR + 72° = 180°$
$2\angle QPR = 108°$

$\angle QPR = 54°$ $\left[\frac{1}{2}\right]$

$\therefore \angle QRP = \angle RPQ = 54°$ $\left[\frac{1}{2}\right]$

$\angle POQ = 2\angle QRP = 108°$

Take angles in alternate segment $\left[\frac{1}{2}\right]$

$\angle CQP = \angle QRP = 54°$

And $\angle CPQ = \angle QPC = 54°$ $\left[\frac{1}{2}\right]$

(ii) Now, $\angle CQP + \angle CPQ + \angle PCQ = 180°$ $\left[\frac{1}{2}\right]$

$54° + 54° + \angle PCQ = 180°$ [1]

$108° + \angle PCQ = 180°$

$\Rightarrow \angle PCQ = 180° - 108° = 72°$ $\left[\frac{1}{2}\right]$

**Q. 3**
**Solution**
(a)
Total amount deposited by Manu in 5 years = Rs. 240 × 60 = Rs. 14,400

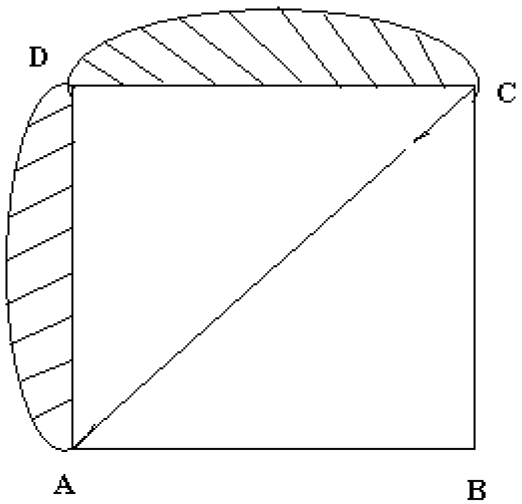
Equivalent principal for 1 month = $\text{Rs.}240 \times \frac{60(60+1)}{2} = \text{Rs.}4,39,200$ [1]

Let the rate of interest be r%

Interest on Rs. 4,39,200 for 1 month $= \text{Rs.}439200 \times \frac{1}{12} \times \frac{r}{100} = \text{Rs.}366r$ [1]

Maturity amount = 17694
Or 14400 + 366r = 17694 $\Rightarrow$ r = 9% [1]

(b)




$$AC = \sqrt{2}a = 58\sqrt{2}m$$

$$r = \frac{58\sqrt{2}}{2} = 29\sqrt{2}m \quad \left[\frac{1}{2}\right]$$

Area of whole lawn = area of ΔABC + Area of semi- circle on AC as diameter. [1]

$$= \frac{1}{2} \times 58 \times 58 + \frac{\pi(29\sqrt{2})^2}{2} \quad \left[\frac{1}{2}\right]$$

$$= 29 \times 58 + \frac{22 \times 841 \times 2}{7 \times 2} \quad \left[\frac{1}{2}\right]$$

$$= 4325.14m^2 \quad \left[\frac{1}{2}\right]$$

(c)

(i) Coordinates of centroid, $x = \frac{x_1 + x_2 + x_3}{3} = \frac{1+3+7}{3} = \frac{11}{3}$ [1]

And, $y = \frac{y_1 + y_2 + y_3}{3} = \frac{4+2+5}{3} = \frac{11}{3}$ [1]

So, $G = \left(\frac{11}{3}, \frac{11}{3}\right)$

(ii) the equation of a line, through G and parallel to AB.

Sol: Slope of line $AB = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-4}{3-1} = -\frac{2}{2} = -1$ [1]

Now, equation of line through G and parallel to AB.

$\Rightarrow y - y_1 = m(x - x_1)$ [1]

$\Rightarrow y - \frac{11}{3} = -1\left(x - \frac{11}{3}\right)$

$\Rightarrow 3y - 11 = -3x + 11$

$\Rightarrow 3x + 3y - 22 = 0$

**Q. 4**

**Solution**

(a)

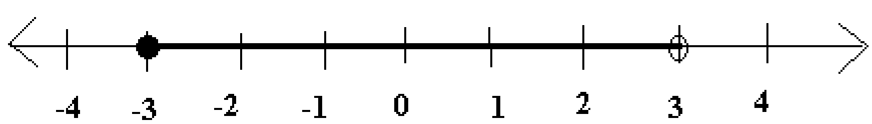
$-2\frac{2}{3} \le x + \frac{1}{3} < 3\frac{1}{3}; x \in R.$

