



DELHI PUBLIC SCHOOL, GURGAON
FIRST TERM EXAMINATION (2025-2026)
SUBJECT: MATHEMATICS (041)
CLASS: X (10/09/25)
SET B

Duration: 3 Hours
No. of Printed Pages: 08

M.M: 80

GENERAL INSTRUCTIONS:

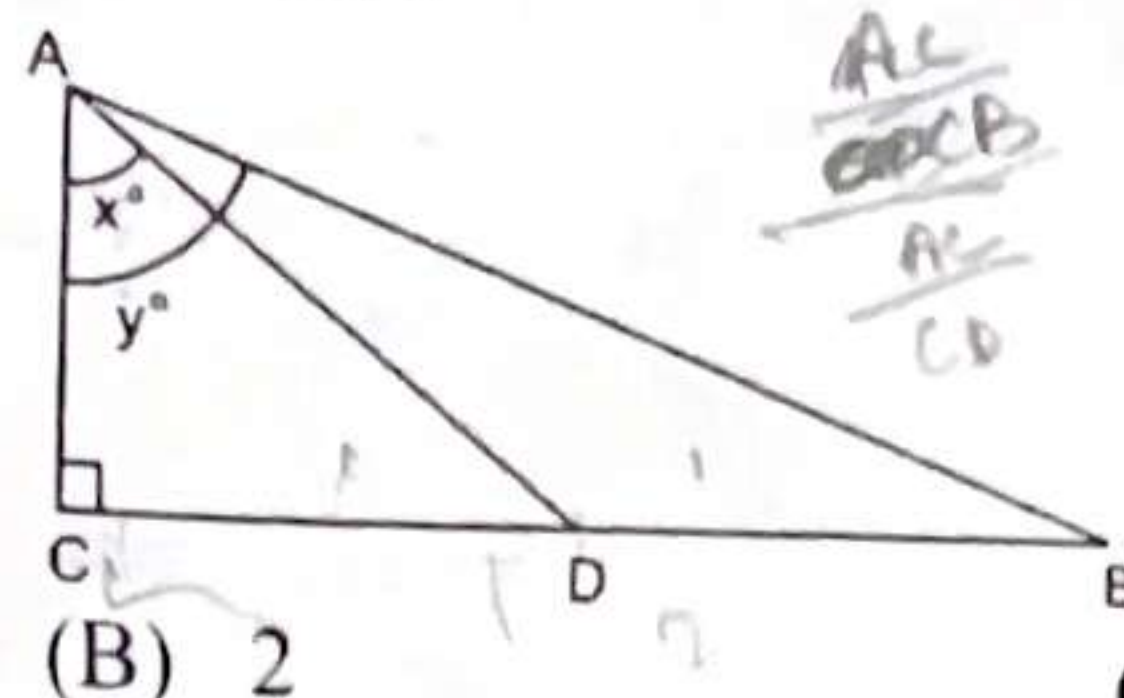
1. This question paper contains 38 questions.
2. This question paper is divided into five Sections A, B, C, D and E.
3. In Section A, Question numbers 1 to 18 are multiple choice questions (MCQs) and question numbers 19 and 20 are Assertion - Reason based questions of 1 mark each.
4. In Section B, Question numbers 21 to 25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Question numbers 26 to 31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Question numbers 32 to 35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question numbers 36 to 38 are case study-based questions carrying 4 marks each with sub - parts of the values of 1, 1 and 2 marks each, respectively.
8. All questions are compulsory. However, an internal choice in 2 questions of section B, 2 questions of section C and 2 questions of section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat figures wherever required.

SECTION – A

This section comprises of 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
Choose the correct option.

1. If probability of happening an event is denoted by p and probability of non-happening of the same event is denoted by q , then the relation between p and q is expressed as (1)
(A) $p - q = -1$ (B) $p + q = 1$ (C) $p = 1, q = 1$ (D) $p + q + 1 = 1$
2. The sum of LCM and HCF of smallest prime number and smallest composite number is (1)
(A) 2 (B) 6 (C) 3 (D) 4
LCM(2, 4) = 4, HCF(2, 4) = 2, 4 + 2 = 6
3. All red face cards are removed from a deck of playing cards. The remaining cards are well shuffled and then a card is drawn at random from them. The probability that the drawn card is a red card is (1)
(A) $\frac{10}{23}$ (B) $\frac{23}{26}$ (C) $\frac{23}{52}$ (D) $\frac{1}{2}$
4. A quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $5x^2 + 2x - 3$ is (1)
(A) $5x^2 + 2x + 3$ (B) $3x^2 + 2x - 3$ (C) $5x^2 - 2x - 5$ (D) $3x^2 - 2x - 5$

5. In the given figure, ABC is a triangle right angled at C. If $\angle CAB = y^\circ$, $\angle CAD = x^\circ$ and D is the mid-point of BC, then the value of $\frac{\cot y^\circ}{\cot x^\circ}$ is



(A) $\frac{1}{2}$

(B) 2

(C) $\frac{1}{3}$

(D) $\frac{1}{4}$

6. If the distance between the points (4, p) and (1, 0) is 5 units, then the values of p are (1)

(A) ± 3

(B) 0

(C) ± 4

(D) ± 5

7. If point O (-1, 2) divides the line segment joining the points A (2, 5) and B (x, y) in the ratio of 3 : 4 internally, then the value of x + y is (1)

