UDAAN 2024

– FOR CLASS 10th STUDENTS

Lecture No.- 04

- Subject Name- Mathematics
- Chapter Name- Coordinate Geometry

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Topic to be Covered

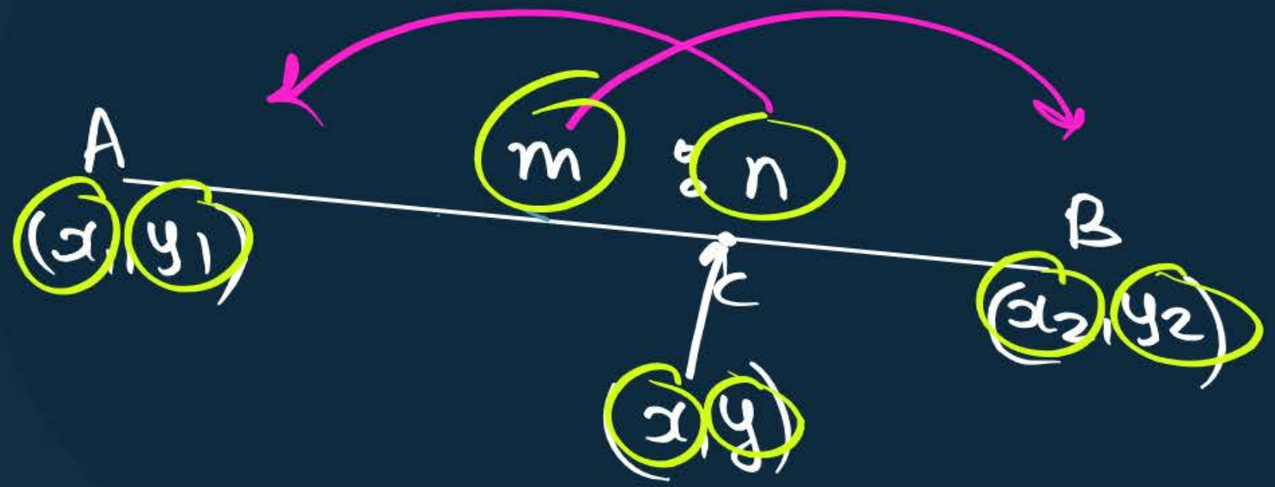
Topic Most important questions on section formula.

Topic Most important questions on mid point formula.

Recap of Previous Lecture

Topic Section formula

Topic Mid point formula



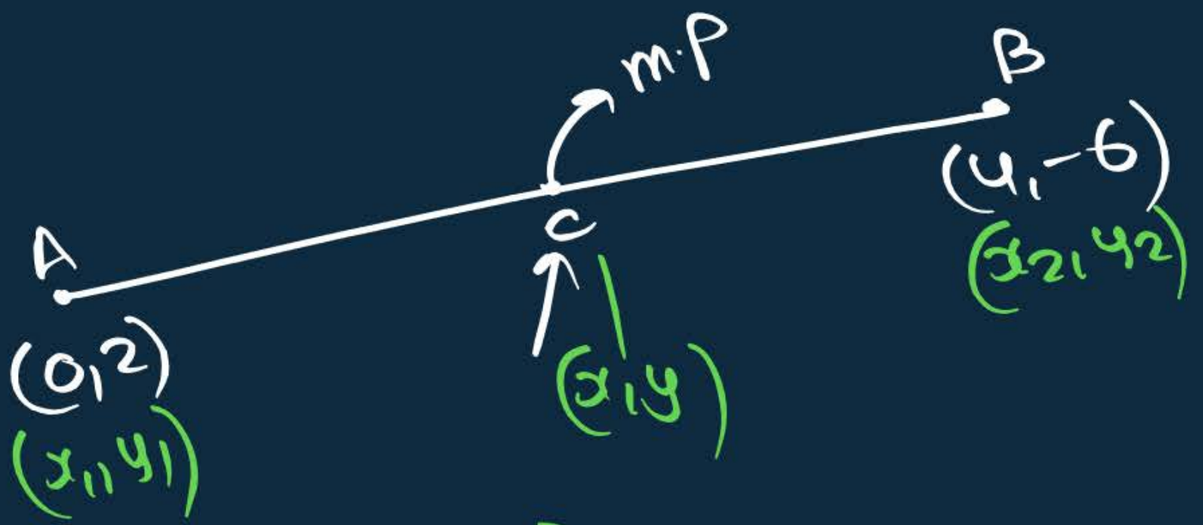
$$x = \frac{mx_2 + nx_1}{m+n}$$

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

If C is mid-point...