$\Rightarrow \frac{-8}{3} \le x + \frac{1}{3} < \frac{10}{3}$ [by subtracting $\frac{1}{3}$, we get] [1]

$\frac{-8}{3} - \frac{1}{3} \le x + \frac{1}{3} - \frac{1}{3} < \frac{10}{3} - \frac{1}{3}$ [1]

$\frac{-9}{3} \le x < \frac{9}{3} \Rightarrow -3 \le x < 3$

Solution is $\{x : x \in R, -3 \le x < 3\}$ [1]




(b)

$\frac{\sin(90^\circ - 70^\circ)}{\sin 20^\circ} + \frac{\sin(90^\circ - 59^\circ)}{\sin 31^\circ} - 8\left(\frac{1}{2}\right)^2$ [1]

Since, $\text{Cos}\theta = \text{Sin}(90^\circ - \theta)$ [1]

$= \frac{\sin 20^\circ}{\sin 20^\circ} + \frac{\sin 31^\circ}{\sin 31^\circ} - 8 \times \frac{1}{4} = 1 + 1 - 2 = 0$ [1]

(c)

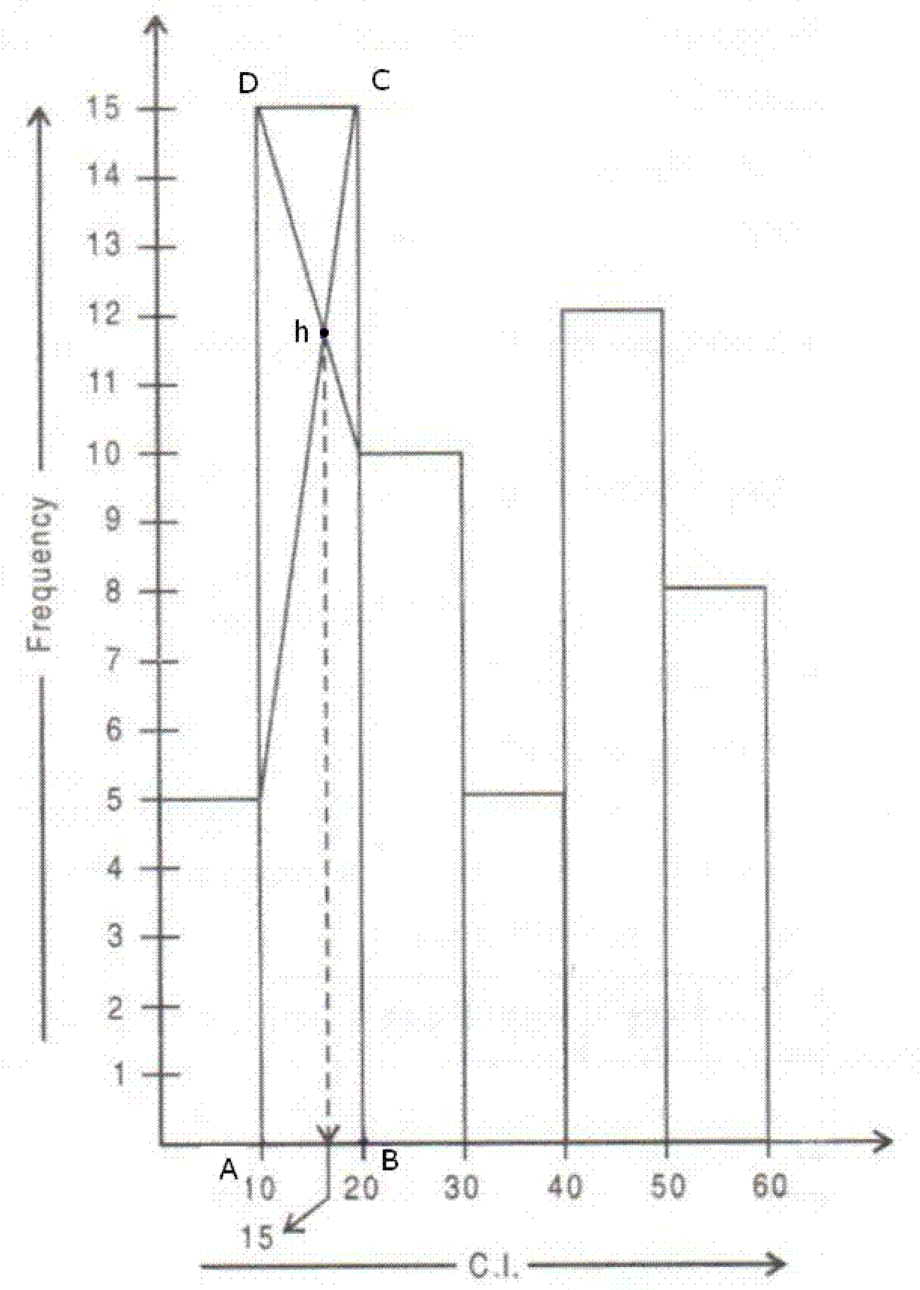
To locate the mode from the histogram, we proceed as follows:

