Topics *to be covered*

Section Formula

Mid point Formula

#Q. The distance between the points $(a \cos \theta + b \sin \theta, 0)$ and $(0, a \sin \theta - b \cos \theta)$ is:

A $a^2 + b^2$

B $a + b$
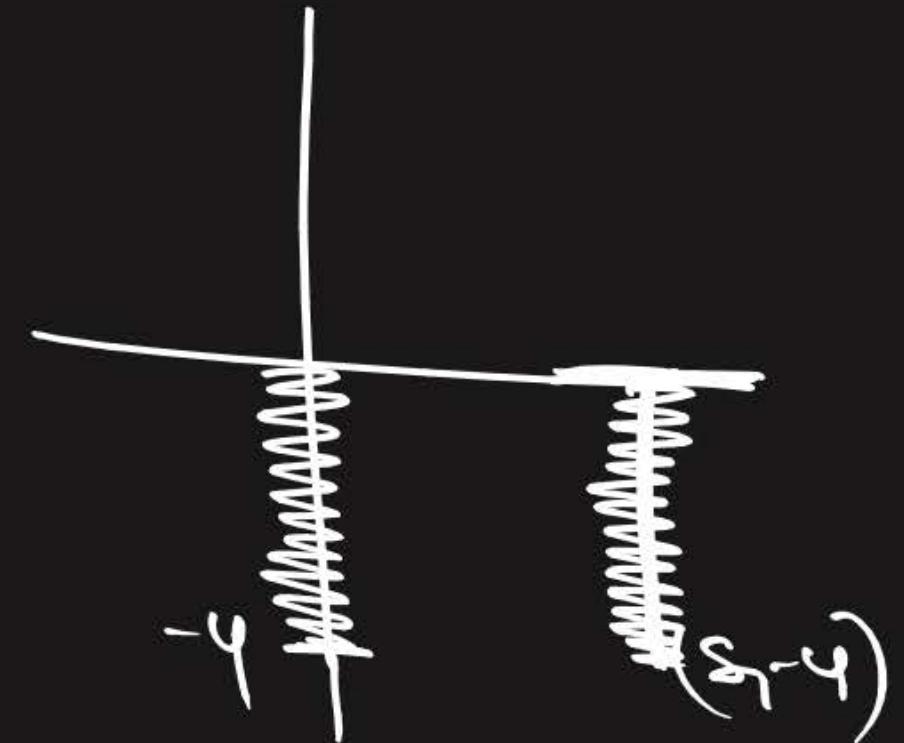
C $a^2 - b^2$

D $\sqrt{a^2 + b^2}$

$$= \sqrt{[(a\sin\theta - b\cos\theta) - (0)]^2 + [(0) - (a\cos\theta + b\sin\theta)]^2}$$

$$= \sqrt{a^2s^2 + b^2c^2 - 2absc + a^2c^2 + b^2s^2 + 2absc}$$

$$= \sqrt{a^2[s^2 + c^2] + b^2[c^2 + s^2]}$$

$$= \boxed{\sqrt{a^2 + b^2}}$$

#Q. The distance of the point (5, -4) from x-axis is

A   5 units

B   4 units

C   1 unit

D   9 units

-4

(5, -4)
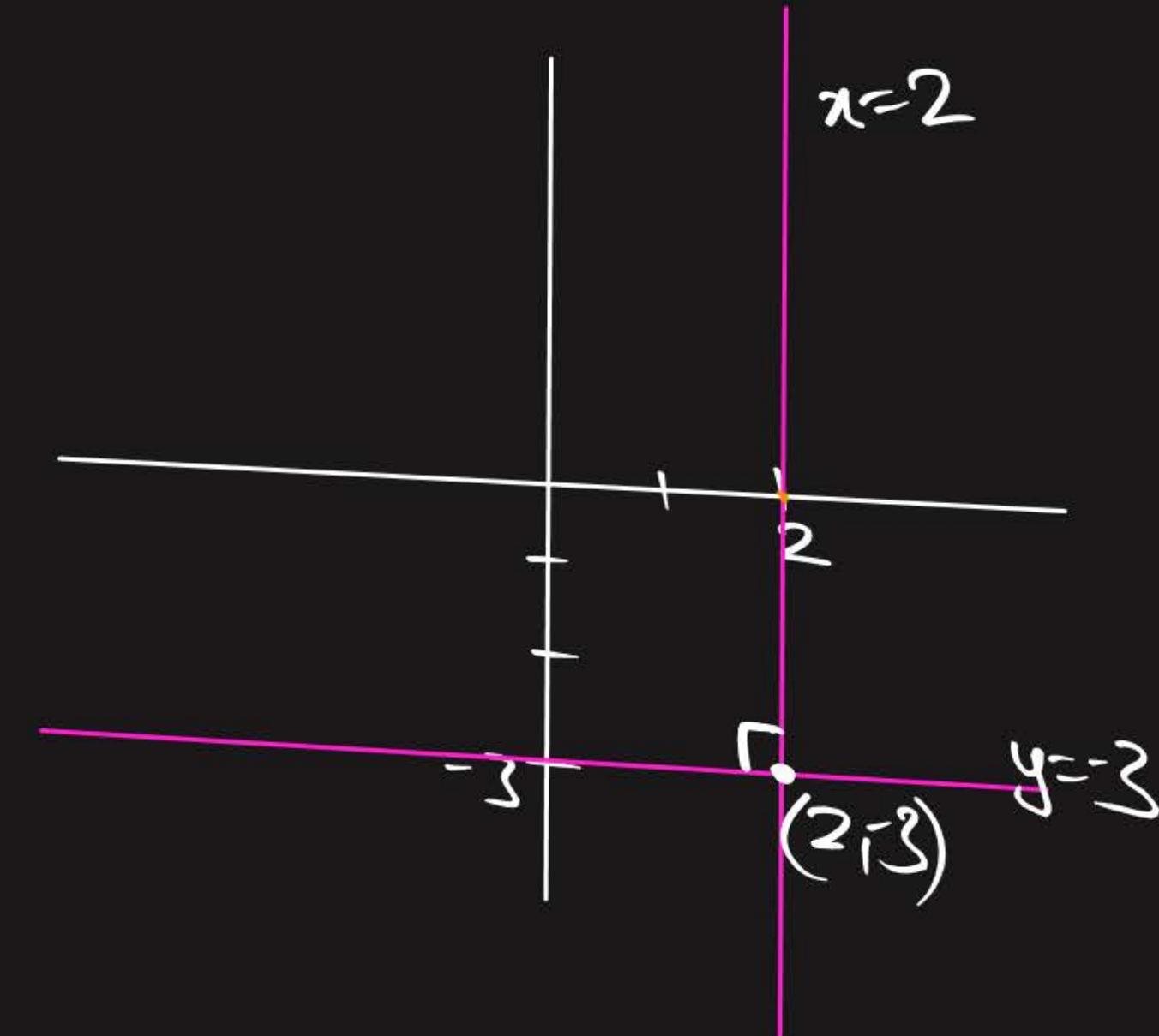
#Q. The measure of the angle between the lines $x = 2$, $y = -3$ and the coordinates of the point of intersection of these lines are respectively