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

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



$$C = \left(\frac{4+0}{2}, \frac{2+-6}{2}\right)$$

$$\boxed{C = (2, -2)}$$

Topic : Section Formulae

#Q. Find the ratio in which the points P(3/4, 5/12) divides the line segments joining the points A(1/2, 3/2) and B(2, –5). [CBSE 2015]

A 5 : 1

B 1 : 5

C 2 : 1

D None of these

let the ratio be $k:1$

(x_1, y_1)

$A(1/2, 3/2)$

$m:n$

$k:1$

P

$(3/4, 5/12)$

(x, y)

B

$(2, -5)$

(x_2, y_2)

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

$\frac{3}{4} = \frac{k(2) + 1(\frac{1}{2})}{k+1}$

$\frac{3(k+1)}{4} = 2k + \frac{1}{2}$

$\frac{3k+3}{4} = \frac{4k+1}{2}$

$2(3k+3) = 4(4k+1)$

$6k+6 = 16k+4$

$2 = 10k$

$\frac{1}{5} = k$

ratio $\rightarrow k:1$

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

$= 1:5$

Topic : Section Formulae

#Q. In what ratio does the points (–4, 6) divide the line segment joining the points A(–6, 10) and B(3, –8)? [NCERT, CBSE 2017]

(P)

A 2 : 7

B 7 : 2

C 3 : 5

D None of these

Let the ratio be k:1

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

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

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

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

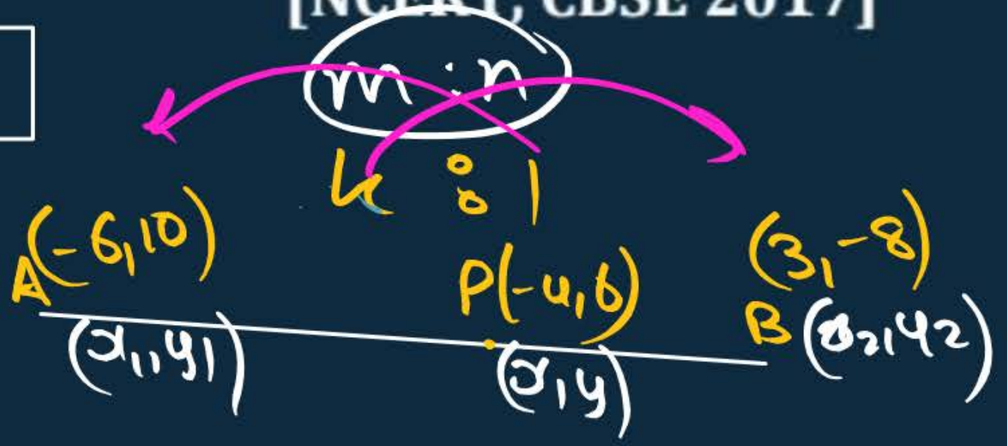
$-7k = -6+4$

$-7k = -2$

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

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

$\Rightarrow 2:7$



#Q. Find the ratio in which P(4, m) divides the line segment joining the points A(2, 3) and B(6, –3). Hence, find m.