i Find the modal class. Rectangle ABCD is the largest rectangle. It represents the modal class, that is, the mode lies in this rectangle. The modal class is 10 – 20. [1]

ii Draw two lines diagonally from the vertices C and D to the upper corners of the two adjacent rectangles. Let these rectangles intersect at point H. [1]

iii The x-value of the point H is the mode. Thus, mode of the given data is approximately 15. [1]

So, the histogram is [1]




So, mode = 15.

**SECTION – B (40 Marks)**

**Q. 5**
**Solution**
(a)

M.P. = Rs. x, Discount = 20% of x = $\text{Rs.}\frac{x}{5}$

New M.P. after discount = $\text{Rs.}x - \frac{x}{5} = \text{Rs.}\frac{4x}{5}$

Again discount = 5% of $\frac{4x}{5} = \frac{1}{20}\left(\frac{4x}{5}\right) = \text{Rs.}\frac{x}{25}$ [1]

Changed M.P. after $2^{nd}$ discount = $\frac{4x}{5} - \frac{x}{25} = \text{Rs.}\frac{19x}{25}$

Now, 2298.24 = $\frac{19x}{25} + 8\%\text{of}\frac{19x}{25}$ [1]

$$2298.24 = \frac{19x}{25} + \frac{8}{100} \times \frac{19x}{25}$$

$$\Rightarrow 2298.24 = \frac{19x}{25} + \frac{38x}{625} \Rightarrow 2298.24 = \frac{475x + 38x}{625}$$

$$\Rightarrow 2298.24 = \frac{513x}{625}$$ [1]

$$\Rightarrow \frac{2298.24 \times 625}{513} = x \Rightarrow x = \text{Rs.}2800$$

$\therefore$ M.P. = Rs.2800

(b)
Length of wire for one round = 3mm = 0.3cm

Number of rounds required to cover the 12 cm length = $\frac{12}{0.3} = 40$

Diameter of the cylinder = 10cm $\Rightarrow$ Radius of the cylinder = 5 cm

Length of wire required for one round $= 2\pi r = 2\pi \times 5\text{cm} = 10\pi\text{cm}$

$\therefore$ Length of wire required for 40 rounds = $10\pi \times 40$ [1]

$= 400\pi\text{cm} = 400 \times 3.14 = 1256\text{cm}$

Now, radius of the wire $= \frac{3}{2}\text{mm} = \frac{3}{20}\text{cm}$ [1]

Volume of the wire $= \pi r^2 h = \pi\left(\frac{3}{20}\right)^2 \times 1256\text{cm}^3$

Weight of the wire = Volume of the wire $\times 8.88$ gm

$= 3.14 \times \left(\frac{3}{20}\right)^2 \times 1256 \times 8.88 = 787.98\text{gm}$ [1]

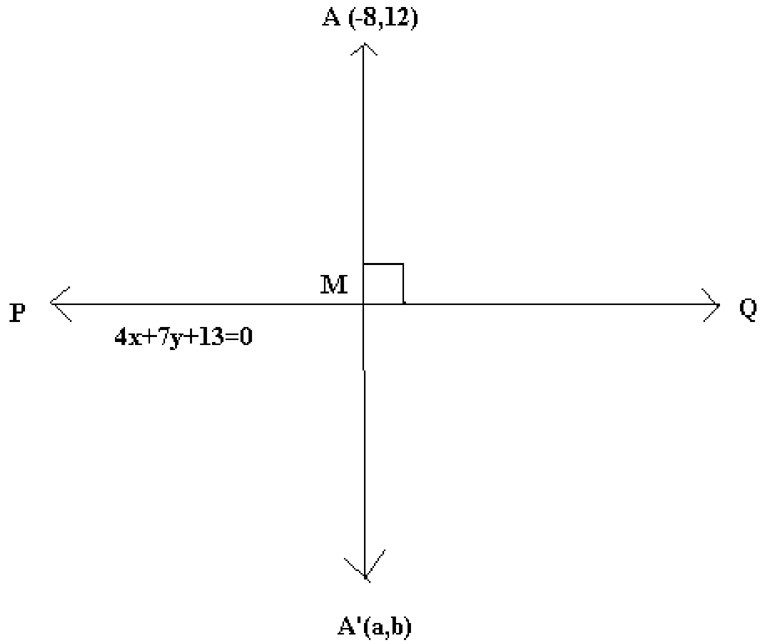
(c)

