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Class - 10

MATHS

Chapter - 7

COORDINATE GEOMETRY

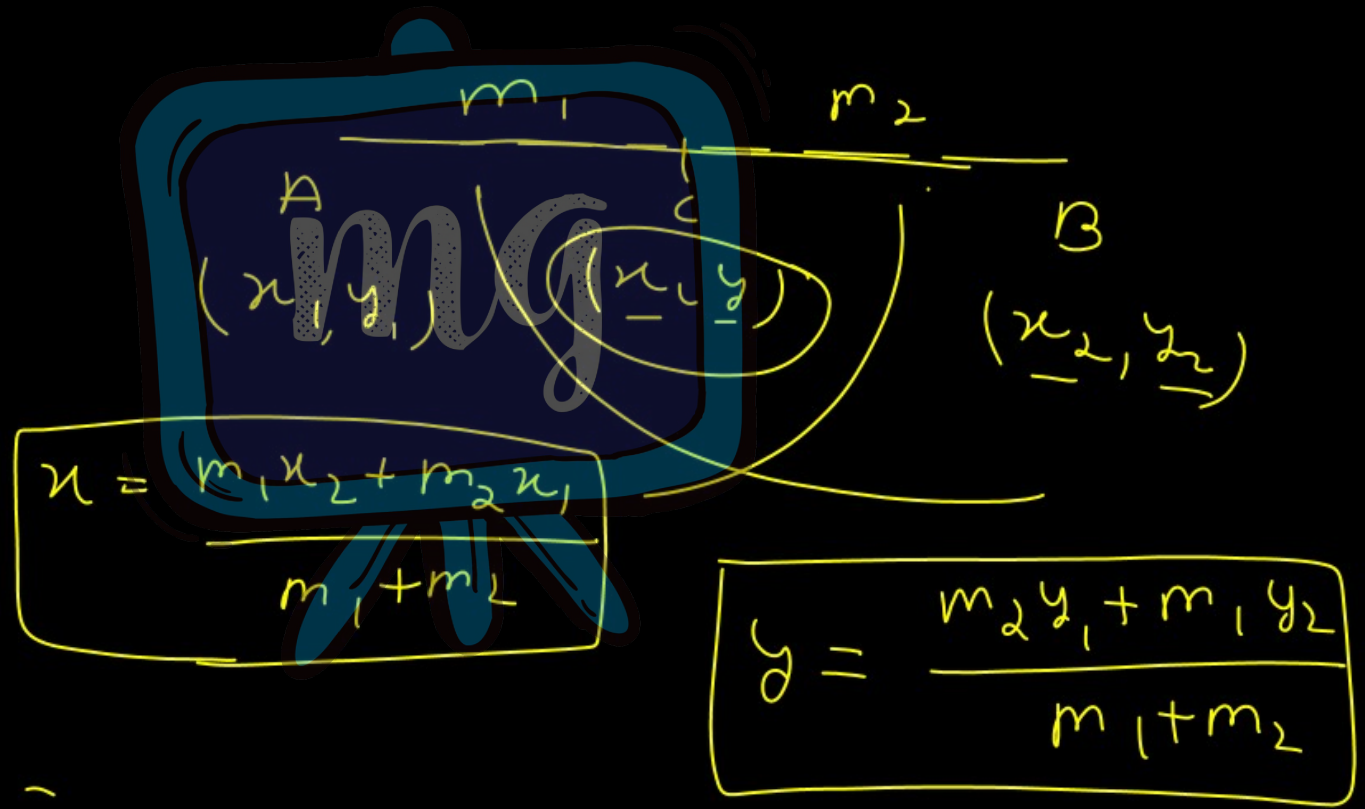
Part - 3

SHUBHAM TIWARI

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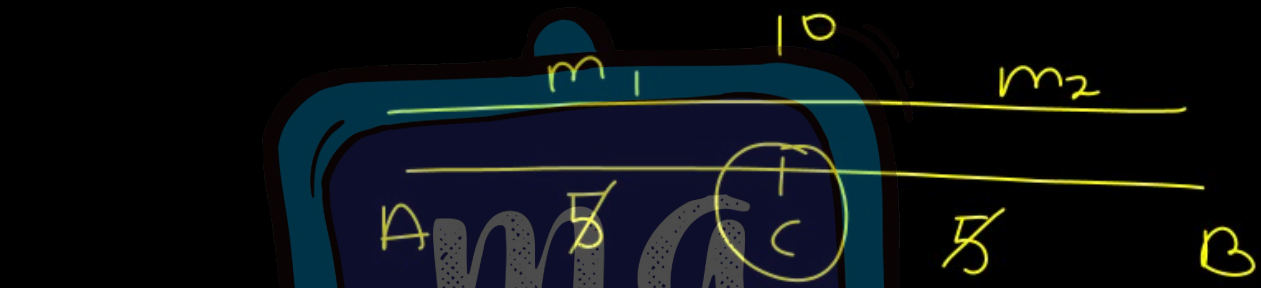
Section formula.