(A) -5

(B) -7

(C) 5

(D) 7

8. Which of the following expression represents $\sin \theta$ in terms of $\tan \theta$? (1)

(A) $\frac{1 + \tan \theta}{\tan \theta}$

(B) $\frac{\tan \theta}{\sqrt{1 + \tan^2 \theta}}$

(C) $\frac{\tan \theta}{1 - \tan^2 \theta}$

(D) $\sqrt{1 + \tan^2 \theta}$

9. The common difference of the given AP $\frac{1}{2x}, \frac{1-4x}{2x}, \frac{1-8x}{2x}, \dots$ is (1)

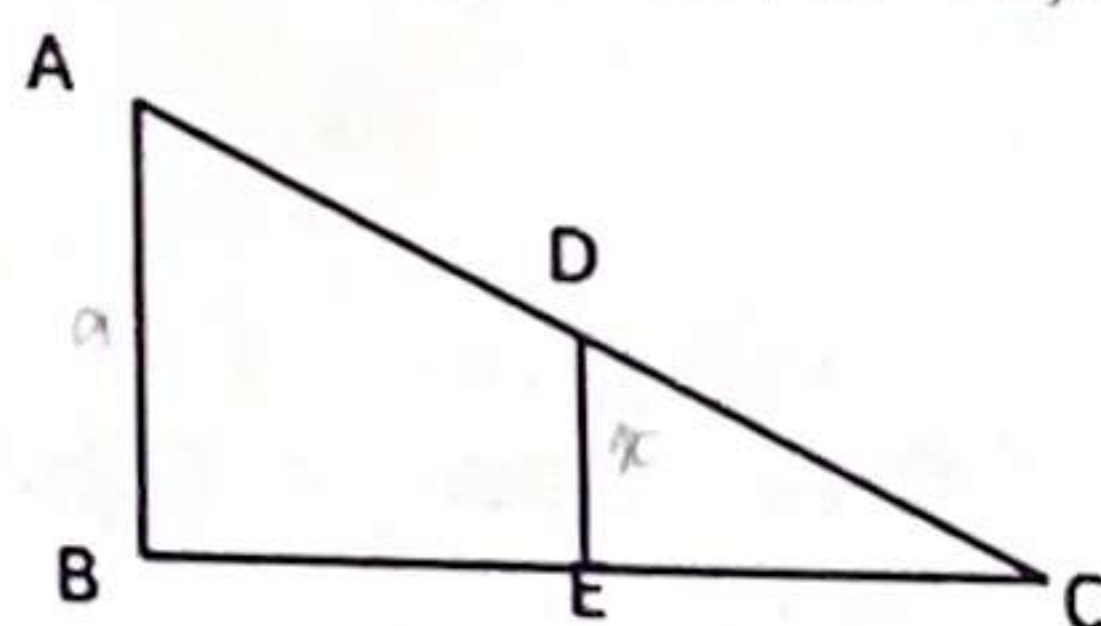
(A) -2x

(B) -2

(C) 2

(D) 2x

10. In the figure, ABC is a triangle in which $DE \parallel AB$. If $AB = a$, $DE = x$, $BE = b$ and $EC = c$, then express x in terms of a, b and c. (1)



(A) $x = \frac{ac}{b}$

(B) $x = \frac{ac}{b+c}$

(C) $x = \frac{ab}{c}$

(D) $x = \frac{ab}{b+c}$

11. If $\Delta ABC \sim \Delta PQR$, $AB = 8$ cm, $PQ = 6$ cm and the perimeter of ΔABC is 36 cm, then the perimeter of ΔPQR is (1)

(A) 27 cm

(B) 48 cm

(C) 64 cm

(D) 40 cm

12. If θ is an acute angle such that $\tan^2 \theta = \frac{8}{7}$, then the value of $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$ is (1)

(A) $\frac{7}{8}$

(B) $\frac{8}{7}$

(C) $\frac{7}{4}$

(D) $\frac{64}{49}$

13. If the centroid of the triangle with vertices (7, p), (q, -6) and (9, 10) is (6, 3), then the values of p and q respectively, are (1)