$$M = \left(\frac{a-8}{2}, \frac{b+12}{2}\right)$$

It lies on 4x + 7y + 13 = 0

$$\therefore 4\left(\frac{a-8}{2}\right) + 7\left(\frac{b+12}{2}\right) + 13 = 0 \qquad [1]$$

$$\Rightarrow 4a + 7b + 78 = 0$$




Since AA' ⊥ PQ, so

Slope (PQ) × Slope (AA') = -1 [1]

$$\frac{-4}{7} \times \frac{b-12}{a+8} = -1$$

$$\Rightarrow 7a - 4b + 104 = 0$$

$$4a + 7b = -78....(1)$$

$$7a - 4b = -104....(2)$$

Multiplyingw equation (1) by 4 and equation (2) by 7 we get

16a + 28b = -312

49a – 28b = -728

65a = -1040 ⇒ $a = \frac{-1040}{65} = -16,$ [1]

Put a = -16 in equation, we get

4a + 7b + 78 = 0

⇒ 4 × -16 + 7b + 78 = 0

⇒ -64 + 7b + 78 = 0

⇒ 7b + 14 = 0 ⇒ 7b = -14 ⇒ b = -2 [1]

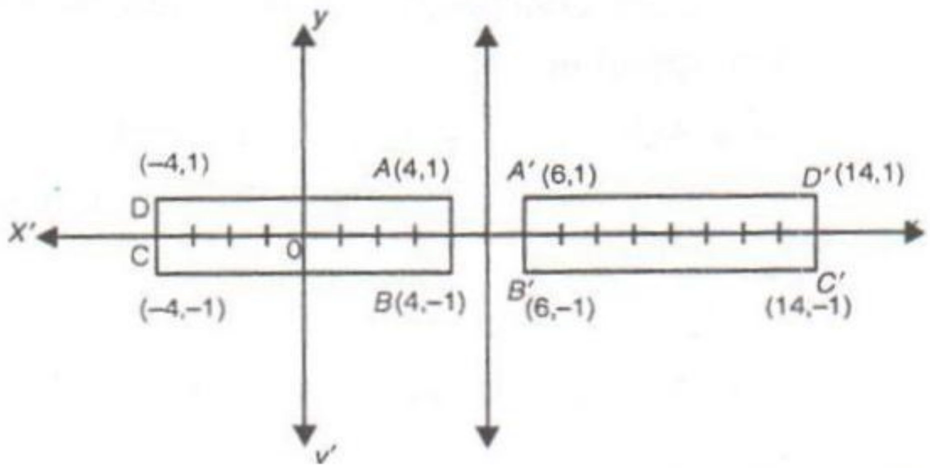
Image = (-16, -2)

**Q. 6**

**Solution**

(a)

First the coordinates A(4,1), B(4,-1), D(-4,1) and C(-4,-1) are plotted to form a rectangle.
The rectangle so formed and the reflected rectangle is shown in fig:




[2]

It is reflected through x = 5, then the coordinates of the new rectangle become
A'(6,1), B'(6,-1), C'(14,-1) and D'(14,1) [1]

Perimeter of A'B'C'D' = A'B' + B'C' + C'D' + D'A" [1]

= 2 + 8 + 2 + 8 = 20 units

Area = L × B = B'C' × C'D' = 8 × 2 = 16 sq.units [1]

(b)

Min. balance for the month of june = 8680.00
Min. balance for the month of july = 6180.00
Min. balance for the month of Aug = 6180.00
Min. balance for the month of Sept = 6180.00 [1]
Min. balance for the month of Oct = 6180.00
Min. balance for the month of Nov = 6560.00
Min. balance for the month of Dec = 00.00

Total = 39, 960.00 [1]

P = Rs. 39,960

I = Rs. (5940.80 – 5741) = Rs. 199.80

R = ?, $T = \frac{1}{12}$ years

[1]

Use, $I = \frac{P \times R \times T}{100}$ [1]

$\Rightarrow 199.80 = \frac{39,960 \times R \times 1}{12 \times 100}$

[1]

