CLASS 10TH MID TERM

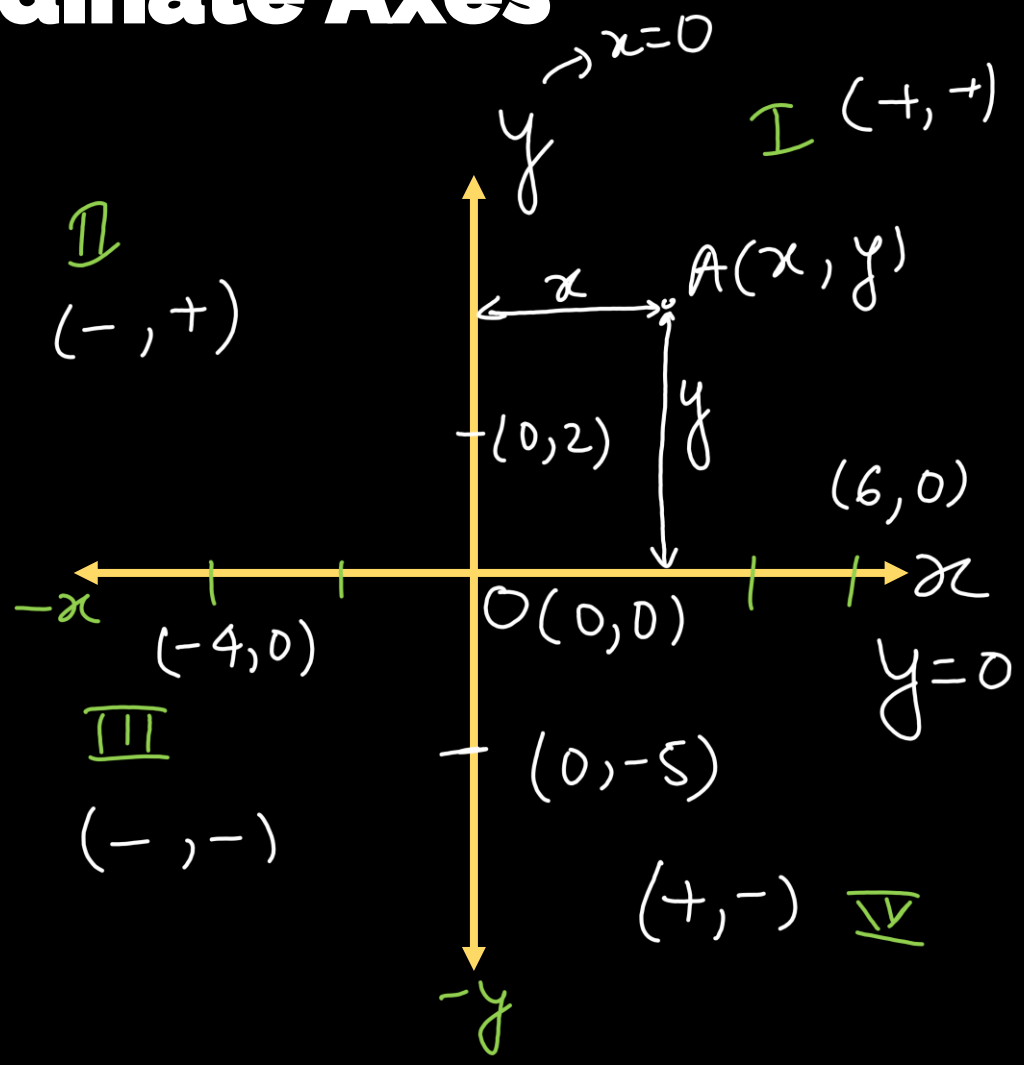
SCORE BOOSTER

COORDINATE GEOMETRY

ONE SHOT

MATHS

Coordinate Axes



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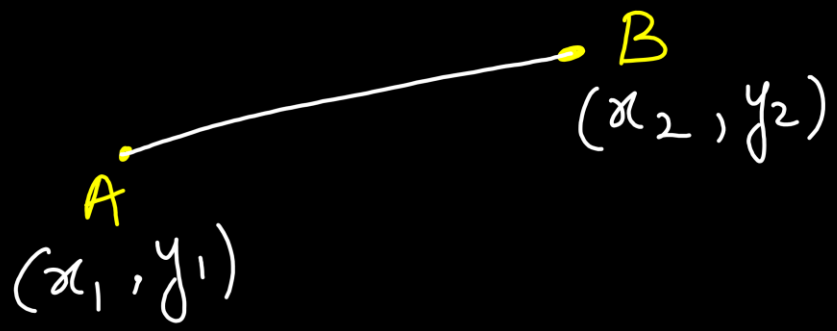
Distance Formula