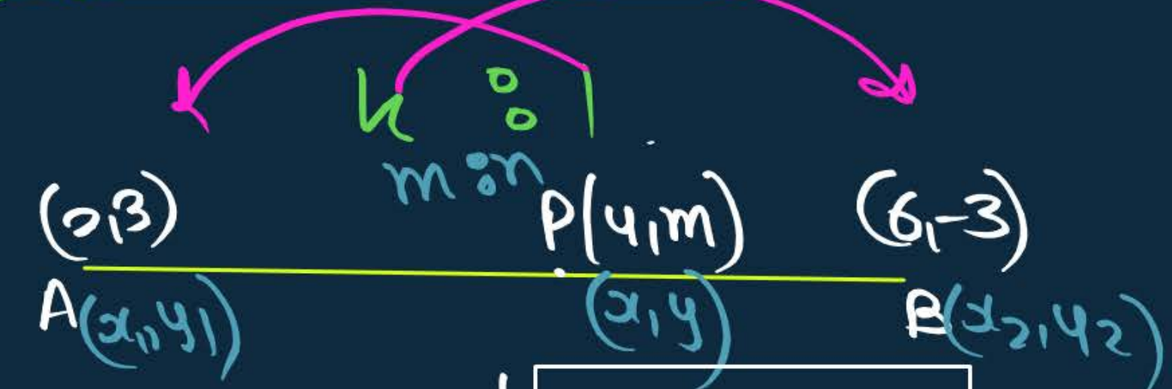
A 1 : 1 and m = 0

B 1 : 2 and m = 1

C 1 : 3 and m = 3

D None of these

let the ratio be k:1



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

$4 = \frac{6k+2}{k+1}$

$4k+4 = 6k+2$

$2 = 2k$

$1 = k$

Ratio = k:1 = 1:1

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

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

$m = \frac{-3+3}{1+1}$

$m = 0$

Topic : Section Formulae

#Q. Find the ratio in which the y-axis divides the line segment joining the points (5, –6) and (–1, –4). Also, find the coordinates of the point of division. [CBSE, 2010, 2016]

A $2:5$ and $\left(1, \frac{-13}{3}\right)$

B $6:1$ and $\left(0, \frac{-15}{3}\right)$

C $5:1$ and $\left(0, \frac{-13}{3}\right)$

D None of these

let → k : 1

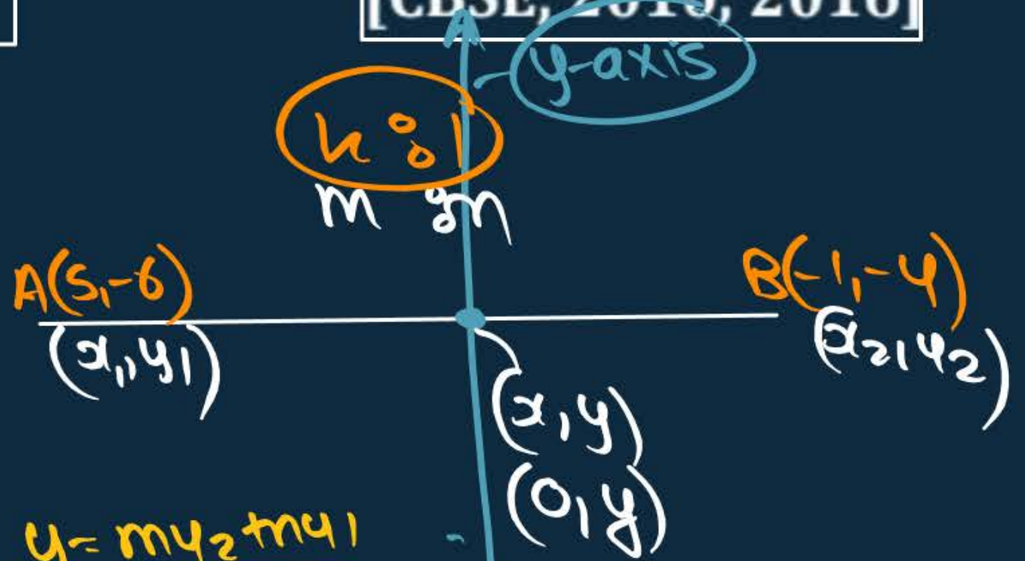
$x = \frac{mx_2 + nx_1}{m+n}$

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

$0 = -k+5$

$k = 5$

∴ Ratio = 5 : 1



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

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

$y = \frac{-20-6}{6} = \frac{-26}{6} = \frac{-13}{3}$

Topic : Section Formulae

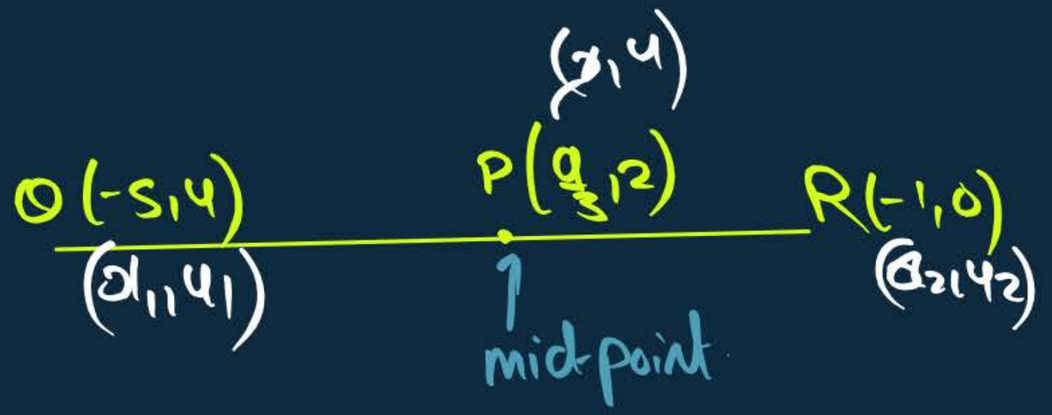
#Q. Find the value of a, for which points $\left(\frac{a}{3}, 2\right)$ is the mid points of the line segment joining the points Q(–5, 4) and R(–1, 0). [CBSE SQP, 2018]