$\Rightarrow R = \frac{199.80 \times 12 \times 100}{39960} = 6\%$

**Q.7**
**Solution**
(a)

Given, $\frac{\sqrt{a+x}+\sqrt{a-x}}{\sqrt{a+x}-\sqrt{a-x}}=\frac{b}{1}$

By using the componendo and dividendo, we get [1]

$$\frac{2\sqrt{a+x}}{2\sqrt{a-x}}=\frac{b+1}{b-1}$$

Now squaring both sides, we get [1]

$$\frac{a+x}{a-x}=\frac{b^2+1+2b}{b^2+1-2b},$$

Again use componendo and dividend, to get the value of x. [1]

$$\frac{a+x+a-x}{a+x-a+x}=\frac{b^2+1+2b+b^2+1-2b}{b^2+1+2b-b^2-1+2b}$$

$$\Rightarrow \frac{2a}{2x}=\frac{2b^2+2}{4b}$$

$$\Rightarrow \frac{a}{x}=\frac{b^2+1}{2b}$$

$$\Rightarrow x=\frac{2ab}{b^2+1}$$

(b)

$A^2=A.A=\begin{bmatrix}2&3\\1&2\end{bmatrix}\begin{bmatrix}2&3\\1&2\end{bmatrix}=\begin{bmatrix}7&12\\4&7\end{bmatrix}$ [1]

$A^3=A^2.A=\begin{bmatrix}7&12\\4&7\end{bmatrix}\begin{bmatrix}2&3\\1&2\end{bmatrix}=\begin{bmatrix}26&45\\15&26\end{bmatrix}$ [1]

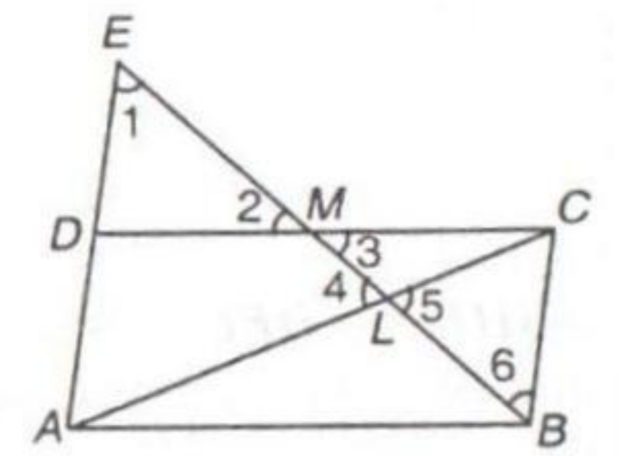
Now, L.H.S. = $A^3-4A^2+A$

$$\Rightarrow \begin{bmatrix}26&45\\15&26\end{bmatrix}-4\begin{bmatrix}7&12\\4&7\end{bmatrix}+\begin{bmatrix}2&3\\1&2\end{bmatrix}$$

$$\Rightarrow \begin{bmatrix}26&45\\15&26\end{bmatrix}-\begin{bmatrix}28&48\\16&28\end{bmatrix}+\begin{bmatrix}2&3\\1&2\end{bmatrix}$$

$\Rightarrow \begin{bmatrix}0&0\\0&0\end{bmatrix}=0=\text{R.H.S.}\quad \ldots\text{proved}$ [1]

(c)
Construction: Draw the fig [1]