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Mid-point Formula



$$x = \frac{m_2 x_1 + m_1 x_2}{m_1 + m_2}$$

$$y = \frac{m_2 y_1 + m_1 y_2}{m_1 + m_2}$$

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

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

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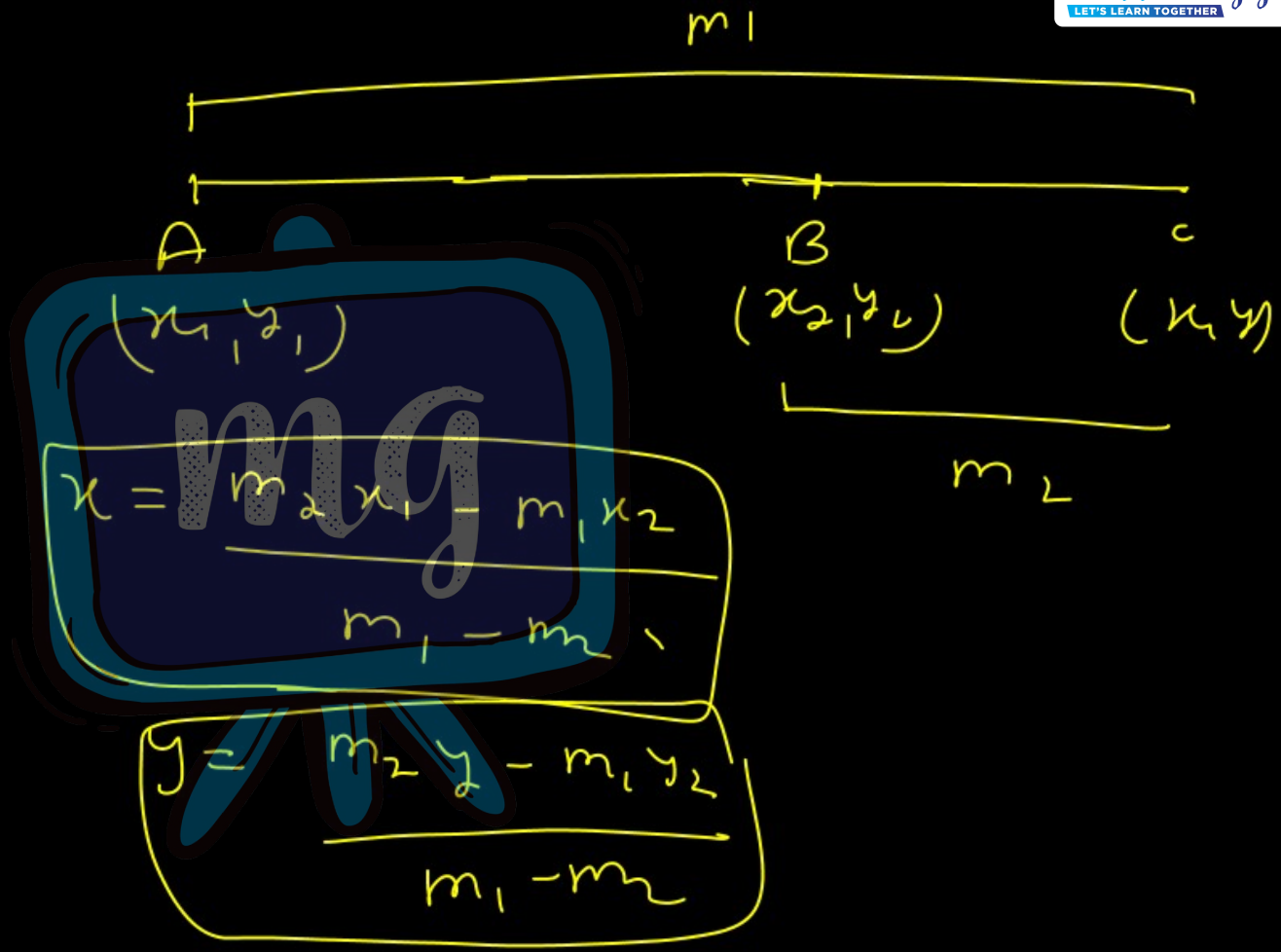
MID-POINT FORMULA

- Coordinates of the mid-point (x, y) of the line segment joining the points (x_1, y_1) and (x_2, y_2) is

$$x = \frac{x_2 + x_1}{2}, \quad y = \frac{y_2 + y_1}{2}$$

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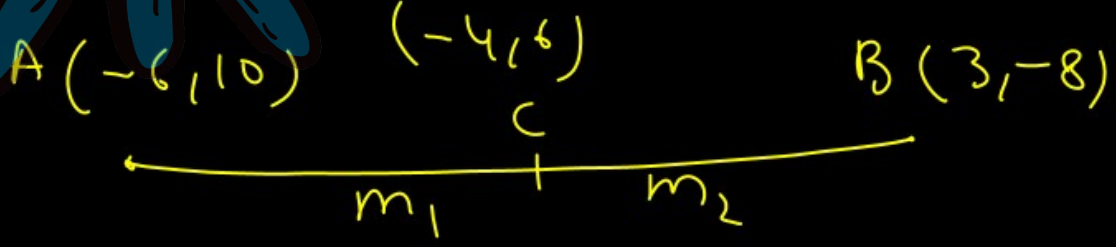
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Let $\frac{m_1}{m_2} = \frac{K}{1}$