A $180°, (2, -3)$

B $90°, (2, -3)$

C $90°, (-3, 2)$

D $90°, (2, 3)$

$$OA = OP = OB$$

$$\Rightarrow \boxed{OA^2 = OP^2 = OB^2}$$

$$OA^2 = OP^2$$

$$(y-0)^2 + (x-0)^2 = (y-1)^2 + (x--2)^2$$

$$y^2 + x^2 = y^2 + 1 - 2y + x^2 + 4 + 4x$$

$$0 = 5 - 2y + 4x$$

$$\boxed{2y - 4x = 5} \; \text{①}$$

$$OP^2 = OB^2$$

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

$$y^2 + 1 - 2y + x^2 + 4 + 4x = y^2 + 4 - 4y + x^2 + 9 + 6x$$

$$5 - 2y + 4x = 13 - 4y + 6x$$

$$2y - 2x = 8$$

$$\boxed{y - x = 4} \; \text{②}$$

A(0,0)

P(2,1)

O(x,y)

B(−3,2)

#6Ple
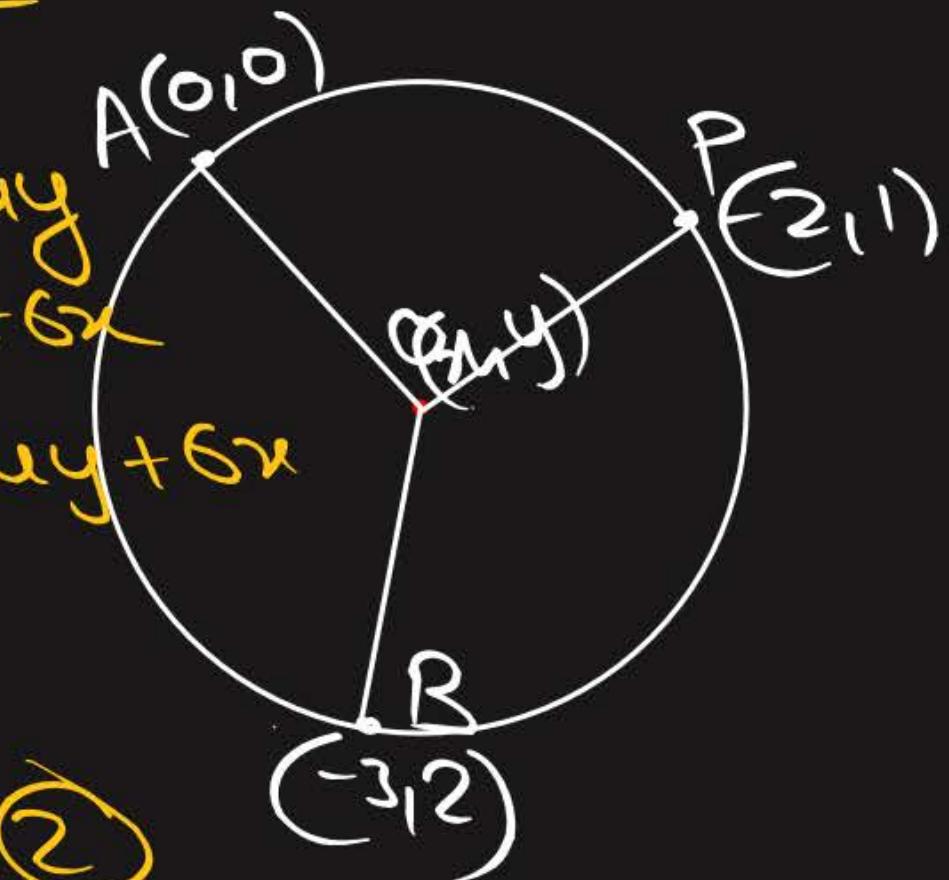
Homework From Questions Bank

Page 257 – 1

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Page 262 – 4, 5, 6

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Page 264 – 6, 1, Case based 1

Page 265 – Case based 3

Direction: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as:

(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.

1. **Assertion (A):** If $k + 1 = \sec^2\theta(1 + \sin\theta)(1 - \sin\theta)$, then the value of k is 1.

   Reason (R): If $\sin\theta + \cos\theta = \sqrt{3}$ then the value of $\tan\theta + \cot\theta$ is 1. **(Ap)**
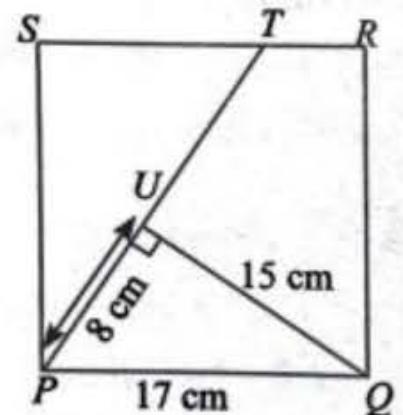
6. If $\dfrac{\cos\alpha}{\cos\beta} = p$ and $\dfrac{\cos\alpha}{\sin\beta} = q$, then prove

   that $(p^2 + q^2)\cos^2\beta = q^2$. **(Ap)**

3. If $\csc\theta - \sin\theta = a$ and $\sec\theta - \cos\theta = b$, prove that
   $a^2 b^2 (a^2 + b^2 + 3) = 1$ **(Un)**

   Sol. L.H.S $= a^2 b^2 (a^2 + b^2 + 3)$

4. During a field day at school, students are playing a game that involves measuring and calculating angles on the playground. The playground is marked with a large square PQRS, where each side of the square measures 17 cm. As part of the game, the students must find the value of $\sin\angle SPT$.