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

OR $\rightarrow (x_1 - x_2)^2$ in this format



Q. The distance of the point P (–6, 8) from the origin is 10 units

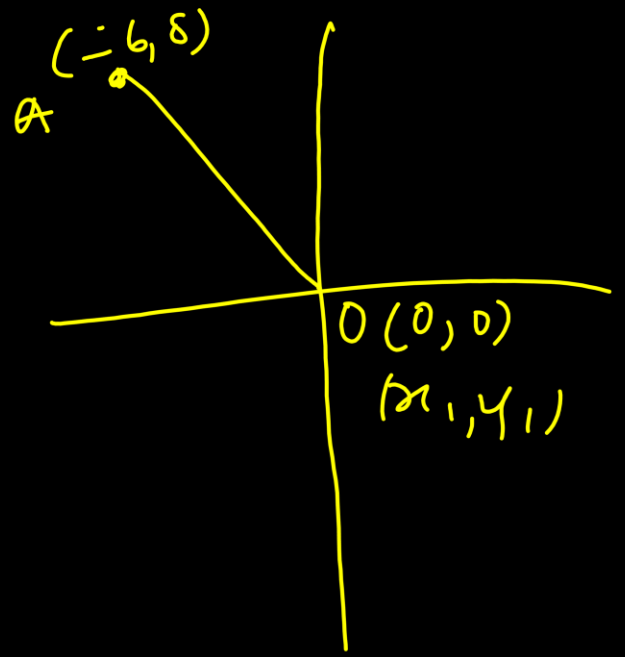
$$OA = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-6 - 0)^2 + (8 - 0)^2}$$