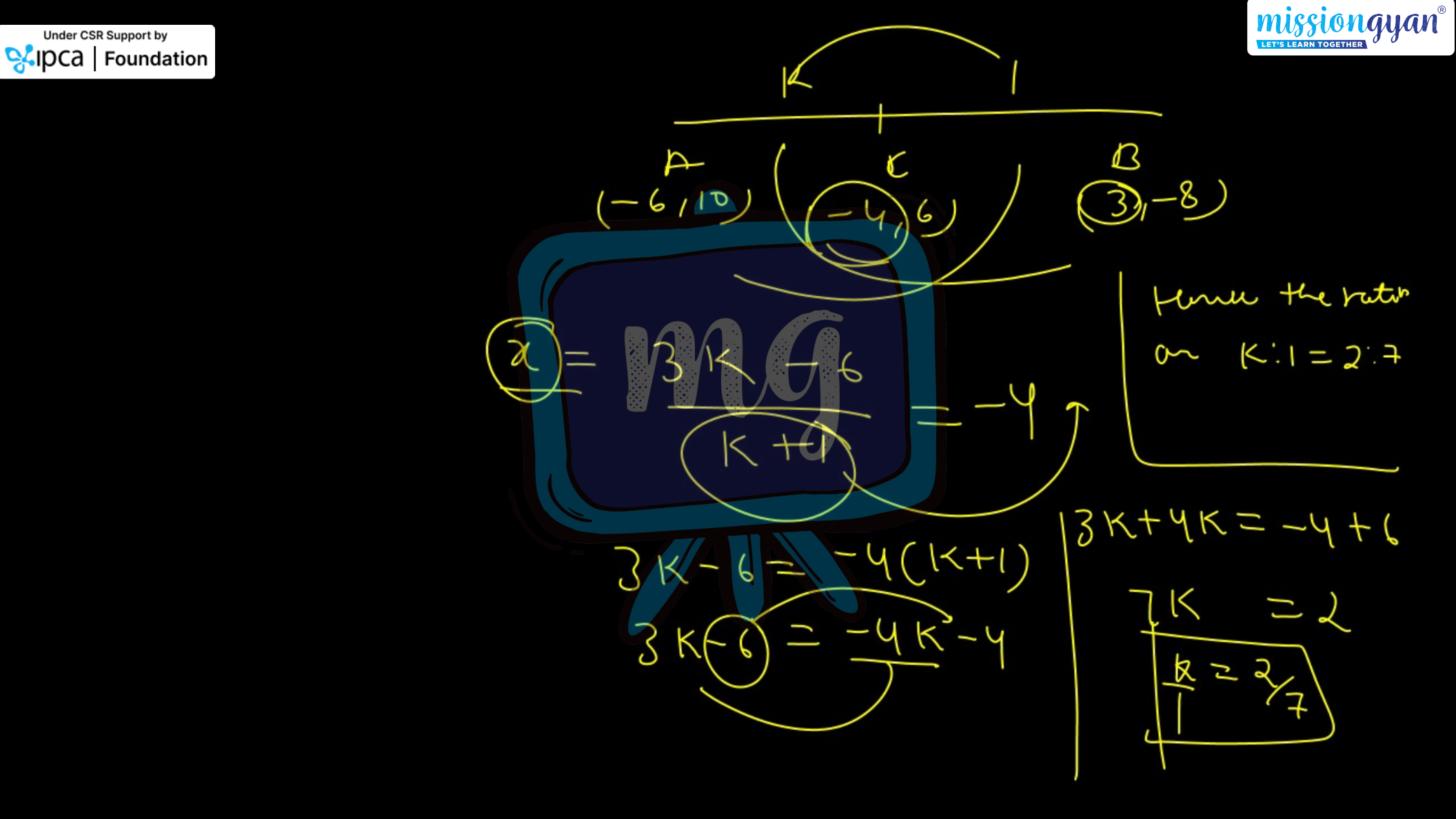
Example : 7

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



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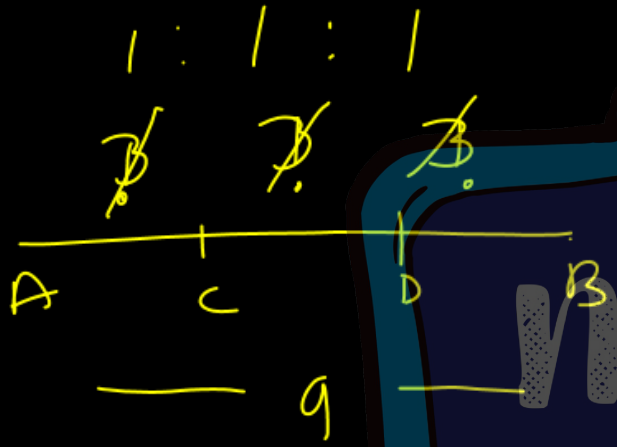
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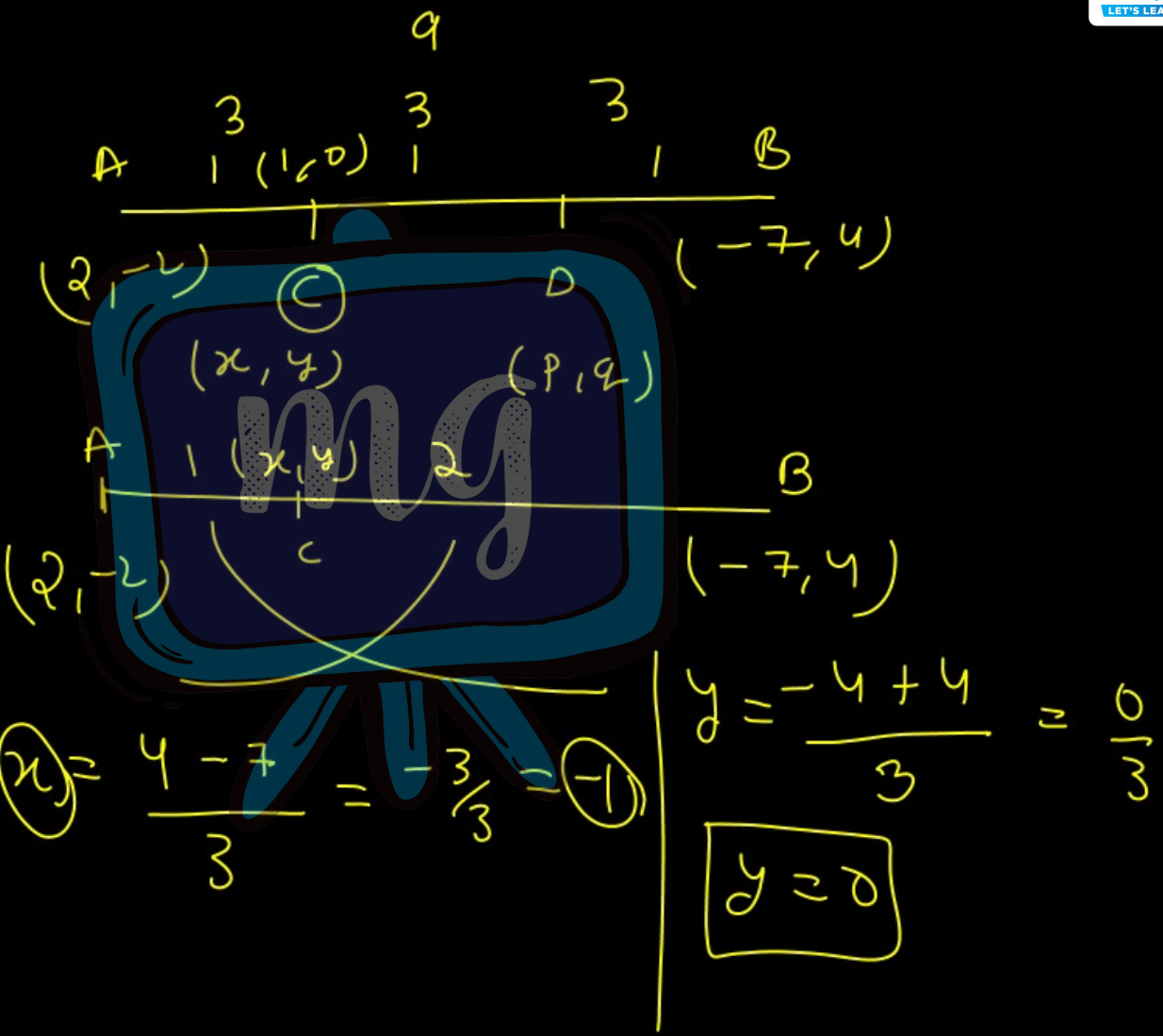