A a = 9

B a = 7

C a = –9

D None of these



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

$\frac{a}{3} = \frac{-1-5}{2}$

$a = \frac{-18}{2}$

$a = -9$

Topic : Section Formulae

#Q. If P (9a – 2, –b) divides the line segment joining A(3a + 1, – 3) and B(8a, 5) in the ratio 3 : 1, find the values of a and b. [NCERT Exemplar]

A a = 1, b = –3

B a = 1, b = 3

C a = –1, b = –3

D None of these

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

$9a - 2 = \frac{2(4a) + (3a+1)}{4}$

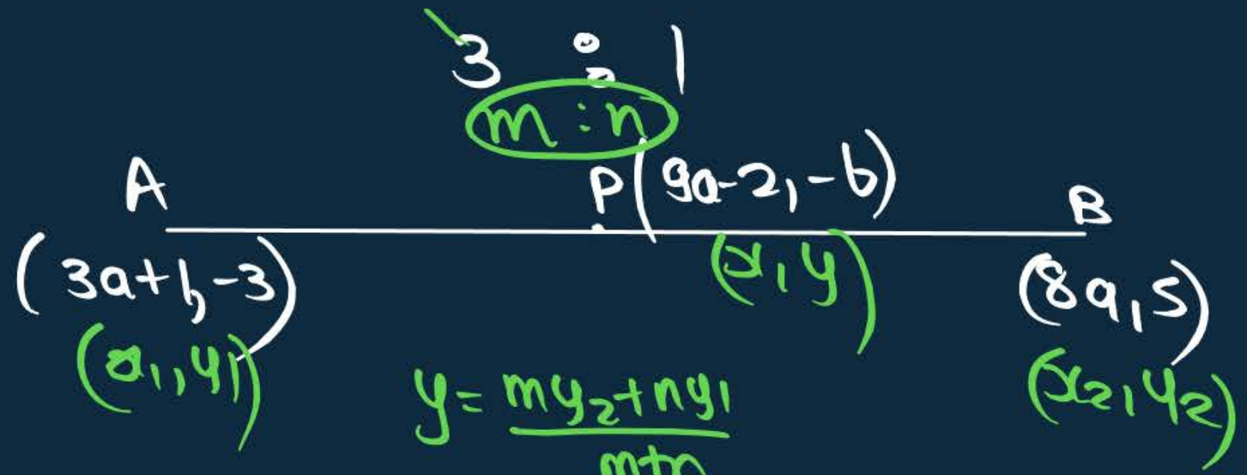
$4(9a-2) = 2(4a) + 3a + 1$

$36a - 8 = 8a + 3a + 1$

$36a - 27a = 9$

$9a = 9$

$a = 1$



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

$-b = \frac{15 + -3}{4}$

$-b = \frac{12}{4}$

$-b = 3$

$b = -3$

Topic : Section Formulae

#Q. If (a, b) is the mid-point of the line segment joining the points A(10, –6), B(k, 4) and a – 2b = 18, find the value of k. [NCERT Exemplar]