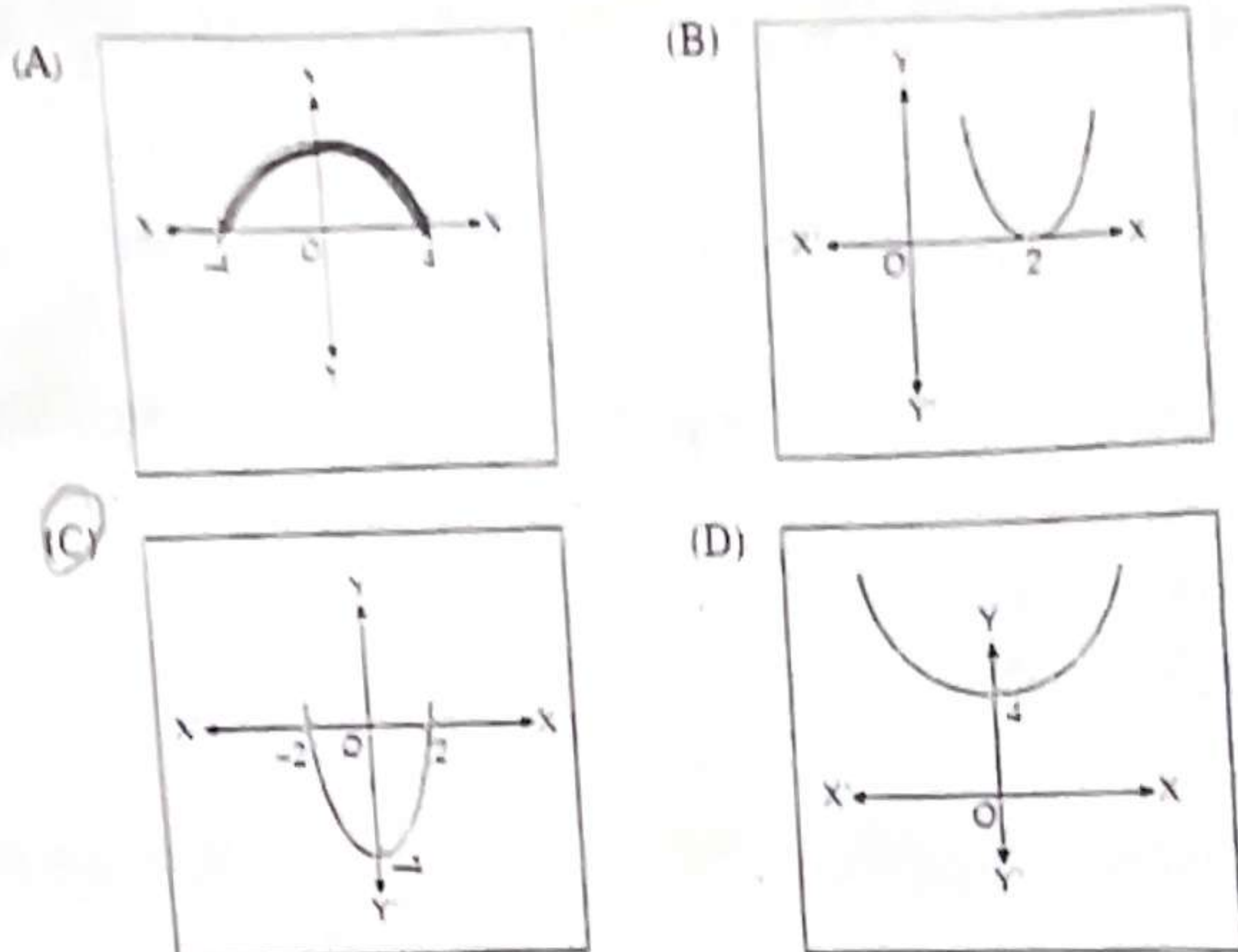
(A) 6 and 5

(B) 5 and 3

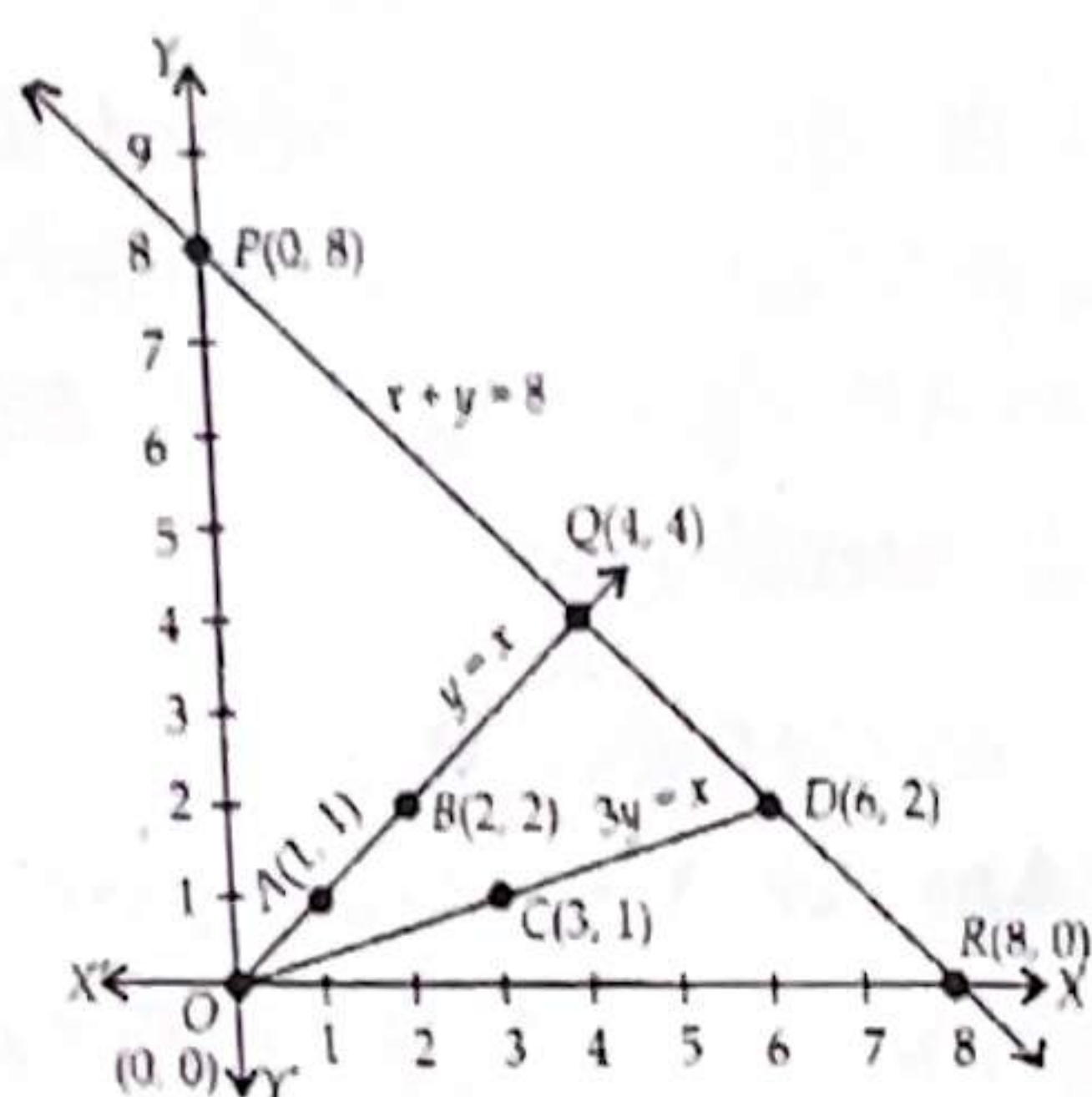
(C) 5 and 2

(D) -3 and 2

Which of the following is the graph of $y = p(x)$, where $p(x)$ is the polynomial $x^2 - 4$? (1)



5. The co-ordinates of the vertices of the triangle formed by the lines $y = x$, $3y = x$ and $x + y = 8$ from the graph given below are (1)



- (A) $(0, 0)$, $(0, 8)$ and $(4, 4)$ (B) $(0, 0)$, $(4, 4)$ and $(6, 2)$
 (C) $(0, 0)$, $(8, 0)$ and $(0, 8)$ (D) $(0, 0)$, $(6, 2)$ and $(8, 0)$

16. If p and q are positive integers such that $p = 18x^2y^4$ and $q = 20x^3y^2$, where x and y are prime numbers, then the LCM (p, q) is (1)

- (A) $2x^2y^2$ (B) $180x^2y^2$ (C) $12x^2y^2$ (D) $180x^3y^4$

17. A survey regarding the marks of 80 students of class X of a school was conducted and the following data was obtained. (1)

MARKS	BELOW 10	BELOW 20	BELOW 30	BELOW 40	BELOW 50	BELOW 60
NO. OF STUDENTS	2	12	28	56	76	80

The median class is

- (A) 20 - 30 (B) 40 - 50 (C) 30 - 40 (D) 10 - 20

18. If α and β are the zeroes of the quadratic polynomial $p(y) = ry^2 + 4y + 4$ such that $(\alpha + \beta)^2 = 24$, then the value of r is (1)

(A) $\frac{5}{3}$

(B) -1

(C) both option (A) and option (B)

(D) neither option (A) nor option (B)

$(-\frac{4}{r})^2 = 24$
 $\frac{16}{r^2} = 24$
 $r^2 = \frac{16}{24} = \frac{2}{3}$
 $r = \pm \sqrt{\frac{2}{3}}$

DIRECTIONS:

In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:

- (A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (C) Assertion (A) is true but reason (R) is false.
- (D) Assertion (A) is false but reason (R) is true.

19. **Assertion(A):** The system of pair of linear equations $2x + y = 9$ and $x + 3y = 0$ intersect at a point and are consistent.

Reason(R): The system of pair of linear equations $ax + by + c = 0$ and $px + qy + r = 0$ is always consistent, if $aq \neq bp$.

20. **Assertion(A):** If a , b and c form an AP with common difference d , then the value of $a - 2b - c$ is equal to $-2a - 4d$.

Reason (R): The sum of first n terms of an AP is given by $S_n = \frac{n}{2} \{ 2a + (n-1)d \}$ where a and d are first term and common difference, respectively.

SECTION - B

This section comprises of 5 Very Short Answer (VSA) type questions of 2 marks each.

21. Prove that $7\sqrt{13} - 1$ is an irrational number, given that $\sqrt{13}$ is an irrational number.

OR

Check whether 6^n can end with the digit 0 for any natural number n .

22. Find the mode of the given data.

Class Interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	6	11	21	23	5

23. Find the equation of the perpendicular bisector of AB, where A and B are the points (3, 6) and (-3, 4) respectively.

24. Find the sum of the first 15 multiples of 8.

25. If $\sin(A + B) = 1$ and $\cos(A - B) = \frac{\sqrt{3}}{2}$, $0^\circ < A + B \leq 90^\circ$ and $A > B$, then find A and B.