Example : 8

Find the coordinates of the points of trisection (i.e., points dividing in three equal parts) of the line segment joining the points A(2, –2) and B(– 7, 4).

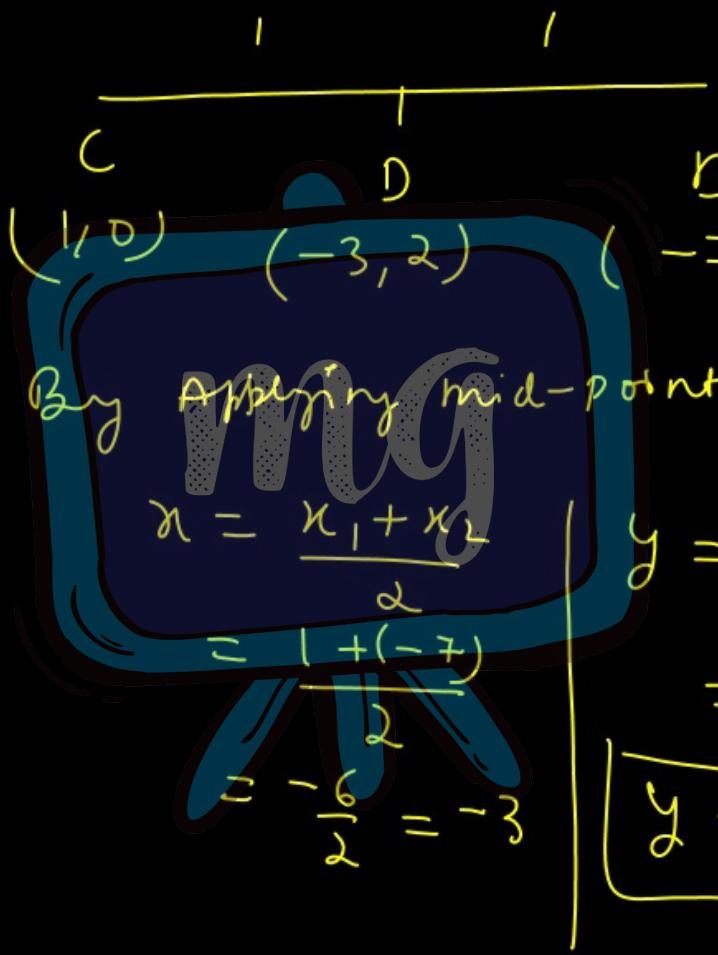
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By Applying mid-point formula.