A k = 23

B k = 22

C k = 24

D None of these

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

$a = \frac{k+10}{2}$, $b = \frac{4+-6}{2}$

Put a = 16

$16 = \frac{k+10}{2}$

$32 = k+10$

$22 = k$

$b = \frac{-2}{2}$

$\boxed{b = -1}$

$a - 2b = 18$

$a - 2(-1) = 18$

$a + 2 = 18$

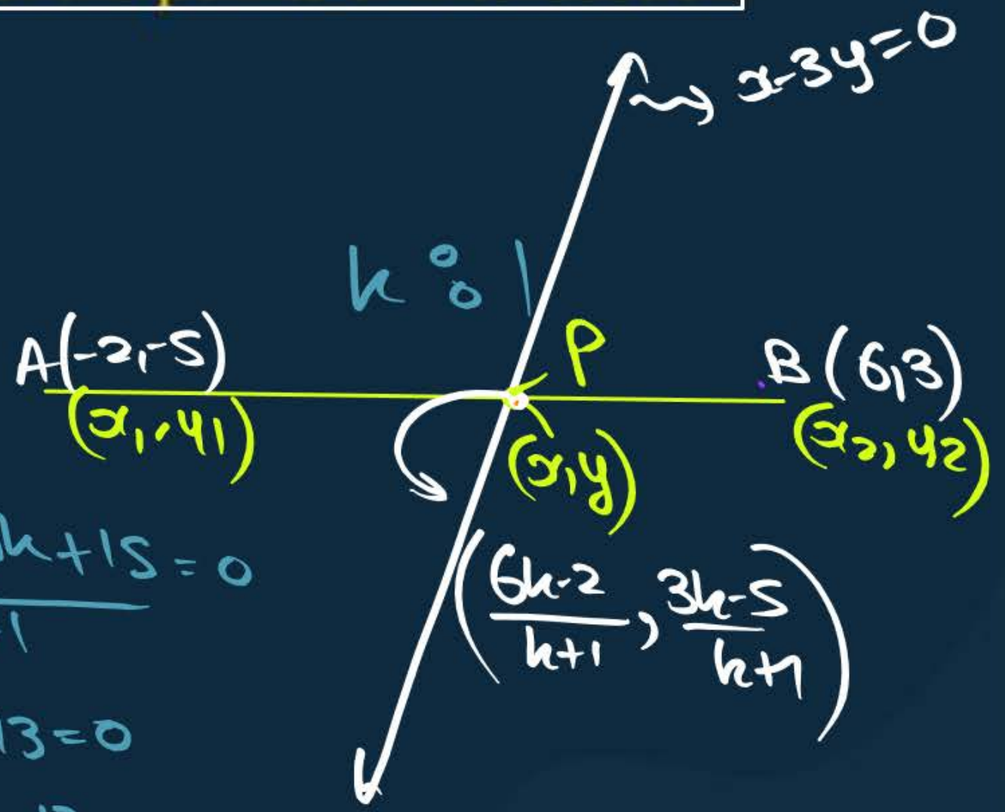
$\boxed{a = 16}$

#Q. Find the ratio in which the line $x - 3y = 0$ divides the line segment joining the points $(-2, -5)$ and $(6, 3)$. Find the coordinates of the points of intersection.

Let the ratio be $k : 1$

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

$$x = \frac{6k - 2}{k+1} \qquad y = \frac{3k - 5}{k+1}$$



Since (x, y) lie on the line $x - 3y = 0$

$\therefore$ it will satisfy the eqn of the line.