(Note: The figures are not to scale.)

(a) $\dfrac{8}{15}$

(b) $\dfrac{8}{17}$

(c) $\dfrac{15}{17}$

(d) cannot be found with the given information

5. If $\sqrt{3}\tan\theta = 3\sin\theta$, then the value of $\sin^2\theta - \cos^2\theta$

(a) $\dfrac{1}{3}$

(b) $\dfrac{2}{3}$

(c) $\dfrac{3}{5}$

(d) $\dfrac{2}{5}$

6. P and Q are acute angles such that $P > Q$.

Which of the following is DEFINITELY true?

(CBSE CFPQ, 2023)

(a) $\sin P < \sin Q$ (b) $\tan P > \tan Q$

(c) $\cos P > \cos Q$ (d) $\cos P > \sin Q$

7. Prove that $1 + \dfrac{\cot^2 \alpha}{1 + \csc \alpha} = \csc \alpha$ (CBSE ODL, 2020)

~~formulas and identities.~~

6. If $\cos\theta + \sin\theta = 1$, then prove that $\cos\theta - \sin\theta = \pm 1$

(CBSE SQP, 2024)

Long Answer Type Questions   (4 or 5 M)

1. If $\dfrac{1}{\sin\theta - \cos\theta} = \dfrac{\csc\theta}{\sqrt{2}}$,

prove that $\left(\dfrac{1}{\sin\theta + \cos\theta}\right)^2 = \dfrac{\sec^2\theta}{2}$.

(CBSE CFPQ, 2023)

Case Based Questions

Case Based-I: Puja and her father go to meet her friend Priya for a party. When they reached to Priya's place, Puja saw the roof of the house, which is triangular in shape. If she imagined the dimensions of the roof as given in the figure, then

(i) If D is the mid point of AC, then Find the value of BD.

(ii) Find the measure of $\angle A$ and $\angle C$

OR

Find the value of $\sin A + \cos C$.

(iii) Find the value of $\tan^2 C + \tan^2 A$.

We have, $AB = BC = 6\sqrt{2}$ m and $AC = 12$m.

Case Based-III: A coach is training athletes and incorporating trigonometry into their practice routines. If the position of three players are at A, B, and C respectively, they form an isosceles right-angle triangle at A.

Given that $AB = 6\sqrt{2}$ m, $AC = 6\sqrt{2}$ m, and $BC = 12$m.

Based on the given information, answer the following questions:

(i) If D is thsse midpoint of BC, then find the value of AD.

(ii) Find the measure of $\angle B$ and $\angle C$ (using trigonometric ratios).

(iii) Find the value of $\sin B + \cos C$ and $(\tan^2 C + \tan^2 B)$

OR
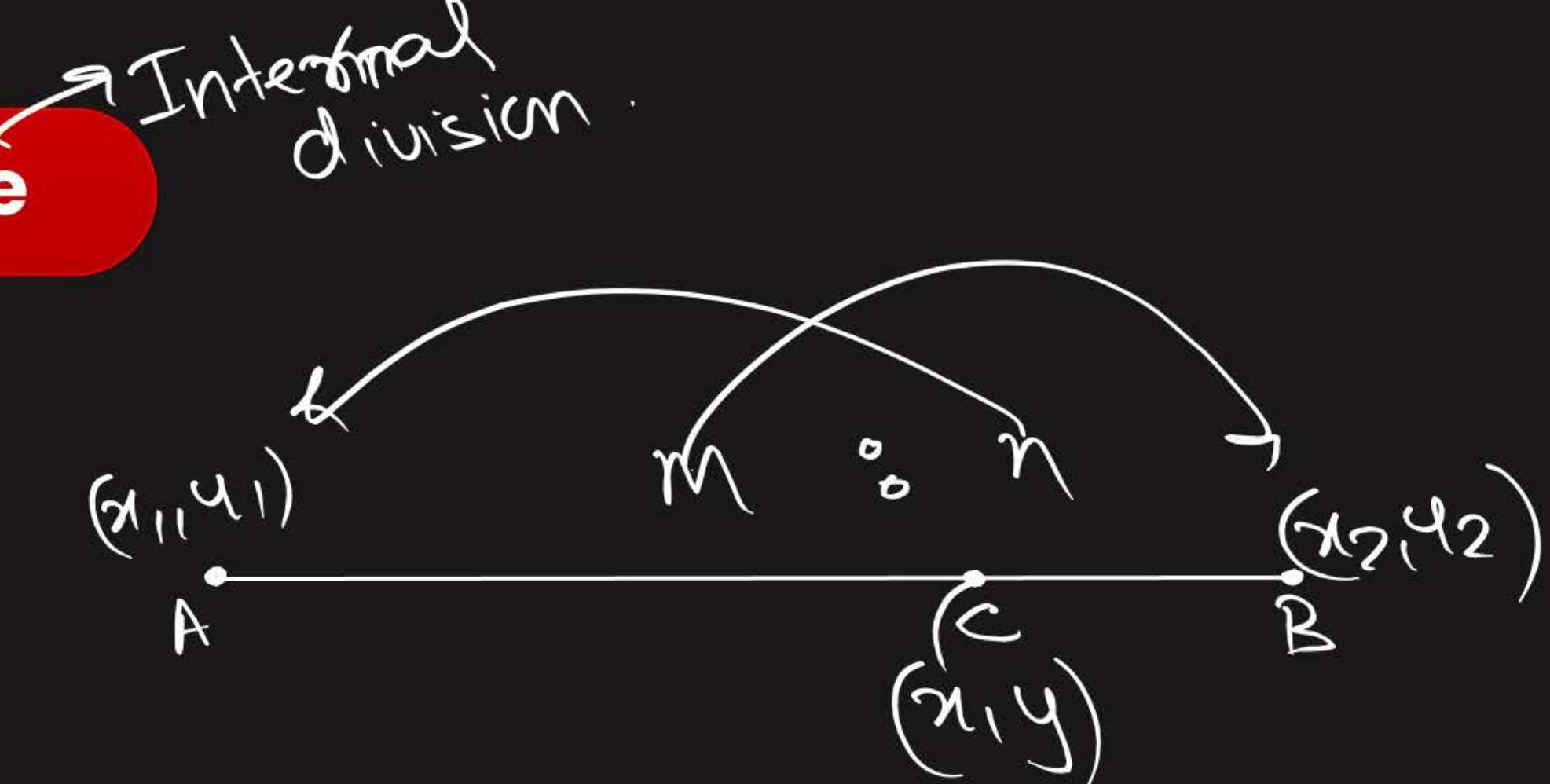
Determine the perimeter and area of $\triangle ABC$.