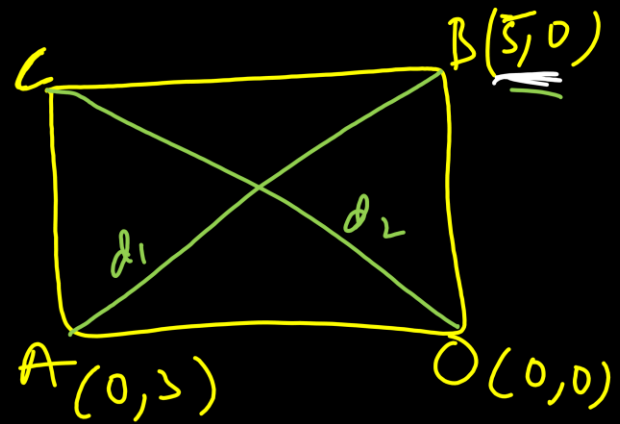
$$= \sqrt{(-6)^2 + 8^2}$$

$$= \sqrt{36 + 64}$$

$$= \sqrt{100} = 10 \text{ units}$$



Q. AOBC is a rectangle whose three vertices are vertices A (0, 3), O (0, 0) and B (5, 0). The length of its diagonal is



$d_1 = d_2$

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(5-0)^2 + (0-3)^2}$$

$$= \sqrt{25 + 9}$$

$$= \sqrt{34} \rightarrow \text{diagonal's length}$$

Q. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is _____

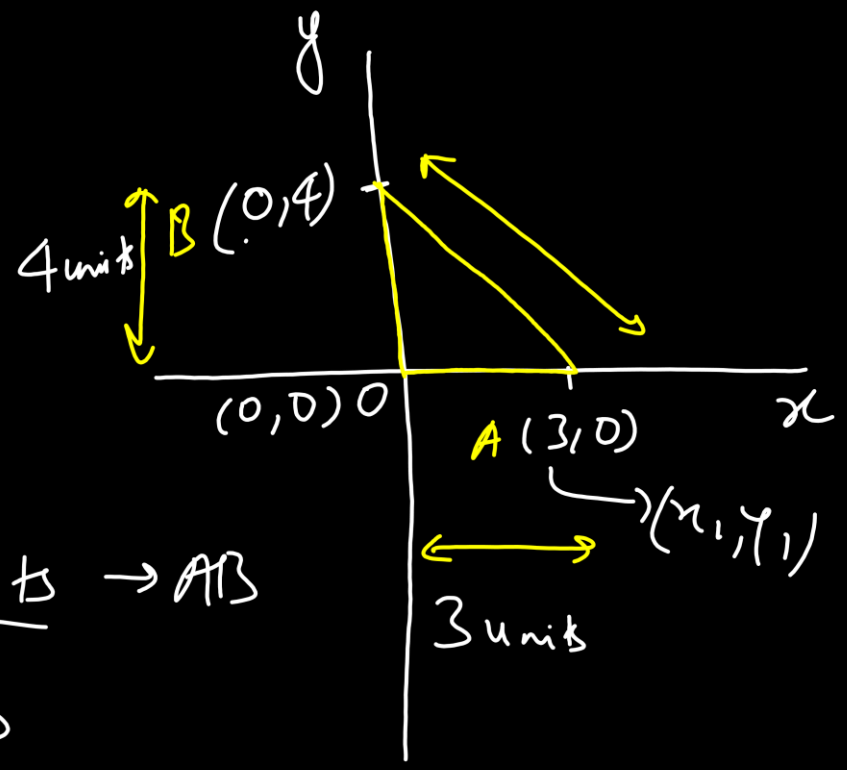
12

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(0-3)^2 + (4-0)^2}$$

$$= \sqrt{9 + 16} = \sqrt{25}$$

$$= 5 \text{ units} \rightarrow AB$$



Perimeter of $\triangle OAB = OA + OB + AB$

$= 3 + 4 + 5$

$= 12$ units

Q. Do the points (3, 2), (–2, –3) and (2, 3) form a triangle? If so, name the type of triangle formed.

$$PQ = \sqrt{(3-(-2))^2 + (2-(-3))^2}$$

$$= \sqrt{5^2 + 5^2} = \sqrt{25+25}$$

$$= \sqrt{50} \rightarrow 7.02$$

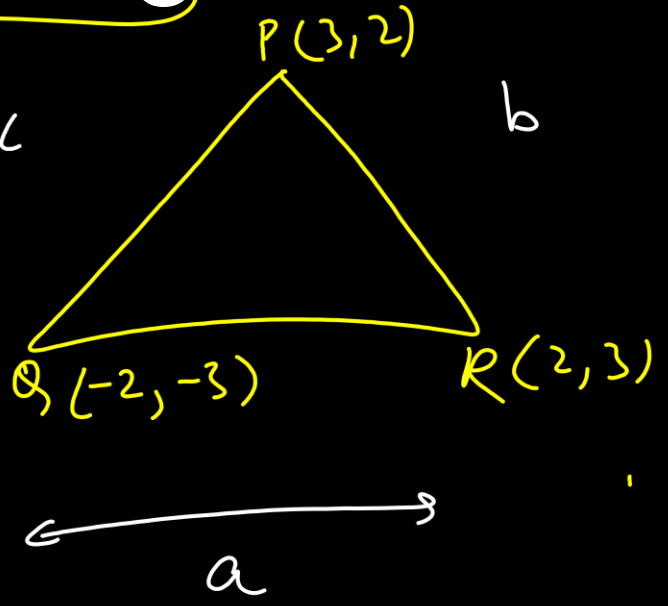
$$QR = \sqrt{(-2-2)^2 + (-3-3)^2} = \sqrt{16+36}$$

$$= \sqrt{52} \rightarrow 7.1$$

$$PR = \sqrt{(3-2)^2 + (2-3)^2} = \sqrt{1^2+1^2}$$

$$= \sqrt{2} \rightarrow 1.4$$

Yes PQR forms a $\triangle$le.