OR

Find an acute angle θ when $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$.

SECTION - C

This section comprises of 6 Short Answer (SA) type questions of 3 marks each.

Solve for a and b and find the value of $5a - 2b$ if:

$$2a + b = 23 \text{ and } 4a - b = 19$$

The numerical clues in the treasure hunt game collectively form an arithmetic progression, challenging players to find the treasure. If the number on the n^{th} spot is given by $20 + 4n$, then

- (i) Find the number on the first spot. -24
- (ii) Which number is on the 34^{th} spot? -156
- (iii) What is the sum of all the numbers on the first 10 spots? -440



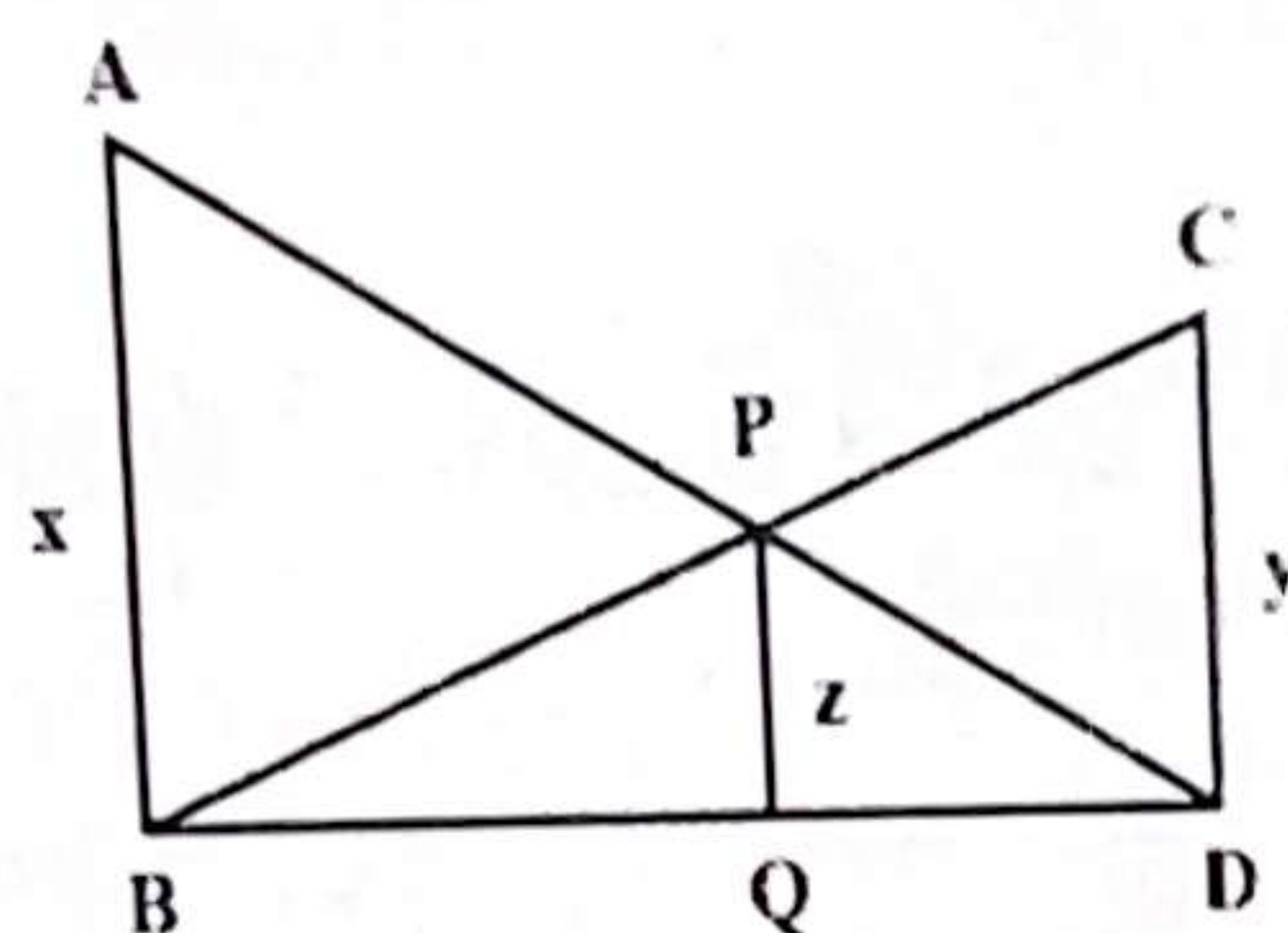
28. A workshop has been conducted for Class X students, the number of students enrolled for different languages French, Hindi, and English are 48, 80, and 144 respectively. Calculate the minimum number of rooms required for students from different language groups, ensuring each room has an equal number of students from the same language. 17

29. A box contains 100 red cards, 200 yellow cards and 50 blue cards. If a card is drawn at random from the box, then find the probability that it will be

- (i) a blue card $1/7$
- (ii) a yellow or a red card $6/7$
- (iii) neither a yellow nor a blue card. $2/7$