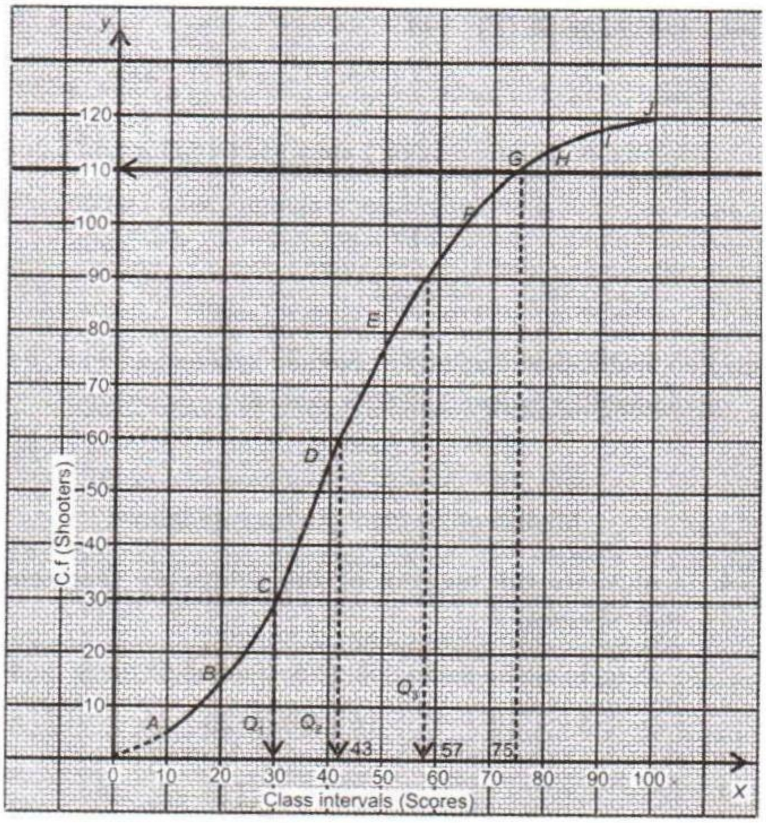

$\angle 1 = \angle 6$ [Alternate interior $\angle$'s]
$\angle 2 = \angle 3$ [Vertically opposite $\angle$'s]
and DM = MC
$\therefore$ $\Delta DEM \cong \Delta BMC$ [AAS congruency] [1]
$\Rightarrow$ DE = BC [by c.p.c.t]
Also AD = BC [opposite sides of a || gm]
$\Rightarrow$ AE = AD + DE = 2 BC [1]
Now, $\angle 1 = \angle 6$ and $\angle 4 = \angle 5$ $\therefore$ $\Delta ELA \sim \Delta BLC$

$\Rightarrow \frac{EL}{BL} = \frac{AE}{BC} \Rightarrow \frac{EL}{BL} = \frac{2BC}{BC} \Rightarrow EL = 2BL$ Proved. [1]

**Q.8**
**Solution**
(a)
Drawing table [1]

| Scores Obtained | Number of Shooters | C.f. |
|---|---|---|
| 0-10 | 5 | 5 |
| 10-20 | 9 | 14 |
| 20-30 | 16 | 30 |
| 30-40 | 22 | 52 |
| 40-50 | 26 | 78 |
| 50-60 | 18 | 96 |
| 60-70 | 11 | 107 |
| 70-80 | 6 | 113 |
| 80-90 | 4 | 117 |
| 90-100 | 3 | 120 |
| | n=120 | |

Plotting Ogive [1]




(i) n = 120 (even)

The position of median is given by $\frac{n}{2} = \frac{120}{2} = 60.$

So, from the graph, median = 43 scores [1]

(ii) The positions of $Q_1$ is given by $\frac{n}{4} = \frac{120}{4} = 30$

So, from the graph, $Q_1$ = 30 scores [1]

The position of $Q_3$ is given by $\frac{3n}{4} = \frac{3 \times 120}{4} = 90$

So, from the graph, $Q_3$ = 57 scores

Now, Inter-quartile range = $Q_3$ - $Q_1$ = 57 – 30 $\left[\frac{1}{2}\right]$

= 27 scores

(iii) number of shooters who obtained more than 75% scores = 120 – 110 = 10 $\left[\frac{1}{2}\right]$

(b)

Drawing Table and calculating values [2]

| $x_i$ | $f_i$ | $u_i = \frac{x_i - A}{h}, h = 5$ | $f_i u_i$ |
|---|---|---|---|
| 15 | 5 | -4 | -20 |
| 20 | 8 | -3 | -24 |
| 25 | 11 | -2 | -22 |
| 30 | 20 | -1 | -20 |
| A=35 | 23 | 0 | 0 |
| 40 | 18 | 1 | 18 |
| 45 | 13 | 2 | 26 |
| 50 | 3 | 3 | 9 |
| 55 | 1 | 4 | 4 |
| | $\sum f_i = 102$ | | $\sum f_i u_i = -29$ |

From the table, $A = 35, \sum f_i = 102, h = 5, \sum f_i u_i = -29$ [1]

So, Mean $\left(\bar{x}\right) = A + h\frac{\sum f_i u_i}{\sum f_i}$ [1]

$$= 35 + 5 \times \frac{-29}{102}$$

$$= 35 - \frac{145}{102}$$ [1]

$$= 35 - 1.42$$

$$= 33.58$$

**Q. 9**

**Solution**

(a)

Market value of 1 share = $\text{Rs.}\left(\frac{26 \times 110}{100}\right) = \text{Rs.}28.80$