$$\begin{cases} a+b > c \\ b+c > a \\ a+c > b \end{cases}$$

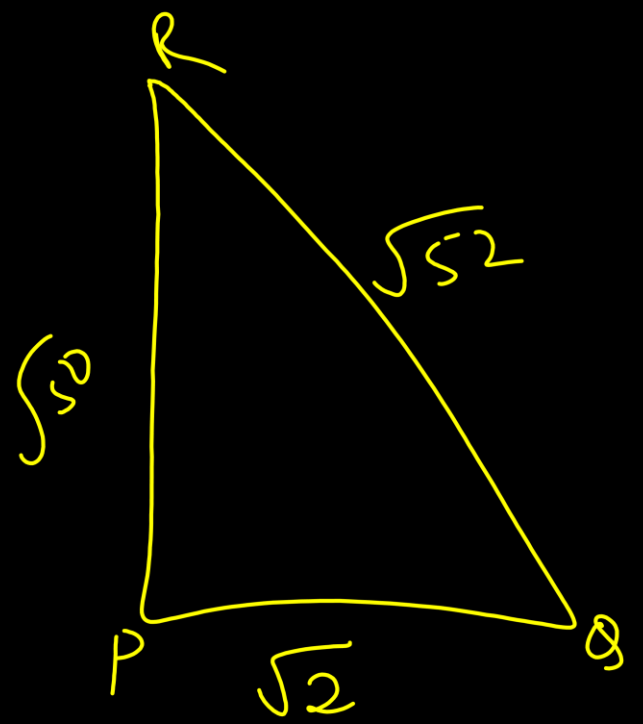
$$QR^2 = (\sqrt{52})^2 = 52$$

$$PR^2 = (\sqrt{2})^2 = 2$$

$$PQ^2 = (\sqrt{50})^2 = 50$$

$$PQ^2 + PR^2 = QR^2$$

$$50 + 2 = 52$$



Q. Find the point on the x-axis which is equidistant from (2, –5) and (–2, 9).

B C

$$AB = AC$$

$$\Rightarrow \sqrt{(x-2)^2+(0-(-5))^2} = \sqrt{(x-(-2))^2+(0-9)^2}$$

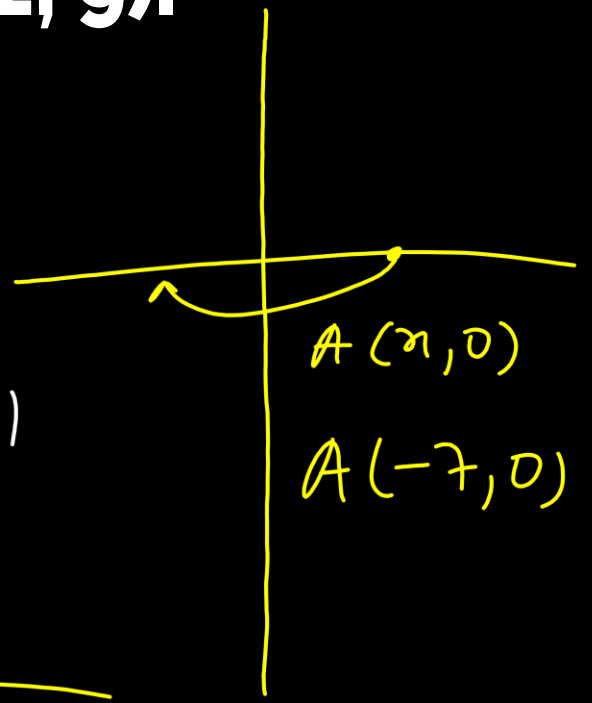
$$\Rightarrow x^2+2^2-2\cdot(2)(x)+25 = x^2+2^2+2\cdot2\cdot x+81$$

$$\Rightarrow -4x+25 = 4x+81$$

$$\Rightarrow -4x-4x = 81-25$$

$$\Rightarrow -8x = 56$$

$$\Rightarrow x = -\frac{56}{8} = -7$$



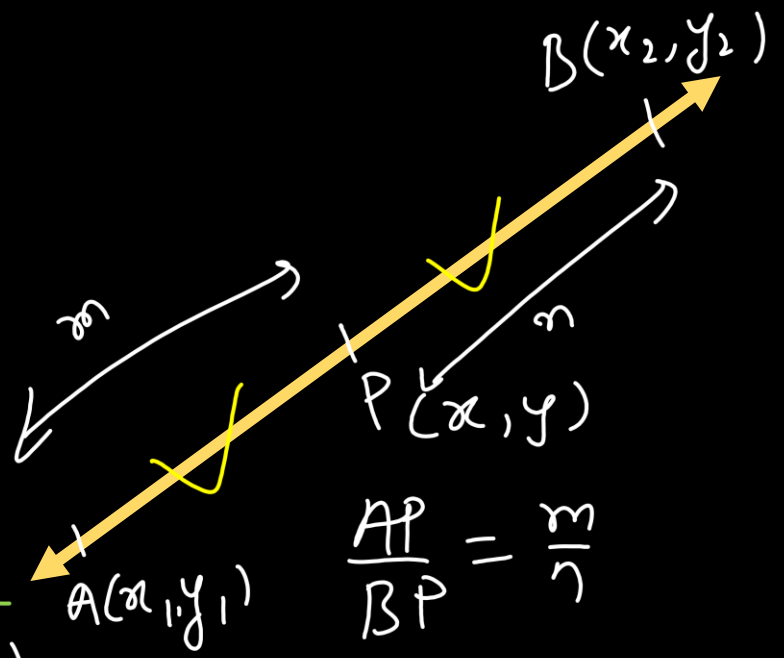
(–7, 0) A_2

Section Formula

① $P(x,y) = \left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n} \right)$