Section Formulae

Internal division

$$x = \dfrac{mx_2 + nx_1}{m+n}$$

$$y = \dfrac{my_2 + ny_1}{m+n}$$

(x_1, y_1)

A

M : n

(x, y)

C

(x_2, y_2)

B
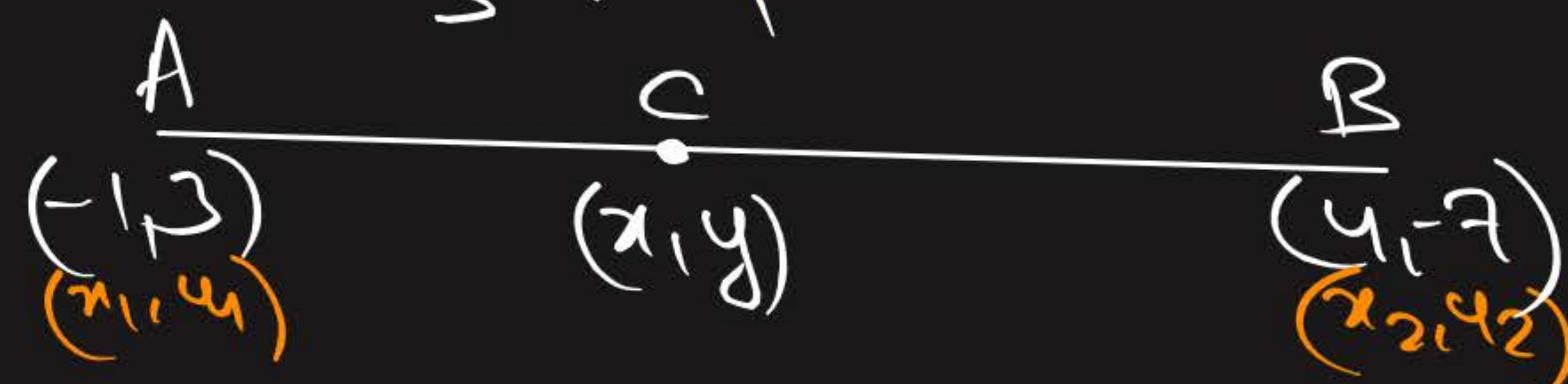
#Q. Find the coordinates of the point which divides the line segment joining (−1, 3) and (4, −7) internally in the ratio 3 : 4.

$$x = \frac{mx_2 + nx_1}{m+n}, \quad y = \frac{my_2 + ny_1}{m+n}$$

A $(-8/7, -9/7)$

B $(2/7, 5/7)$

C $(8/7, -9/7)$

D NOTA

$$x = \frac{12 + -4}{7}$$

$$x = \frac{8}{7}$$

$$y = \frac{-21 + 12}{7}$$

$$y = -9/7$$

m   n
3 : 4

A   C   B
(−1,3)   (x,y)   (4,−7)
(x_1, y_1)   (x_2, y_2)
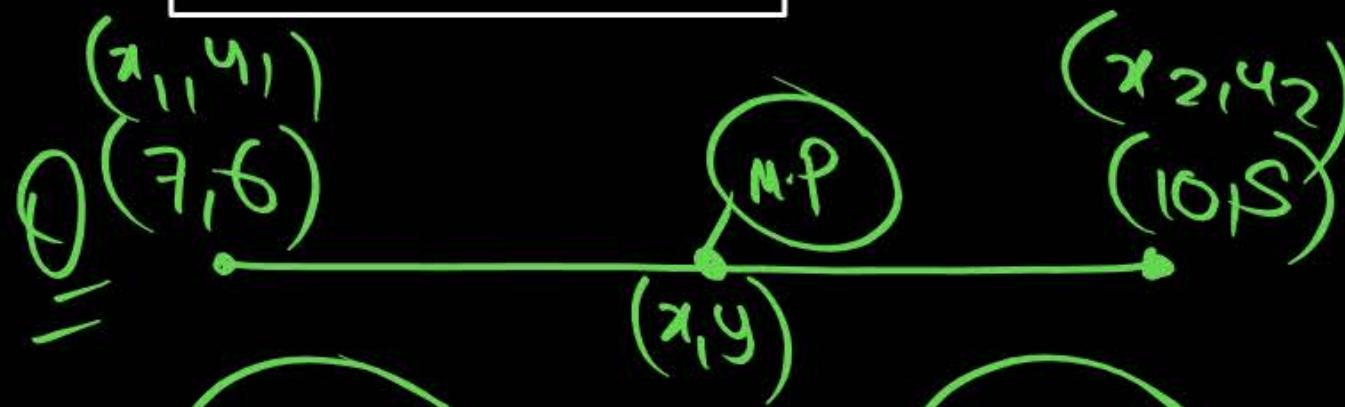
Mid point formulae

$$x = \frac{x_1 + x_2}{2}$$

$$y = \frac{y_1 + y_2}{2}$$

$$1 : 1$$

A (x_1, y_1) C (x, y) B (x_2, y_2)

mid point

(x_1, y_1)
$(7, 6)$

(x_2, y_2)
$(10, 5)$

M.P

(x, y)