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

$$= \frac{1 + (-7)}{2}$$

$$= \frac{-6}{2} = -3$$

$$y = \frac{4 + 0}{2}$$

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

$$y = 2$$

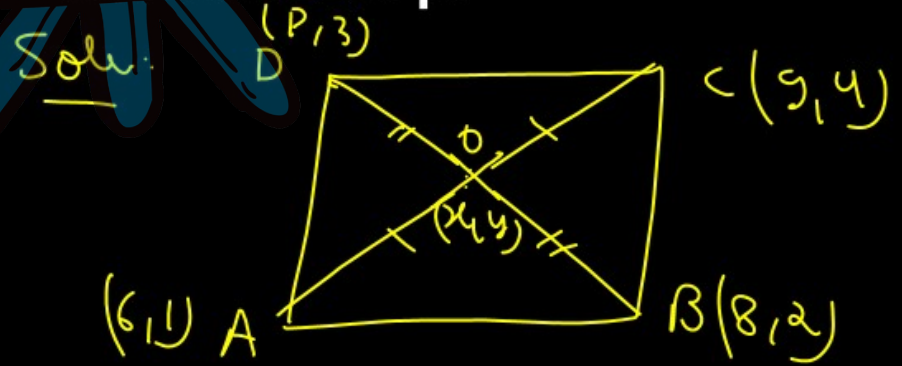
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Example : 10

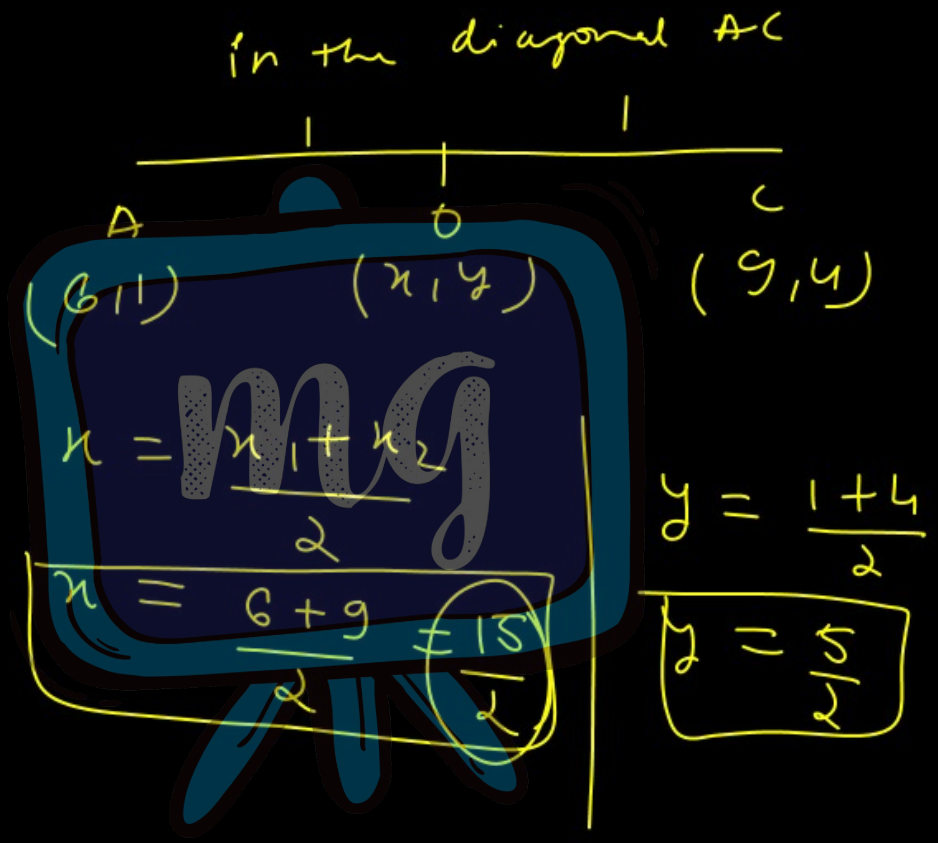
If the points A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram, taken in order, find the value of p.

Soln:



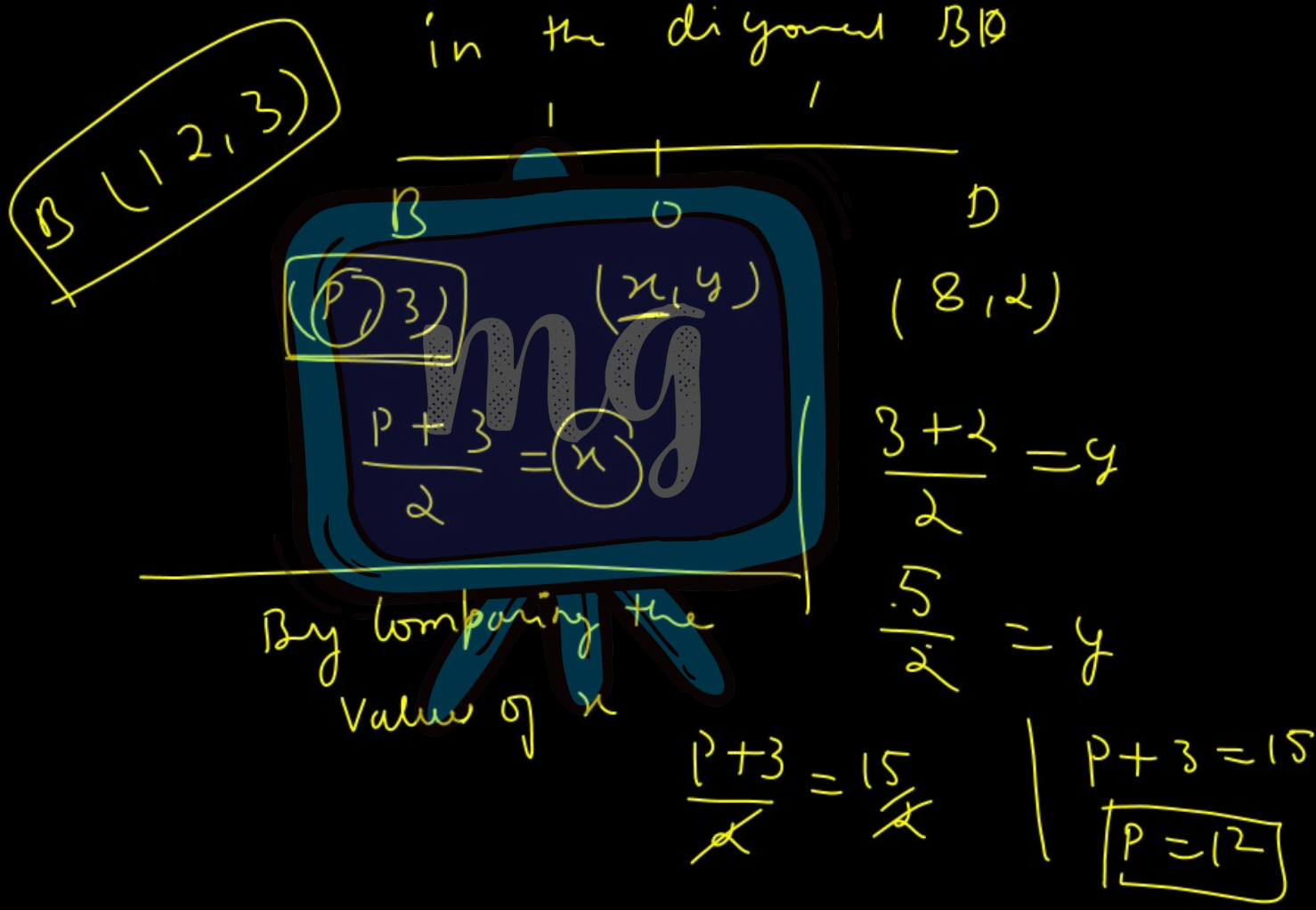
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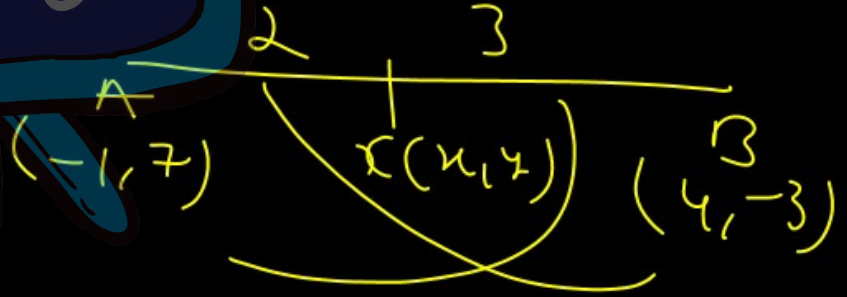
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Exercise : 7.2

1. Find the coordinates of the point which divides the join of (–1, 7) and (4, –3) in the ratio 2 : 3.

Solu.



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$$x = \frac{m_2 x_1 + m_1 x_2}{m_1 + m_2}$$

$(1, 3)$

$$x = \frac{2 \times 4 + 3(-1)}{2 + 3}$$

$$x = \frac{8 - 3}{5} = \frac{5}{5} = 1$$

$$y = \frac{2(-3) + 3(7)}{5}$$

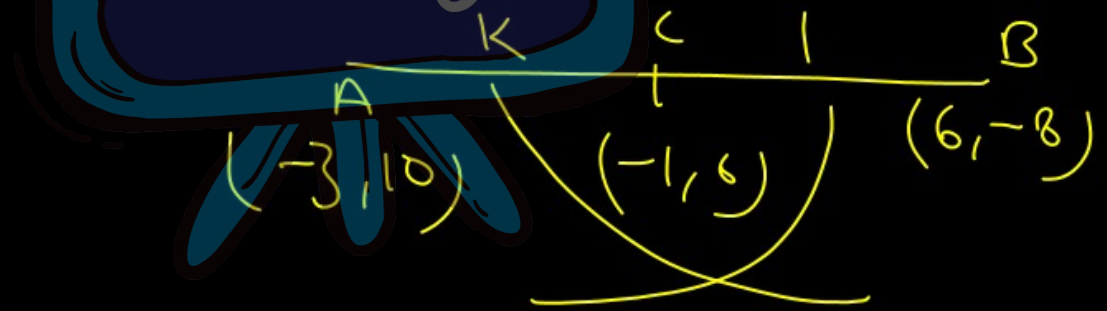
$$= \frac{-6 + 21}{5} = \frac{15}{5} = 3$$

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Exercise : 7.2

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4. Find the ratio in which the line segment joining the points (−3, 10) and (6, −8) is divided by (−1, 6).