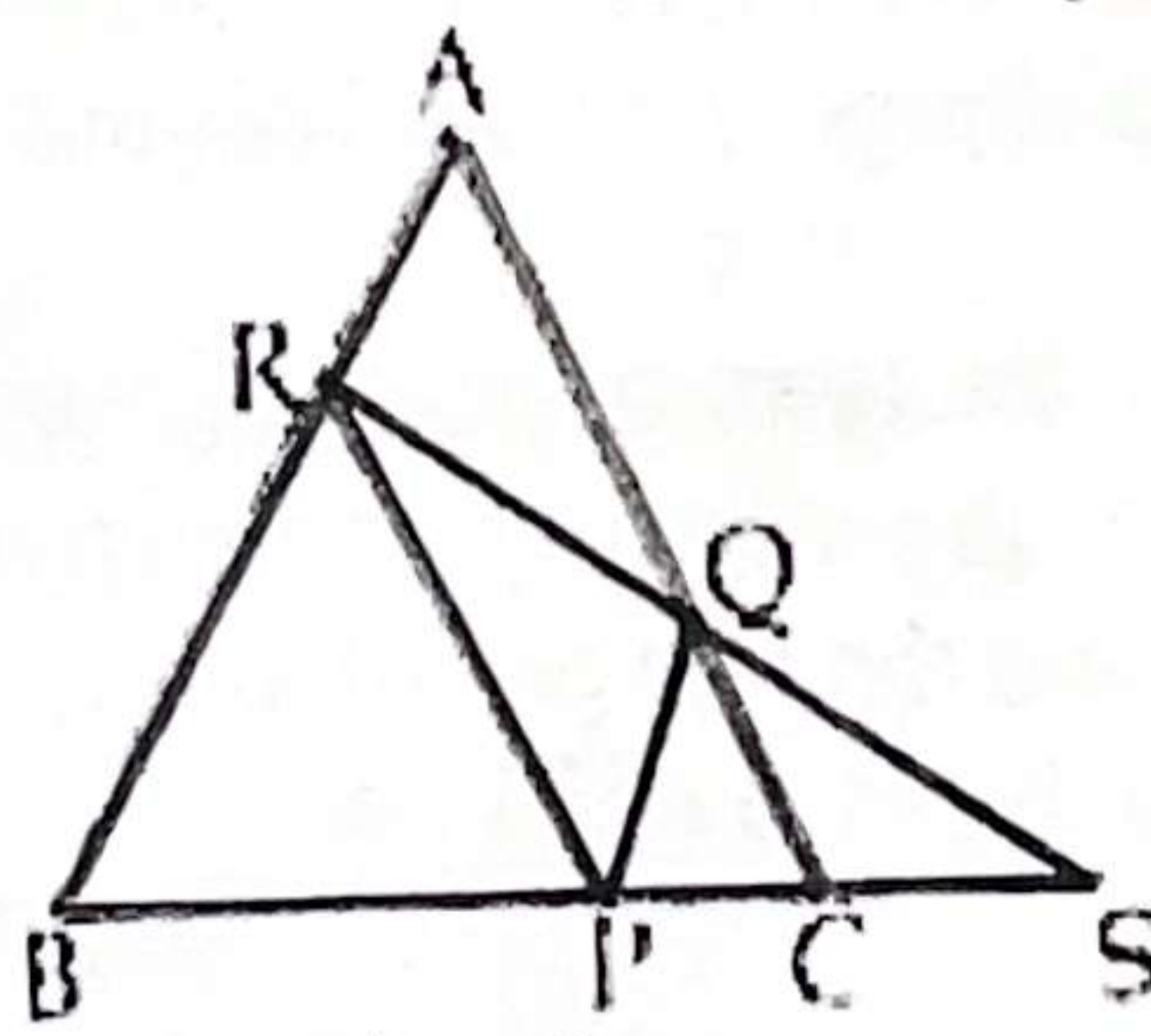
30. In the figure given below, $AB \parallel PQ \parallel CD$, $AB = x$ units, $CD = y$ units and $PQ = z$ units, prove that

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$



OR

P is any point on side BC of $\triangle ABC$ in which $PQ \parallel BA$ and $PR \parallel CA$. RQ produced and meets BC at S. Prove that $SP^2 = BS \times CS$.



31. If $\sec \theta + \tan \theta = p$, then prove that $\frac{p^2 - 1}{p^2 + 1} = \sin \theta$.

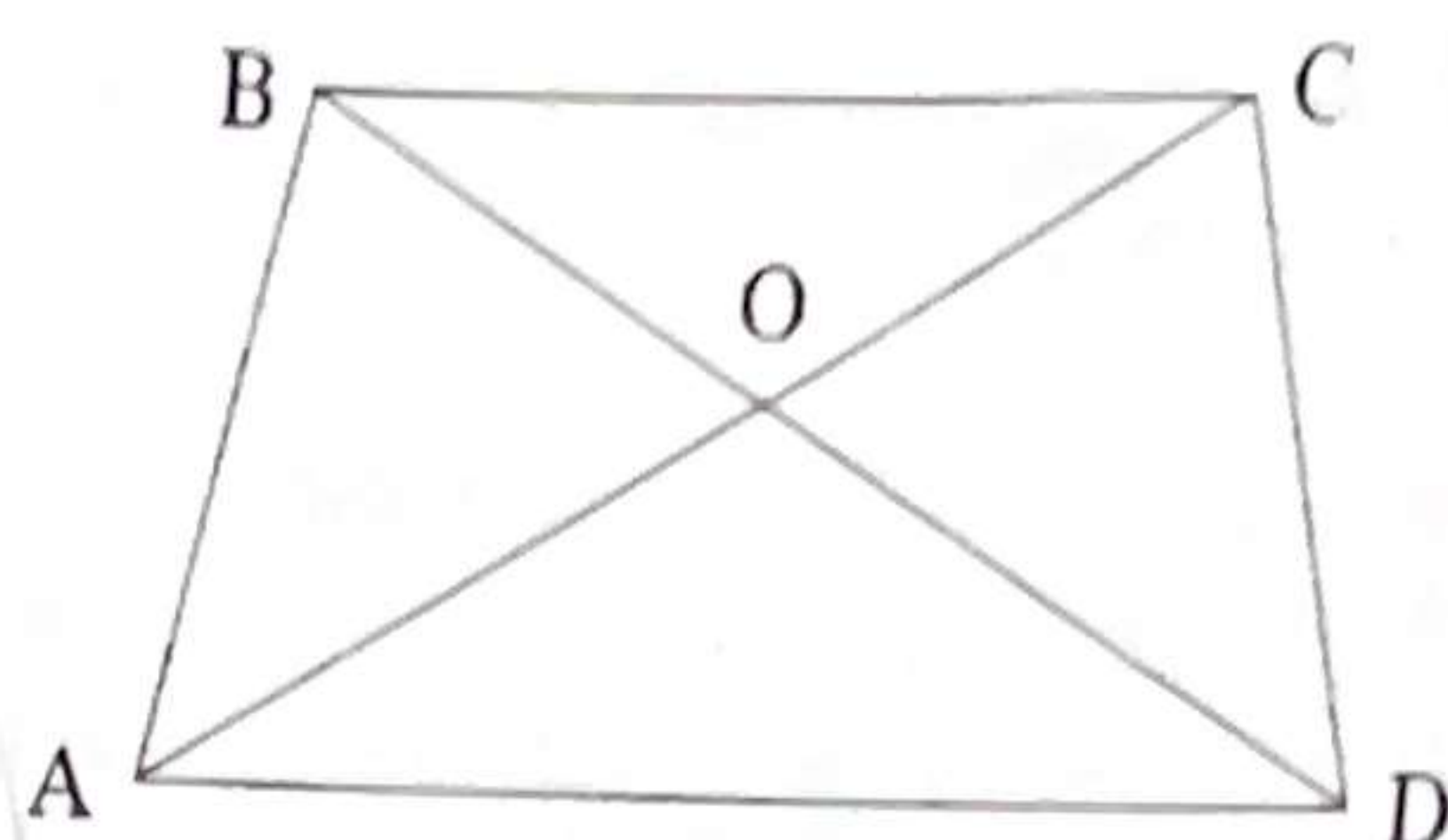
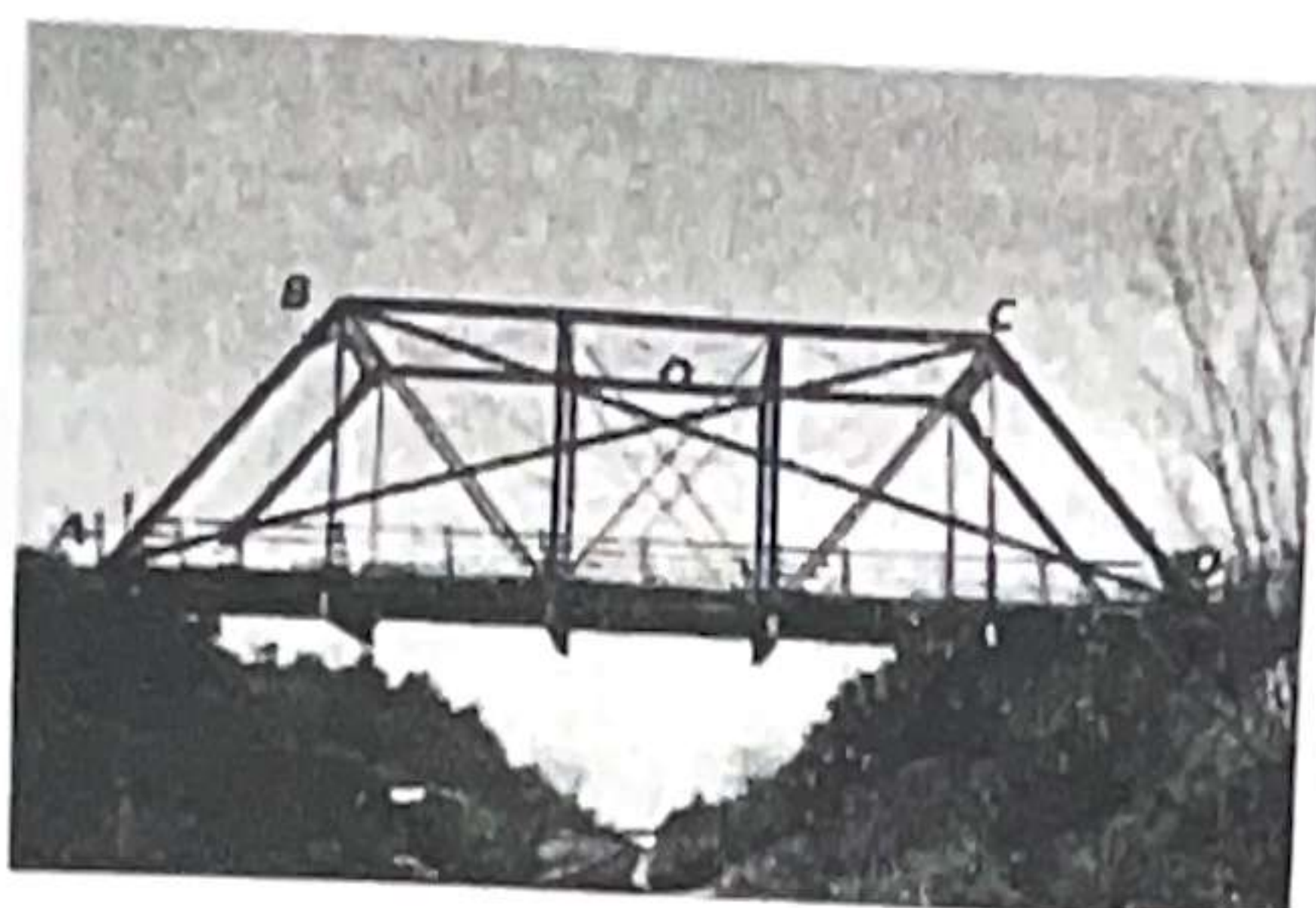
OR