$$x = \frac{17}{2}$$
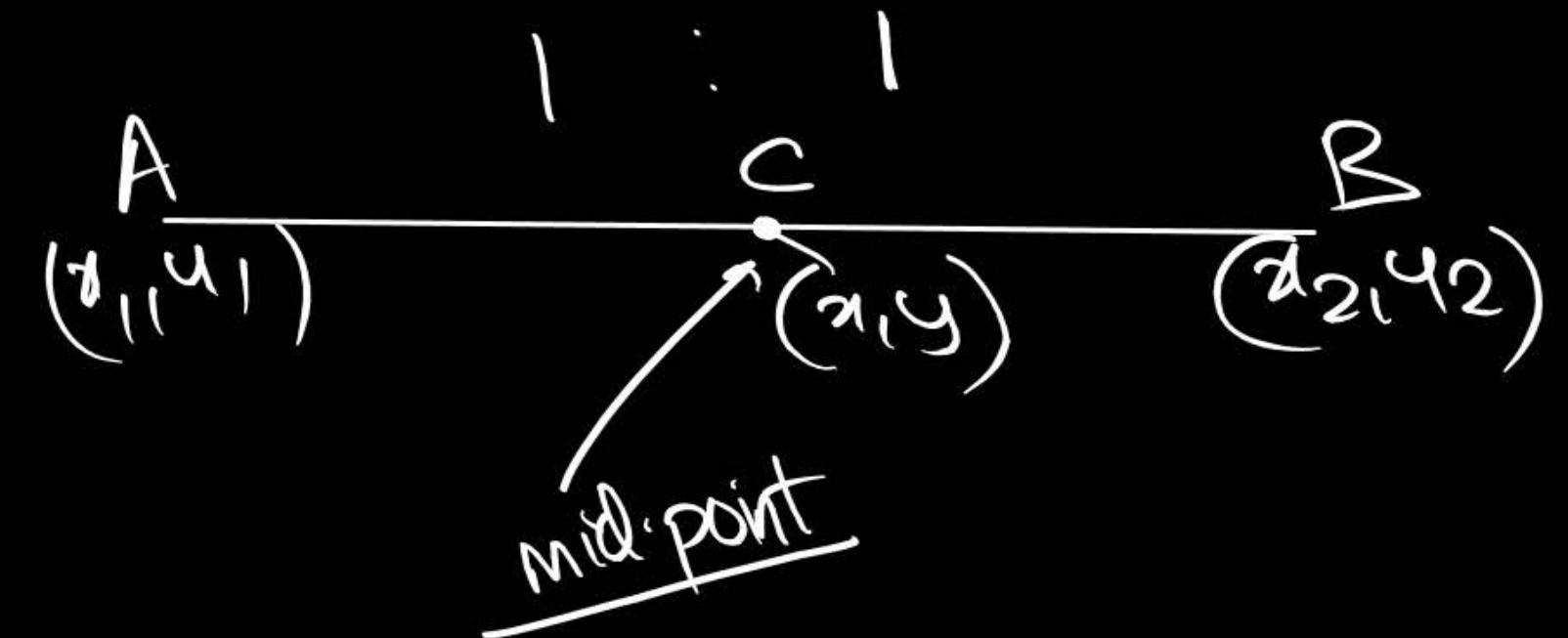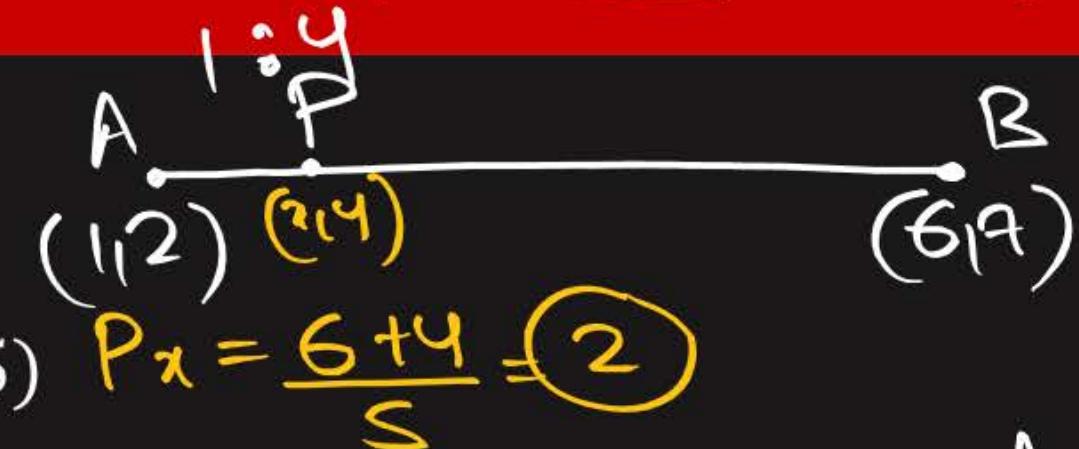
$$y = \frac{11}{2}$$

#Q. Points P, Q, R and S divide the line segment joining the points A $(1, 2)$ and B $(6, 7)$ in 5 equal parts. Find the coordinates of the points P, Q and R.
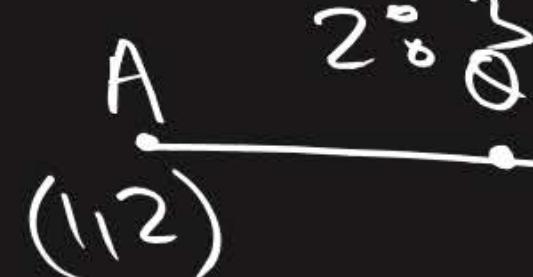
A $P(2, 3), Q(3, 4), R(4, 5)$