② application →

(i) Midpoint: $\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2} \right)$

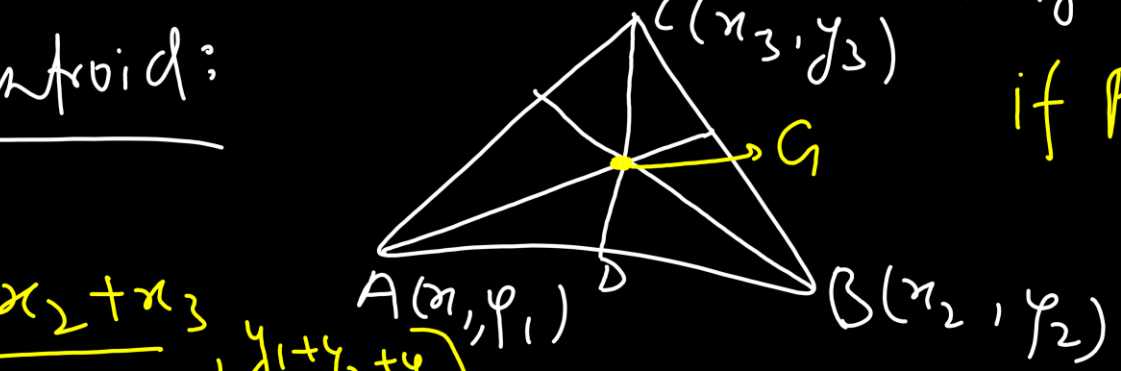


$\frac{AP}{BP} = \frac{m}{n}$

if P is midpoint

$\frac{AP}{BP} = \frac{1}{1} = 1 = \frac{m}{n}$

(ii) Centroid:



$G\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3} \right)$

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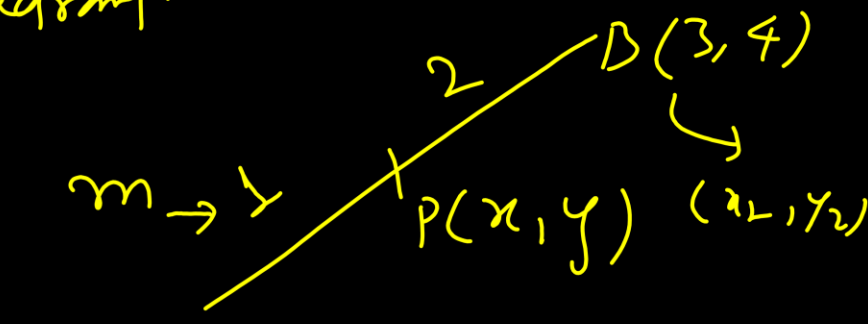
Q. The point which divides the line segment joining the points (7, –6) and (3, 4) in ratio 1 : 2 internally lies in the ____ Quadrant.

to

$$P(x,y) = \left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$$



$$x = \frac{1(3)+2(7)}{1+2} = \frac{3+14}{3} = \frac{17}{3}$$

$$\frac{m}{n} = \frac{1}{2}$$

$$y = \frac{(1)(4)+(2)(-6)}{1+2} = \frac{4-12}{3} = -\frac{8}{3}$$

$\left(\frac{17}{3}, -\frac{8}{3}\right) \rightarrow P$

Ans

→ IV Qual.

Q. 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

→ ratio = $\left(\frac{k}{1}\right)$ → assumption.