Evaluate: $\frac{2 \cos^2 60^\circ + 3 \sec^2 30^\circ - 2 \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 45^\circ}$

SECTION - D

This section comprises of 4 Long Answer (LA) type questions of 5 marks each.

32. While driving through the hills, Sneha observed a bridge in the shape of a trapezium as shown below in which $AD \parallel BC$ and diagonals AC and BD intersect at O .



- Prove that $OA \times OB = OD \times OC$.
 - Find $\angle OBC$ such that $\angle OAD = 50^\circ$ and $\angle AOD = 60^\circ$.
 - Find x , when $OA = 2$ units, $OC = x - 2$ units, $OD = 5$ units and $OB = 2x + 5$ units.
 - If E and F are points on the sides AB and AC respectively of ΔABC , state whether $BC \parallel EF$ when $BE = 3.9$ cm, $EA = 3$ cm, $CF = 3.6$ cm and $FA = 2.4$ cm. *not //*
33. The median of the following data is 50. Find the values of A and B , if the total number of students is 90.

Marks obtained	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
No. of students	A	15	25	20	B	8	10

OR

The distribution given below shows the runs scored by batsmen in one day cricket matches. Find the mean number of runs using step deviation method.

Runs scored	0 - 40	40 - 80	80 - 120	120 - 160	160 - 200
No. of batsmen	12	20	35	30	23

34. The taxi fare in a city includes a fixed component and a variable component based on the distance travelled. With a 60 km journey, the charge paid is ₹ 960 and a journey of 80 km costs ₹ 1260. (5)

- Represent the above situation in the form of pair of linear equations algebraically, if x and y are the fixed component and the rate per kilometer, respectively. *$2x + 60y = 960$ $x + 80y = 1260$*
- Calculate the fixed component and the rate per kilometer. *$x = 60$ $y = 15$*
- Find the amount paid to travel a distance of 35 km. *585*

35. Find the zeroes of the quadratic polynomial $f(x) = p(x^2 + 1) - x(p^2 + 1)$ and verify the relationship between the zeroes and the coefficients. (5)