B $P(3, 3), Q(4, 4), R(5, 5)$

C $P(2, 2), Q(3, 3), R(4, 4)$

D $P(1, 3), Q(2, 4), R(3, 5)$

A $\xrightarrow{\quad 1:4 \quad P \quad}$ B

$(1,2) \quad (3,4) \qquad (6,7)$

$P_x = \dfrac{6+4}{5} = 2$

$P_y = \dfrac{7+8}{5} = \dfrac{15}{5} = 3$

A $\quad$ P $\quad$ Q $\quad$ R $\quad$ S $\quad$ B

$(1,2) \qquad\qquad\qquad (6,7)$

$2:3$

A $\qquad\qquad\qquad$ B

$(1,2) \qquad\qquad (6,7)$

$Q_x = \dfrac{12+3}{5} = 3$

$Q_y = \dfrac{14+6}{5} = 4$

$3:2 \quad R$

A $\qquad\qquad\qquad$ B

$(1,2) \qquad\qquad (6,7)$

$R_x = \dfrac{18+2}{5} = 4$
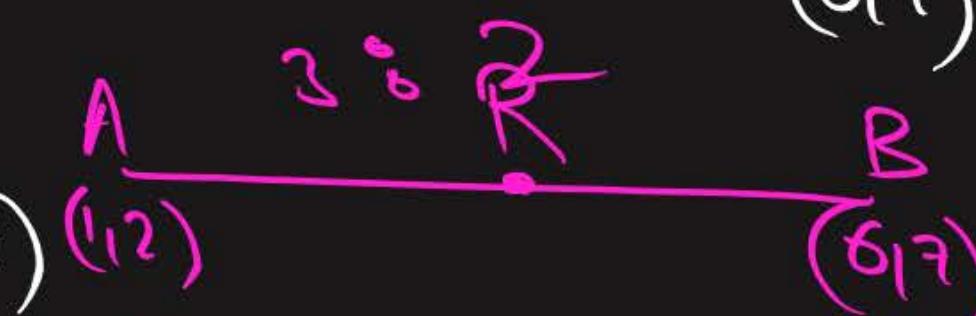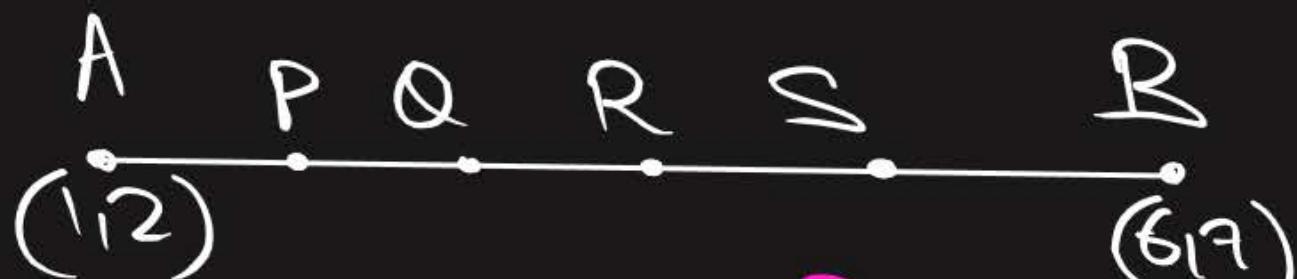
$R_y = \dfrac{21+4}{5} = 5$

#Q. In what ratio does the point (–4, 6) divide the line segment joining the points A (–6, 10) and B (3, –8)?

let the ratio be $k:1$

A. 1 : 5

B. 2 : 7

C. 3 : 6

D. NOTA

$$x = \frac{mx_2 + nx_1}{m+n}$$

$$-4 = \frac{3k + -6}{k+1}$$

$$-4(k+1) = 3k - 6$$
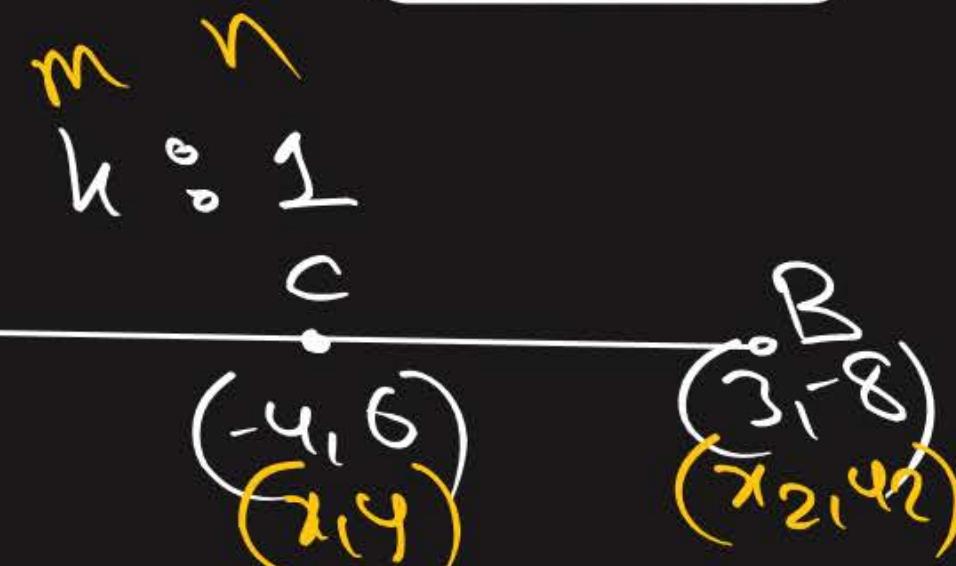
$$-4k - 4 = 3k - 6$$

$$-4k - 3k = -6 + 4$$

$$-7k = -2$$

$$k = \frac{-2}{-7}$$

$$k = 2/7$$

$$\overset{m}{k} : \overset{n}{1}$$

A (–6, 10) (x_1, y_1)

C (–4, 6) (x, y)

B (3, –8) (x_2, y_2)

$$\frac{2}{7} : 1$$

$$2 : 7$$

#Q. Find the ratio in which the point (2, y) divides the line segment joining the points A (−2, 2) and B (3, 7). Also, find the value of y.