$$x = \left(\frac{m x_2 + n x_1}{m+n}\right) = \frac{k(-4) + (1)(1)}{k+1}$$

$$= \left(\frac{-4k+1}{k+1}\right)$$

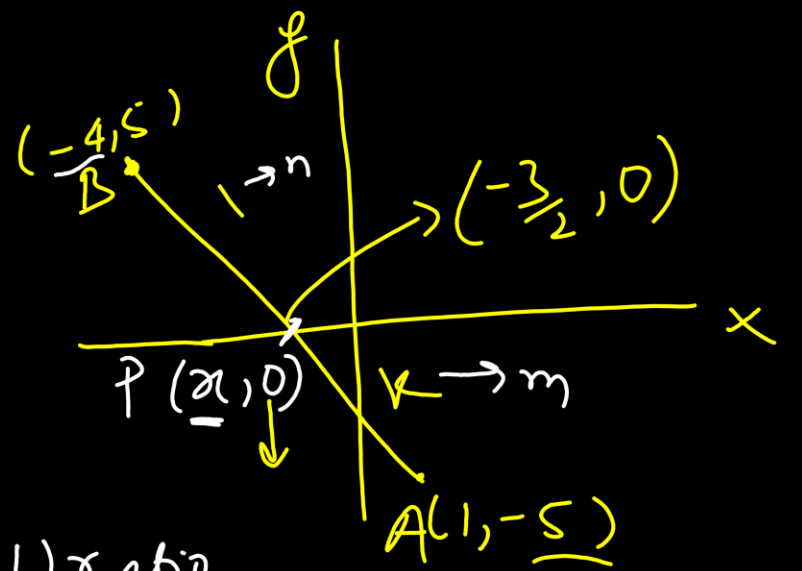
$$y = \left(\frac{(k)(5) + (1)(-5)}{k+1}\right) = \left(\frac{5k-5}{k+1}\right) = 0$$

$$5k - 5 = 0$$

$$\boxed{k = 1}$$

$$\rightarrow x = \frac{-4k+1}{k+1} = \frac{-4+1}{1+1}$$

$$= \left(\frac{-3}{2}\right)$$



(1) ratio

(2) P(x, 0) ↓ $x = -3/2$

$\left(\frac{k}{1}\right) = \frac{1}{1} = 1:1$

Q. Find the area of a rhombus if its vertices are (3, 0), (4, 5), (– 1, 4) and (– 2, – 1) taken in order.

$$ar(\text{rhombus}) = \frac{1}{2}(d_1 \times d_2)$$

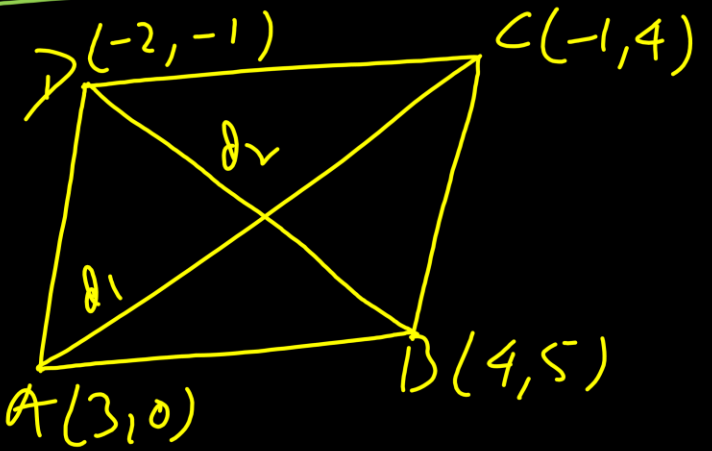
$$d_1 = \sqrt{(3-(-1))^2 + (0-4)^2} = \sqrt{16+16} = \sqrt{32}$$

$$d_2 = \sqrt{(4-(-2))^2 + (5-(-1))^2} = \sqrt{36+36} = \sqrt{72}$$

$$ar(\text{rhom. ABCD}) = \frac{1}{2}\sqrt{32} \times \sqrt{72}$$

$$= \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2}$$

$$= \frac{1}{2} \times 4 \times 6 \times 2 = 24 \text{ Sq. units}$$



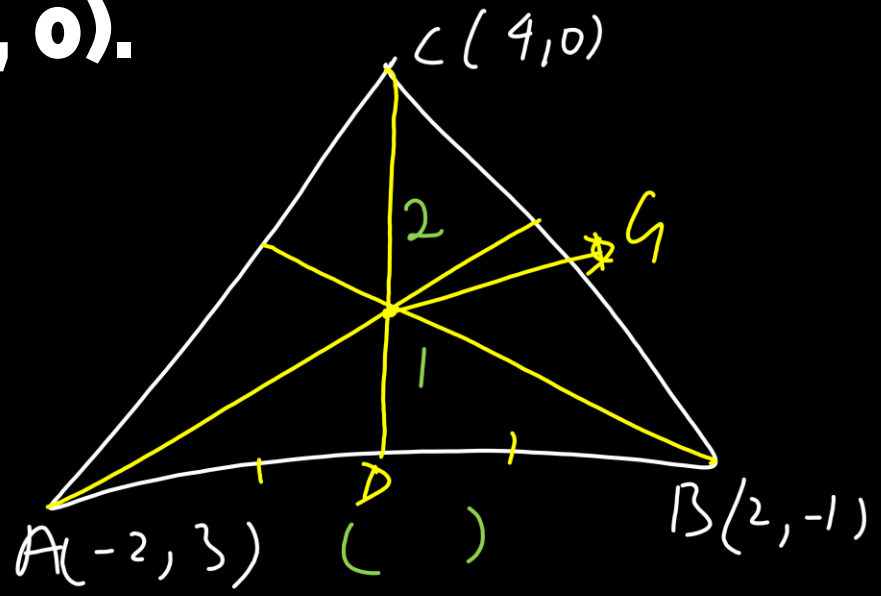
$$\sqrt{72} = \sqrt{36 \times 2} = 6\sqrt{2}$$