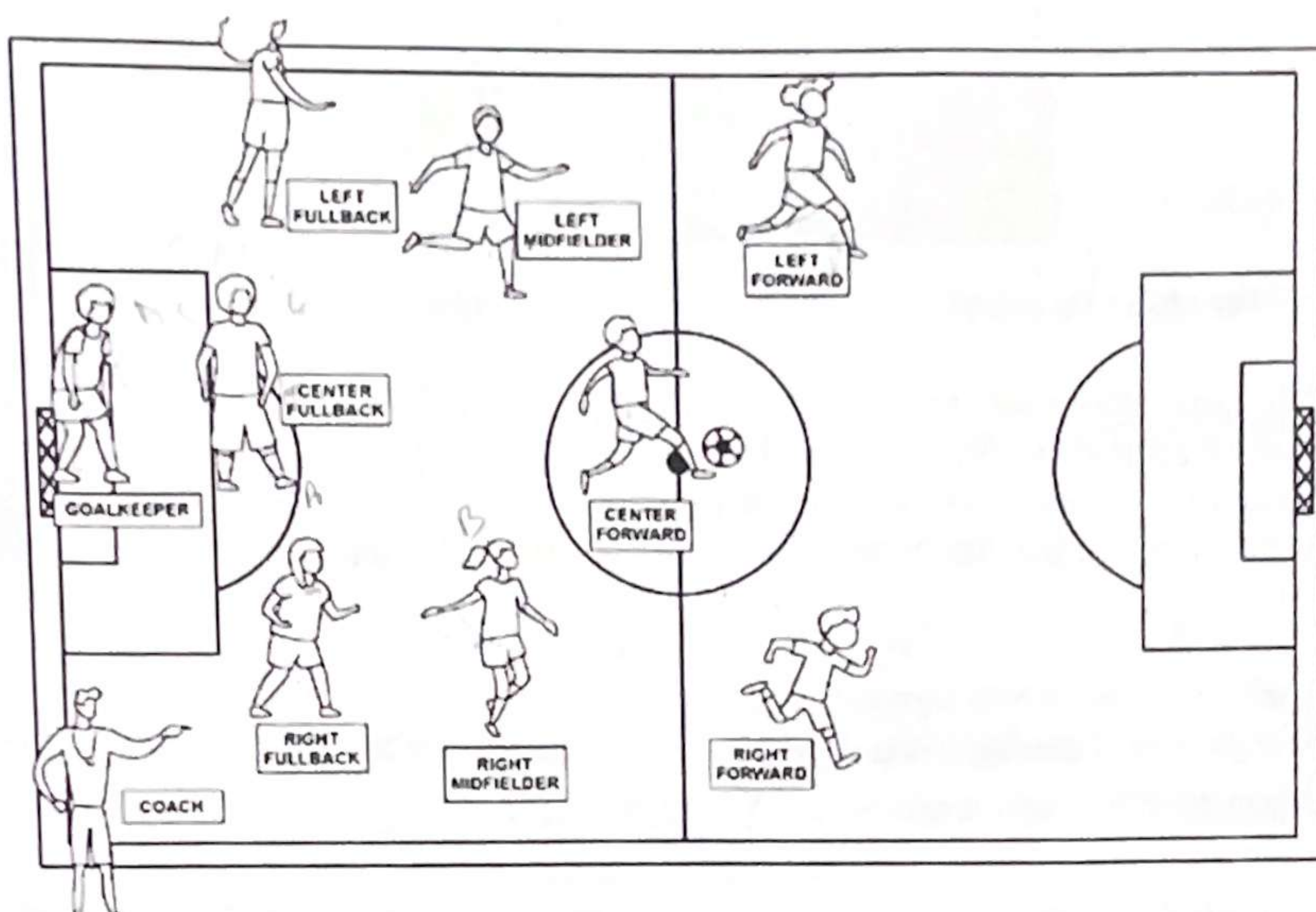
OR

If α and β are two zeroes of the polynomial $x^2 - 3x - 2$, find a quadratic polynomial whose zeroes are $\frac{1}{2\alpha + \beta}$ and $\frac{1}{\alpha + 2\beta}$.

SECTION – E

This section comprises of 3 case-based questions of 4 marks each.

36. Sohan and his friends were thrilled that they all would go to see a soccer match during the holidays. "To understand the positions of players, they have prepared a figure on a Cartesian plane, as they had studied the chapter of coordinate geometry. By plotting the coordinates of each player, they could visualize the formations and strategies employed by the teams."



Based on the above information, answer the following questions.

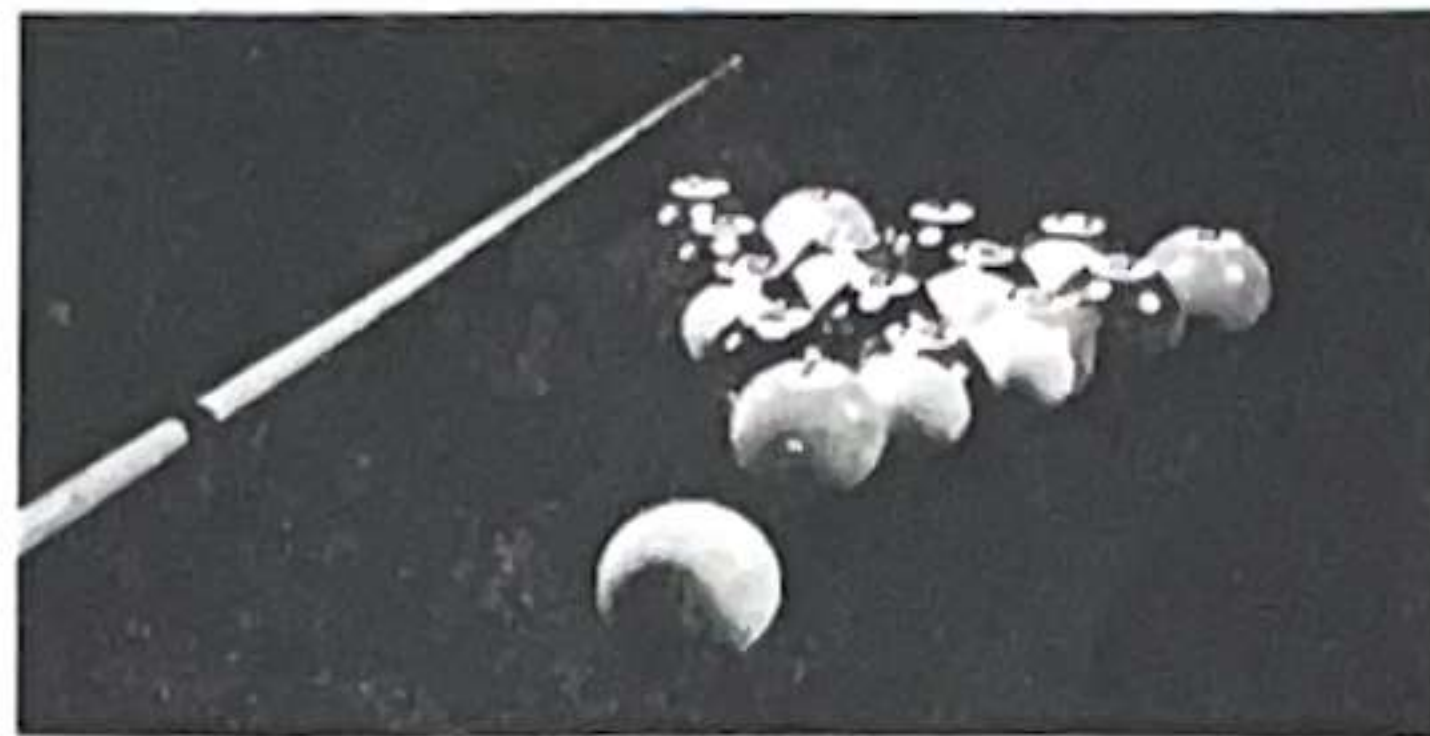
- (i) At an instance, the positions of Right Fullback (A), Right Midfielder (B), Centre Fullback (C) and Goalkeeper (D) formed a parallelogram ABCD. Find the coordinates of the Goalkeeper (D) if the coordinates of A, B and C are (1, 2), (4, 3) and (6, 6) respectively. (1)
- (ii) If the locations of Left Fullback and Left Forward are represented by $(m, -n)$ and $(-m, n)$ respectively, then determine the distance between them. (1)
- (iii) If the x – coordinate of Centre Forward is twice its y – coordinate and he is equidistant from Left forward (2, – 5) and Right Forward (– 3, 6), then find the coordinates of Centre Forward. (2)

OR

- (iii) If Left Forward, Centre Forward and Right Forward lie on the same line, then find the ratio in which Centre Forward (– 2, 3) divides the Left Forward (– 3, 5) and Right Forward (4, – 9).