A $4 : 1, y = 4$

B $2 : 3, y = 5$

C $4 : 1, y = 6$

D $3 : 2, y = 7$

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

$$2u + 2 = 3u - 2$$

$$2 + 2 = 3u - 2u$$

$$\boxed{4 = u}$$

$$y = \frac{7u + 2}{u + 1}$$

$$y = \frac{28 + 2}{5} = \frac{30}{5} = 6$$

$A(-2, 2)$ $u : 1$ B

$(2, y)$ $(3, 7)$
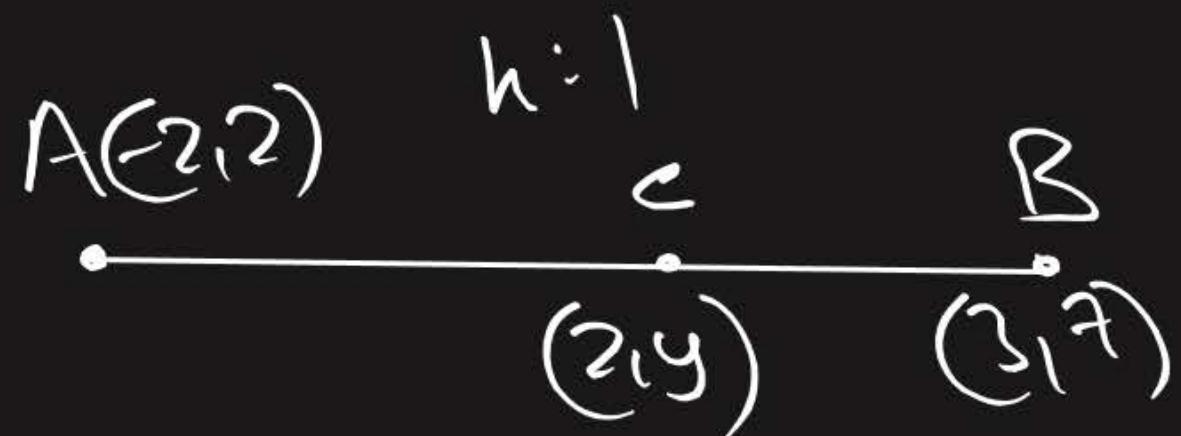
#Q. Find the ratio in which the line segment joining the points A (6, 3) and B (−2, −5) is divided by x-axis.

$$0 = \frac{-5k + 3}{k+1}$$

A 1 : 5

$$0 = -5k + 3$$

B 2 : 7

$$5k = 3$$

$$\boxed{k = 3/5}$$

C 4 : 6

D 3 : 5

$$\frac{3}{5} : 1$$

$$\boxed{3 : 5}$$

x-axis

$$k : 1$$

A
(6,3)

(x,0)

B
(−2,−5)
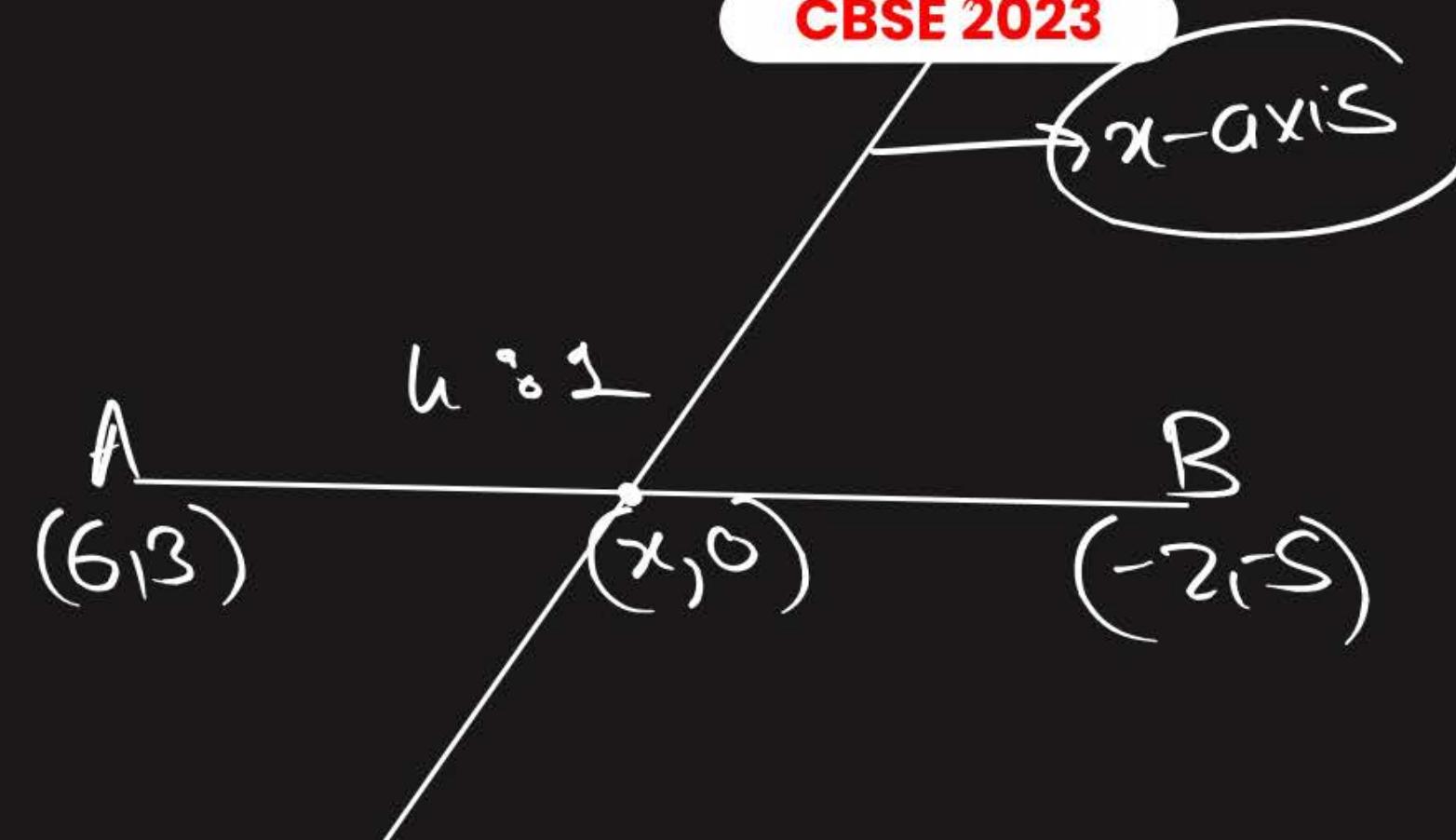
Homework From

Question Bank

Page 126 – Short answer – 6 → *Quadratic equations*

Long answer – 2, 3, 4, 6, 7

Case based 1

Page 129 – Case based 5

6. In a 2-digit number, the digit at the unit's place is 5 less than the digit at the ten's place. The product of the digits is 36. Find the number. **(CBSE ODL, 2024)**

2. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11 km/h more than that of the passenger train, find the average speed of the two trains.

3. Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

4. Out of a group of total students of class x, $\dfrac{7}{2}$ times the square root of the total number are playing cricket. The two remaining ones are playing badminton. Find the total number of students.

Case Based Questions

Case Based-I: Suppose a company wants to construct a rectangular park. If length that is 25 meters longer than the width. The area of the park should be 600 square meters. To determine the length of the park, the company needs to solve a quadratic equation. Read the following and answer the questions.

(i) What is the quadratic equation that represents the area of the rectangular park?

(ii) What is the length of the rectangular park?

OR

What is the value of the discriminant of the quadratic equation?

(iii) What is the value of the coefficient of x^2 in the quadratic equation?

Case Based-V: A passenger while boarding a plane slipped from the stairs and got hurt. The pilot took the passenger to the emergency clinic at the airport for treatment. Due to this, plane got delayed by half an hour. To reach the destination 1500 km away in time, so that the passengers could catch the connecting flight, the speed of the plane was increased by 250 km/h than the usual speed.

Based on the given information, answer the following questions:

(*i*) If *x* represents the usual speed of the plane, then find time at usual and increased speed.

(*ii*) Find the quadratic equation in *x*, formed in this case.

(*iii*) What is the usual speed of the plane?
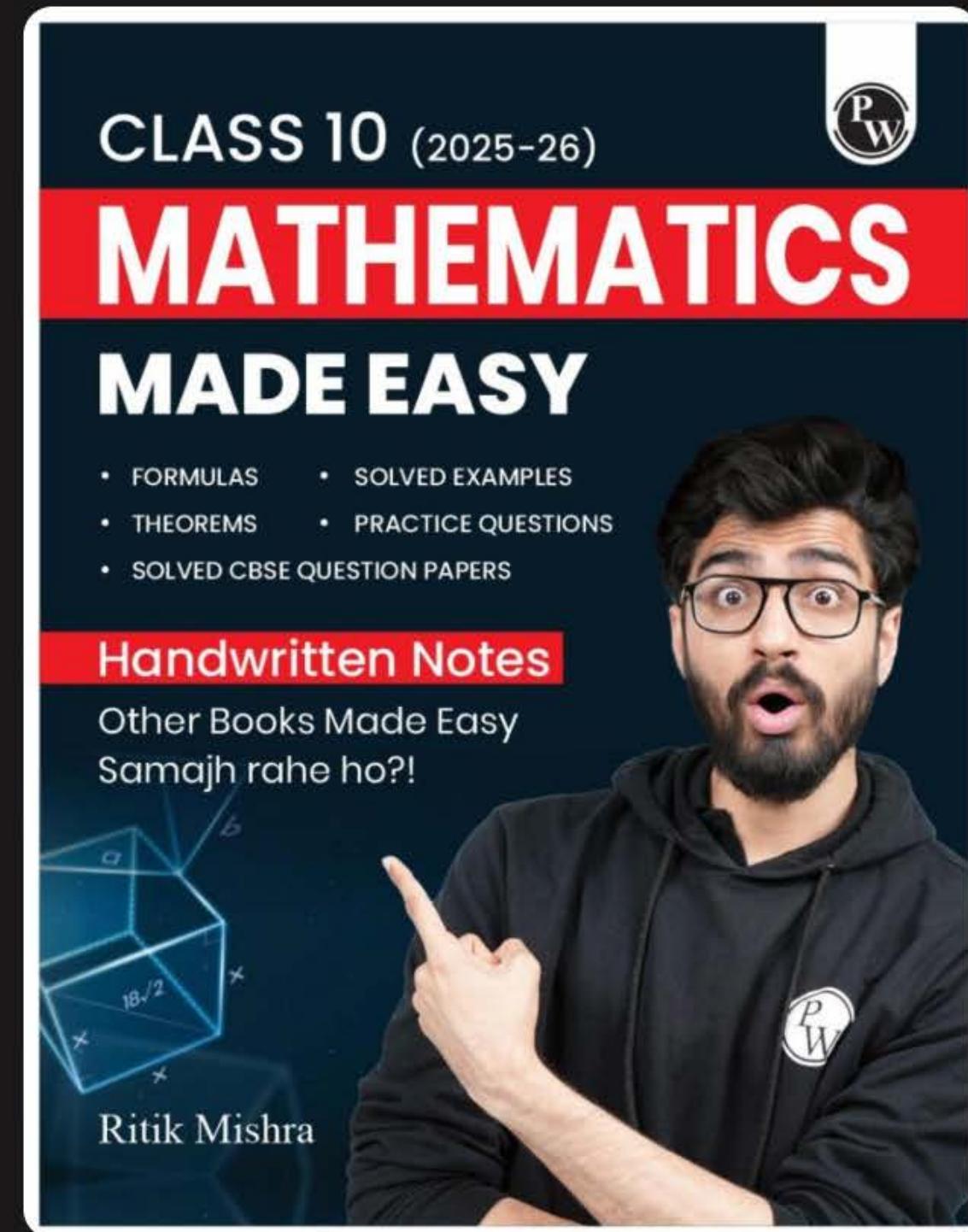
OR

Find the increased speed of the plane.

6. To fill a swimming pool two pipes are used. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. Find how much long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter?

7. Manu and Aiza are competing in a 60 km cycling race. Aiza's average speed is 10 km/hr greater than Manu's average speed and she finished the race in hours less than Manu.

   Find the time taken by Manu to finish the race. Show your work. **(CBSE APQ, 2023)**

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