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$$x = \frac{k(6) + 1(-3)}{k+1}$$

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

$$-k - 1 = 6k - 3$$

$$3 - 1 = 6k + k$$

$$2 = 7k$$

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

$k : 1 = 2 : 7$

A — k — 1 — B

(−3, 10) (−1, 6) (6, −8)

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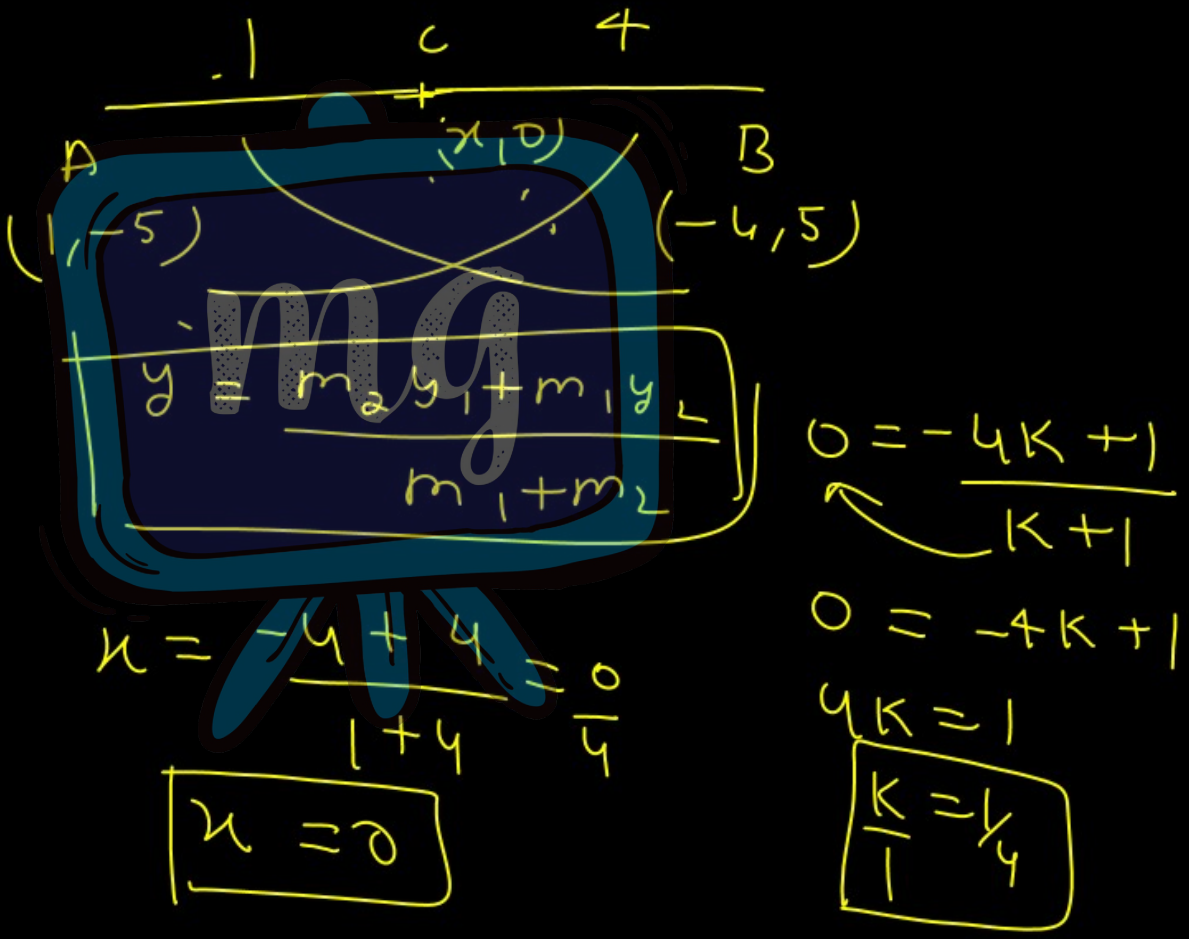
Exercise : 7.2

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5. Find the ratio in which the line segment joining A(1,–5) and B(–4, 5) is divided by the x-axis. Also find the coordinates of the point of division.

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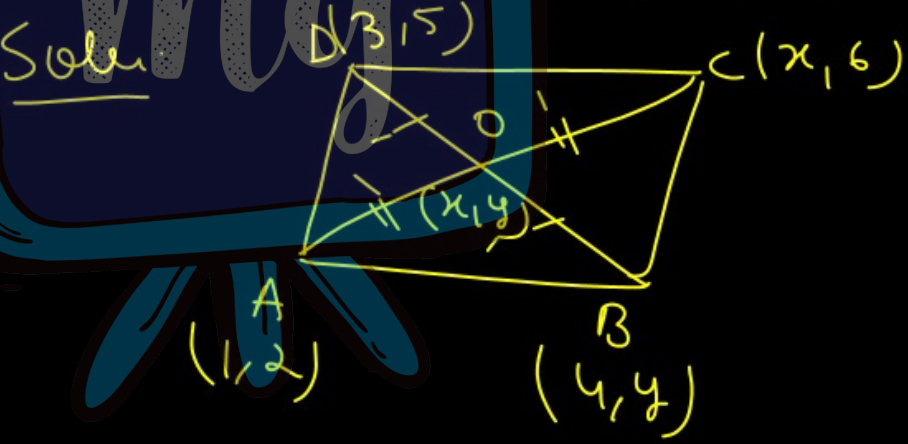
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Exercise : 7.2

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6. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

Solu:



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Soln By the helping the diagram:

A — 1 — 1 — C

(1, 2) O (P, Q) (x, 6)

$P = \frac{1+x}{2}$ | $q = \frac{2+6}{2} = \frac{8}{2} = 4$

By taking diagonal BD.