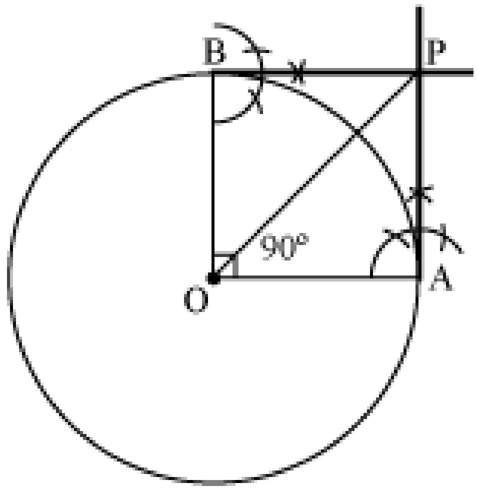
(i) Number of shares bought = $\frac{20,020}{28.60} = \frac{20,02,000}{2860} = 700$ [1]

(ii) Dividend on one share = $\text{Rs.}\frac{26 \times 15}{100} = \text{Rs.}\frac{39}{10}$

$\therefore$ dividend on 700 shares = $700 \times \frac{39}{10} = \text{Rs.}2730$ [1]

(iii) Rate of interest $= \frac{2730}{20020} \times 100 = 13.63\%$ [1]

(b)
The steps of construction are as follows:
(i) Draw a circle of any convenient radius with O as centre.
(ii) Take a point A on the circumference of the circle and join OA. Draw a perpendicular to OA at point A.
(iii) Draw a radius OB, making an angle of 90° with OA.
(iv) Draw a perpendicular to OB at point B. Let both the perpendiculars intersect at point P.
(v) Join OP.
PA and PB are the required tangents, which make an angle of 45° with OP. [1]




[2]

(c)
L.H.S.

$$= \frac{\tan A}{1 - \frac{1}{\tan A}} + \frac{1}{\tan A(1 - \tan A)}$$ [1]

$$= \frac{\tan^2 A}{(\tan A - 1)} - \frac{1}{\tan A(\tan A - 1)}$$

$$= \frac{\tan^3 A - 1}{\tan A(\tan A - 1)}$$ [1]

Use $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$$= \frac{(\tan A - 1)(\tan^2 A + \tan A + 1)}{\tan A(\tan A - 1)}$$ [1]

$$= \tan A + 1 + \cot A$$

$$= 1 + \frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}$$

$$= 1 + \frac{\sin^2 A + \cos^2 A}{\sin A \cos A} = 1 + \frac{1}{\sin A \cos A}$$ [1]

$$= 1 + \operatorname{cosec} A \sec A$$

$=$ R.H.S

Hence Proved

**Q.10**
**Solution**
(a)
Let the numbers be x and y;

So $xy = 196 \Rightarrow x = \frac{196}{y}$ and $112x = y^2$ [1]

Put $x = \frac{196}{y}$ in $112x = y^2$, we get

$\Rightarrow \frac{112 \times 196}{y} = y^2$ [1]

$\Rightarrow y^3 = 112 \times 196$

$\Rightarrow y = \sqrt{112 \times 196} \Rightarrow y = 28$ [1]

And $x = \frac{196}{28} = 7$

So, numbers are = 7, 14, 28.

(b)
Let principal = Rs. P then amount = Rs. $\frac{125}{64}$P

Now, $A = P\left(1 + \frac{R}{100}\right)^n$ [2]

Or $\frac{125}{64}P = P\left(1 + \frac{R}{100}\right)^3$ [1]

Or $\frac{125}{64} = \left(1 + \frac{R}{100}\right)^3$

$\Rightarrow \left(\frac{125}{64}\right) = \left(1 + \frac{R}{100}\right)^3$

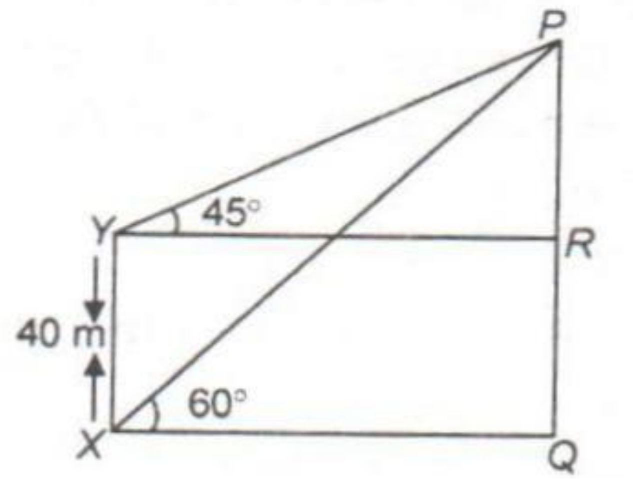
$\Rightarrow \left(\frac{5}{4}\right)^3 = \left(1 + \frac{R}{100}\right)^3$ [1]