Q. Find the centroid of the triangle whose vertices is (-2, 3) (2, -1) & (4, 0).

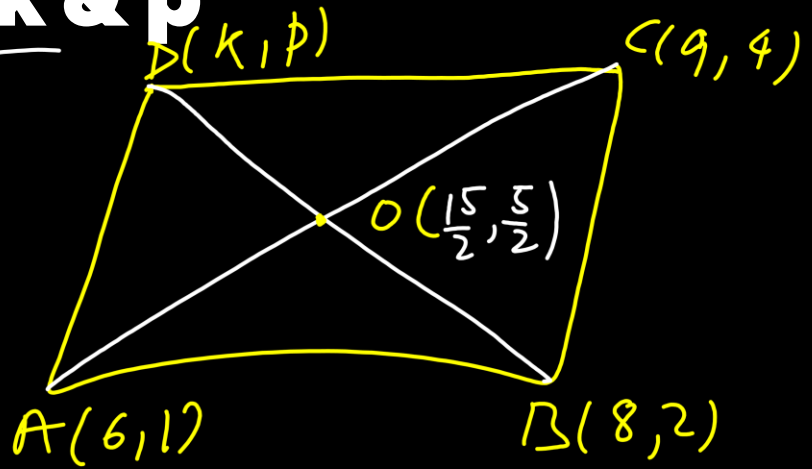
$$G\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$$

$$G\left(\frac{-2+2+4}{3}, \frac{3-1+0}{3}\right)$$

$$\boxed{G\left(\frac{4}{3}, \frac{2}{3}\right)}$$



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



⇒ Midpoint of AC (O)

$x = \frac{x_1+x_2}{2} = \frac{6+9}{2} = \frac{15}{2}$

$y = \frac{y_1+y_2}{2} = \frac{1+4}{2} = \frac{5}{2}$

BD → diagonal → O(x, y)

$x = \left(\frac{8+k}{2}\right)$, $y = \left(\frac{2+p}{2}\right)$

Diagonal bisect each other.

midpoint → $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$$\Rightarrow \frac{8+k}{2} = \frac{15}{2}$$