B — O — D

(4, y) (P, Q) (3, 5)

$P = \frac{4+3}{2} = \frac{7}{2}$ | $q = \frac{5+y}{2}$

By comparing the coordinates

$\frac{1+x}{2} = \frac{7}{2}$

$1 + x = 7$

$x = 6$

$4 = \frac{5+y}{2}$

$8 = 5 + y$

$\boxed{3 = y}$

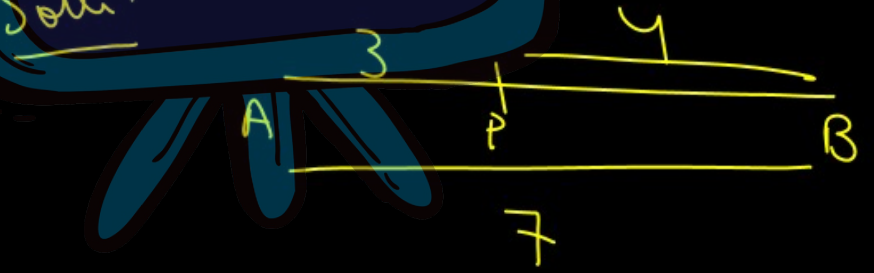
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Exercise : 7.2

8. If A and B are (–2,–2) and (2,–4), respectively, find the coordinates of P such that $AP = \frac{3}{7}AB$ and P lies on the line segment AB.

Soln.



$AP = \frac{3}{7}AB$

$\frac{AP}{AB} = \frac{3}{7}$

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$$AP = \frac{3}{7} AB$$

$$\frac{AP}{AB} = \frac{3}{7}$$

$$\frac{AB}{AP} - 1 = \frac{7}{3} - 1$$

$$\frac{AB - AP}{AP} = \frac{7 - 3}{3}$$

$$\frac{PB}{AP} = \frac{4}{3}$$

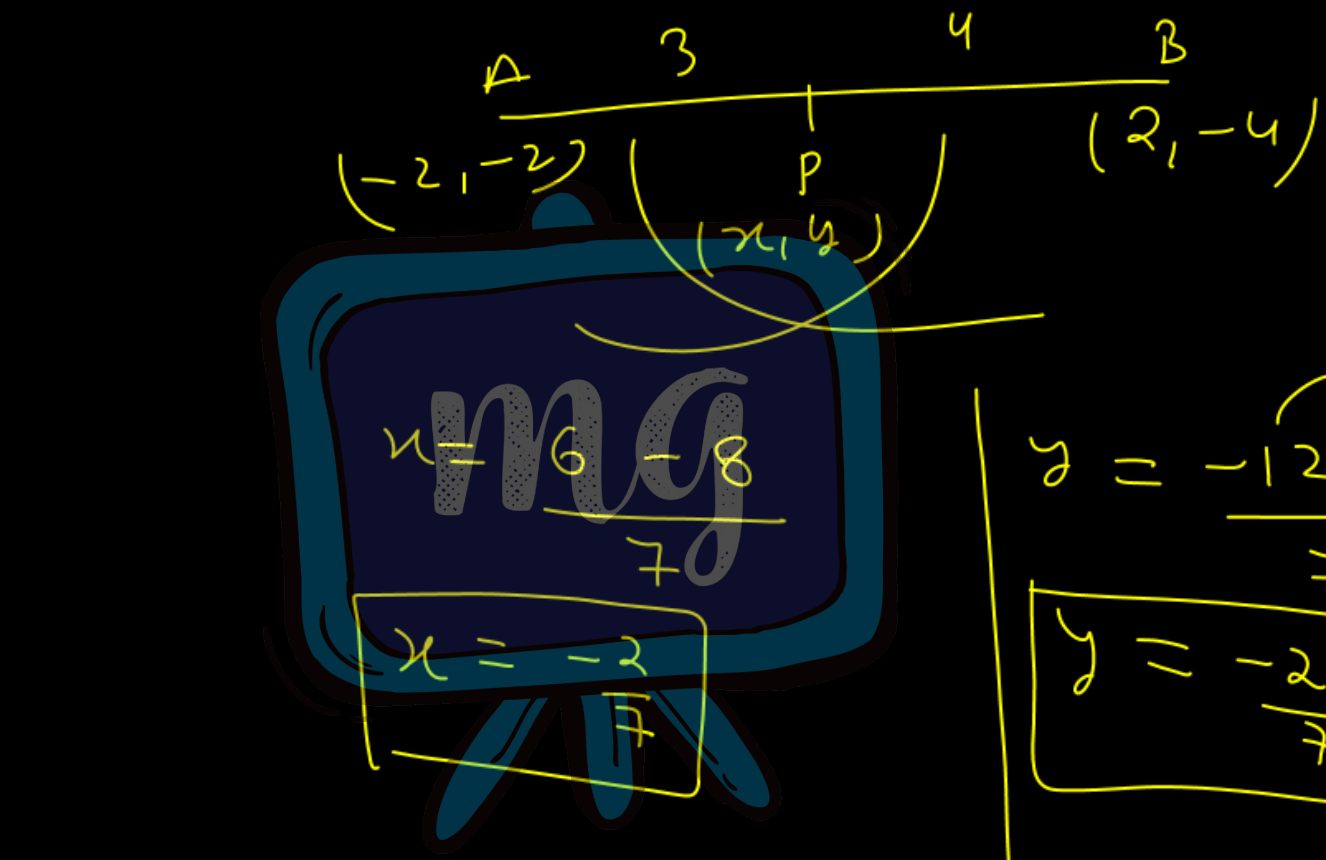
$AP : PB$

$3 : 4$

mg

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$$x = \frac{6 - 8}{7}$$

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

$$y = \frac{-12 - 8}{7}$$

$$y = \frac{-20}{7}$$