Taking cube of both the sides

$\frac{5}{4} = 1 + \frac{R}{100}$ or $\frac{5}{4} = \frac{100 + R}{100}$

Or 500 = 400 + 4R
Or 4R = 100 $\Rightarrow$ R = 25
$\therefore$ Rate = 25%

(c)




Let XQ = x m and PR = h m then YR = XQ = x m
And YX = RQ = 40 m

In $\Delta$PRY, $\frac{h}{x} = \tan 45^\circ \Rightarrow h = x$ [1]

In $\Delta$PQX, $\frac{h+40}{x} = \tan 60^\circ \Rightarrow h + 40 = \sqrt{3}x$

$\Rightarrow h + 40 = \sqrt{3}h\ [\because h = x]$ [1]

$40 = \sqrt{3}h - h$

$40 = h(\sqrt{3} - 1)$

Or $h = \frac{40}{\sqrt{3} - 1}$

$= \frac{40}{(\sqrt{3}-1)} \times \frac{(\sqrt{3}+1)}{(\sqrt{3}+1)}$ [1]

$= \frac{40(\sqrt{3}+1)}{3-1}$

$= \frac{40(1.73+1)}{2}$

$= 20 \times 2.730$

$= 2 \times 27.3$

$= 54.6$

(i) Height PQ = h + 40 = 54.6 + 40 = 94.6m $\left[\frac{1}{2}\right]$

(ii) The distance XQ = x = h = 54.6m $\left[\frac{1}{2}\right]$

**Q.11**
**Solution**
(a)
(i) AM = MP [tangents from an external point]
$\Rightarrow$ $\angle$MAP = $\angle$MPA
Similarly, MP = MB
$\therefore$ $\angle$MBP = $\angle$MPB
Now in $\Delta$ABP,
$\angle$PAB + $\angle$ABP + $\angle$APB = 180° [1]
$\angle$MPA + $\angle$MPB + $\angle$MPA + $\angle$MPB = 180°
($\angle$MPA + $\angle$MPB) = 180° [1]
$\Rightarrow$ $\angle$APB = 90°
(ii) AM = MP and MP = MB [1]
$\Rightarrow$ AM = MB
$\Rightarrow$ tangent at P bisects AB.

(b)
Total money for expenses = Rs.360
Original duration of tour = x days
Final duration of tour = x + 4 days

Originally, 1 day expenses = $Rs.\dfrac{360}{x}$ $\left[\dfrac{1}{2}\right]$

Finally, 1 day expenses = $Rs.\dfrac{360}{x+4}$ $\left[\dfrac{1}{2}\right]$

According to the question,

$$\frac{360}{x} = \frac{360}{x+4} + 3$$ $\left[\dfrac{1}{2}\right]$

$$\Rightarrow \frac{360}{x} - \frac{360}{x+4} = 3$$
$$\Rightarrow 360x + 1440 - 360x = 3x^2 + 12x$$
$$\Rightarrow 3x^2 + 12x - 1440 = 0$$
$$\Rightarrow x^2 + 4x - 480 = 0$$
$$\Rightarrow x^2 + 24x - 20x - 480 = 0$$
$$\Rightarrow x(x+24) - 20(x+24) = 0$$
$$\Rightarrow (x-20)(x+24) = 0$$ $\left[\dfrac{1}{2}\right]$

Thus, x = 20, -24
Days cannot be negative, So, x = 20. [1]

(c)
Let, $\angle ACX = \theta$ and $\angle ABX = \phi$

(i) Given, equation of AB, $x - \sqrt{3}y + 1 = 0$

$\therefore$ Slope of AB $= \dfrac{-\text{coefficient of x}}{\text{coefficient of y}}$ [1]

$= \dfrac{-1}{-\sqrt{3}} = \dfrac{1}{\sqrt{3}}$

So, $(m_1) = \tan\theta = \dfrac{1}{\sqrt{3}}$

$\Rightarrow \theta = 30°$

$\therefore$ angle made by the line AB = 30°

Now, equation of AC, x – y -2 = 0

$\therefore$ Slope of AC = $= \dfrac{-\text{coefficient of x}}{\text{coefficient of y}} = \dfrac{-1}{-1} = 1$ [1]

So, $(m_2) = \tan\phi = 1$ [1]

$\Rightarrow \phi = 45°$

Angle made by the line AC = 45°

(ii) $\angle BAC = \angle C - \angle B$ [1]

= 45° - 30° = 15°