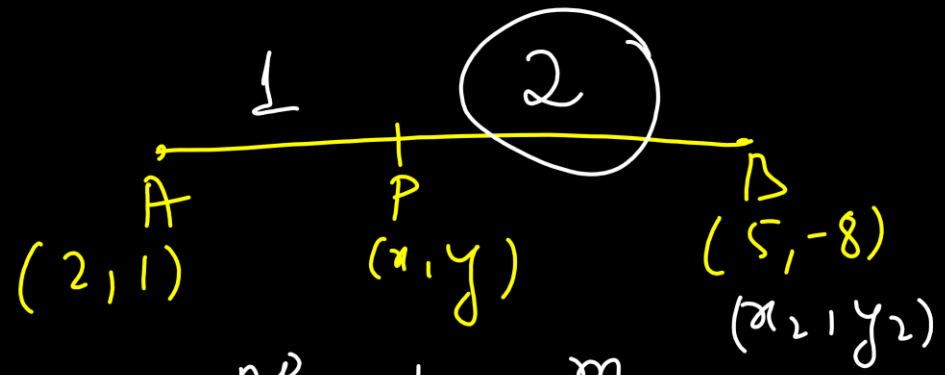
$$8+k = 15 \Rightarrow \boxed{k = 7}$$

$$\Rightarrow \frac{2+p}{2} = \frac{5}{2} \Rightarrow 2+p = 5$$

$$\boxed{p = 3}$$

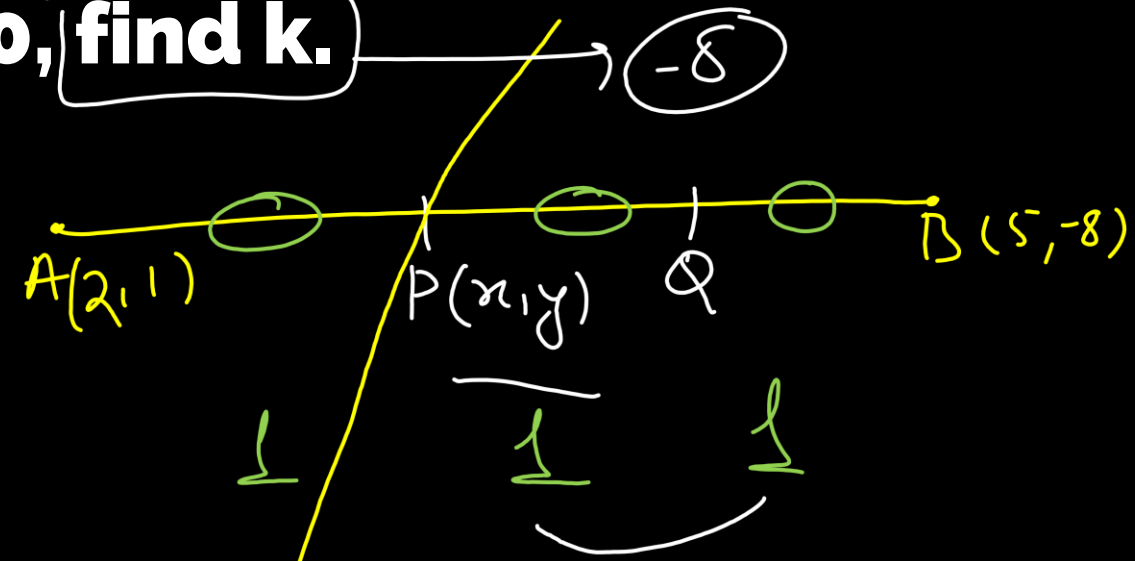
$$D(k,p) = \boxed{D(7,3)}$$

Q. The line joining the points (2, 1) and (5, -8) is trisected at the points P and Q. If the point P lies on the line 2x – y + k = 0, find k.



$$\frac{AP}{BP} = \frac{1}{2} = \frac{m}{n}$$

$$m = 1, \quad n = 2$$



$$x = \frac{mx_2 + nx_1}{m+n} = \frac{(1)(5)+2(2)}{1+2} = \frac{9}{3} = 3$$

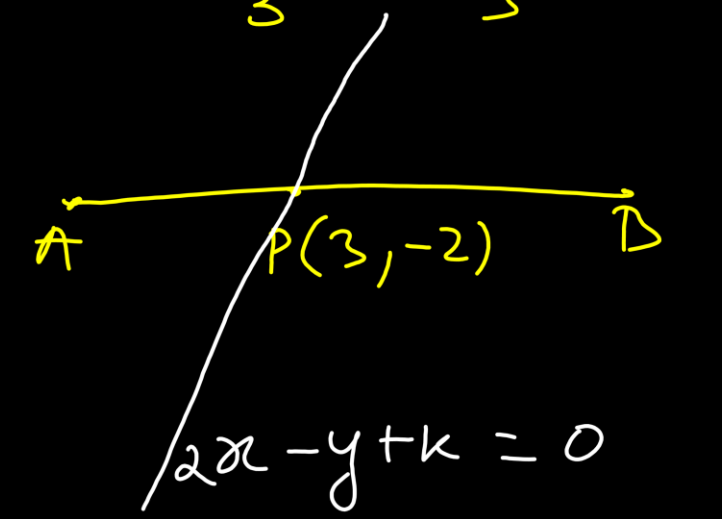
$$y = \frac{my_2 + ny_1}{m+n} = \frac{(1)(-8) + (2)(1)}{1+2} = \frac{-8+2}{3} = \frac{-6}{3} = -2$$

$$2(3) - (-2) + k = 0$$

$$6 + 2 + k = 0$$

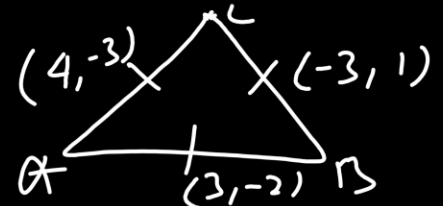
$$8 + k = 0$$

$$\boxed{K = -8}$$



Homework

1. If the coordinates of the midpoints of the sides of a triangle be (3, - 2), (-3, 1) and (4, -3), then find the coordinates of its vertices.



2. Determine the ratio in which the straight line x – y – 2 =0, divides the line segment joining (3, – 1) and (8, 9)

3. If the point P(2,2) is equidistant from the points A(–2,k) and B(–2k,–3), find k. Also, find the length of AP.

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