2 : 6

37. "Eight Ball" is a game played on a pool table with 15 numbered balls and a "cue ball". The game involves 15 numbered balls (1-15) out of which 8 are solid - coloured balls (1-8), 7 are striped balls (9-15) and 1 cue ball (solid white). The goal of the game is to sink all the balls from your assigned group (solid or striped) into the pocket. All balls are racked in a triangle formation at one end of the table as shown below.
(Note: Ignore the cue ball while taking the total number of balls)



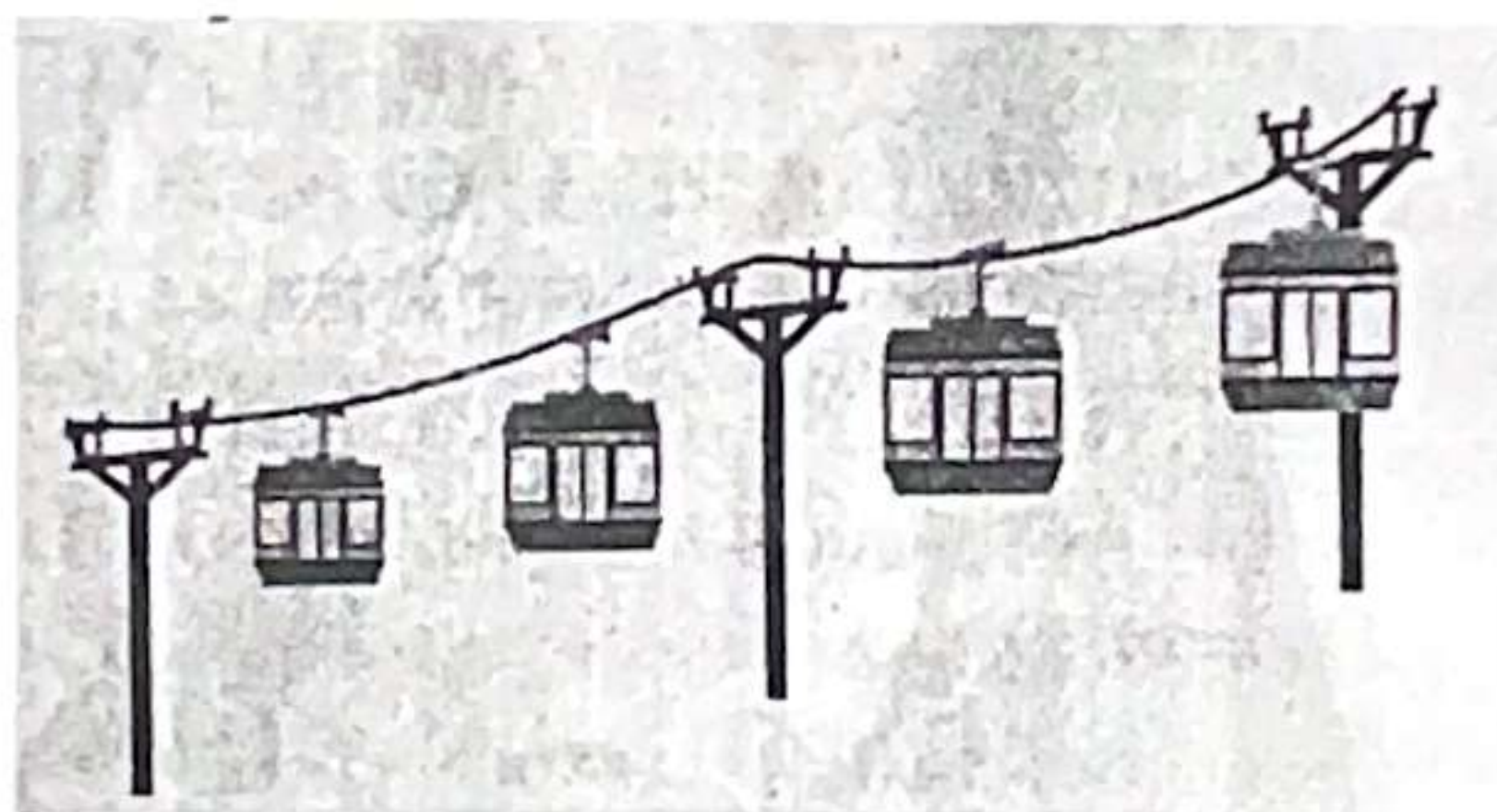
Based on the above information, answer the following questions.

- (i) If the game starts, what's the probability that a striped ball will be pocketed first? $\frac{7}{15}$ (1)
(ii) What's the probability that a numbered ball will be pocketed? $\frac{15}{15}$ (1)
(iii) A ball x is selected at random from the ball numbered 1, 2 and 4. Another ball y is selected at random from the ball numbered 9, 10 and 12. Find the probability that product of x and y is less than 16. (2)

OR

- (iii) Suppose there are 24 balls kept on the table, out of which X are striped. If one ball is drawn at random, the probability of drawing a striped ball is Y . 12 more striped balls are added. Now if a ball is drawn, the probability of drawing a striped ball is $\frac{5}{3}Y$. Find the value of X . $\frac{x}{24} = y$ $y = \frac{1}{3}$ $x = 8$
 $x = 24y$

38. Cable cars at hill stations are one of the major tourist attractions. On a hill station, the length of cable car ride from base point to topmost point on the hill is 4700 m. Poles are installed at equal intervals on the way to provide support to the cables on which car moves.
The distance of first pole from base point is 200 m and subsequent poles are installed at equal interval of 150 m.



Based on the above information, answer the following questions.

- (i) Write the first 3 terms of AP formed in the above situation. 200, 350, 500 (1)
(ii) Find the distance of 10th pole from the base. 1550 (1)
(iii) Find the distance between 15th pole and 25th pole. (2)

OR

- (iii) Find the total number of poles installed along the entire journey. 31