$$\frac{6k-2}{k+1} - 3\left(\frac{3k-5}{k+1}\right) = 0$$

$$\frac{6k - 2 - 9k + 15}{k+1} = 0$$

$$-3k + 13 = 0$$

$$-3k = -13$$

$$k = \frac{13}{3}$$

$\hookrightarrow$ Ratio $= 13 : 3$

$$\left(\frac{6k-2}{k+1}, \frac{3k-5}{k+1}\right)$$

Put $k = \frac{\sqrt{3}}{3}$

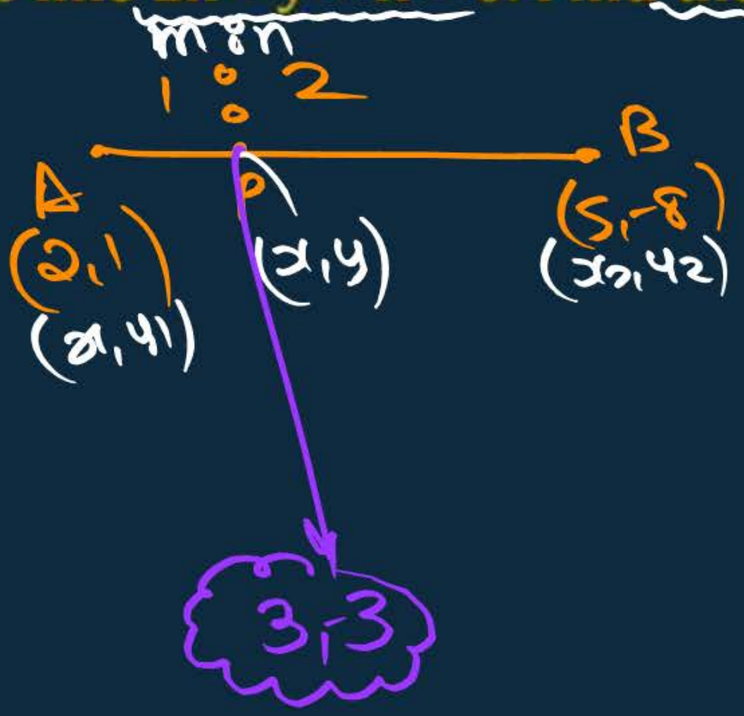
#Q. The line joining the points (2, 1) and (5, –8) is trisected at he point P and Q. If points P lies on the line $2x - y + k = 0$. Find the value of k. [CBSE 2005]

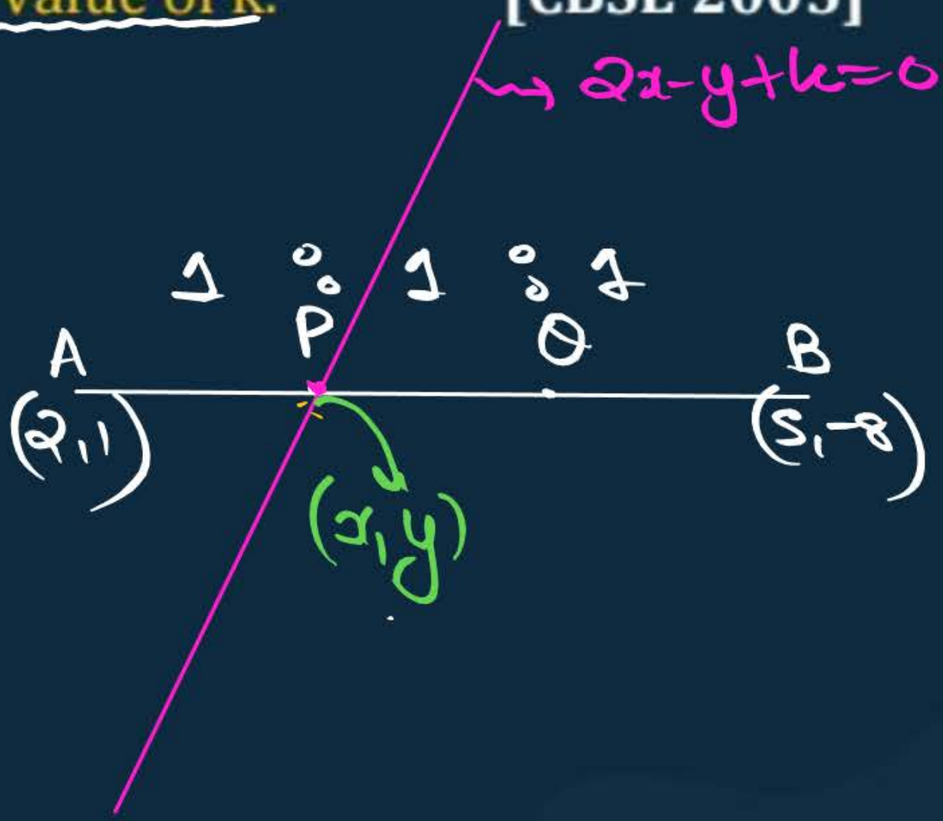
$$x = \frac{mx_2 + nx_1}{m+n}$$

$$x = \frac{5+1}{3} = 3$$

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

$$y = \frac{-8+2}{3} = -2$$





$P(3,-3)$

$2x - y + k = 0$

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

$6 + 2 + k = 0$

$8 + k = 0$

$k = -8$

#Q. If $\left(1, \frac{p}{3}\right)$ is the mid points of the line segment joining the points (2, 0) and $\left(0, \frac{2}{9}\right)$ then show that the lines $5x + 3y + 2 = 0$ passes through the points $(-1, 3p)$.

[CBSE SQP, 2017]

$= -1, 3\left(\frac{1}{3}\right)$

$= (-1, 1)$

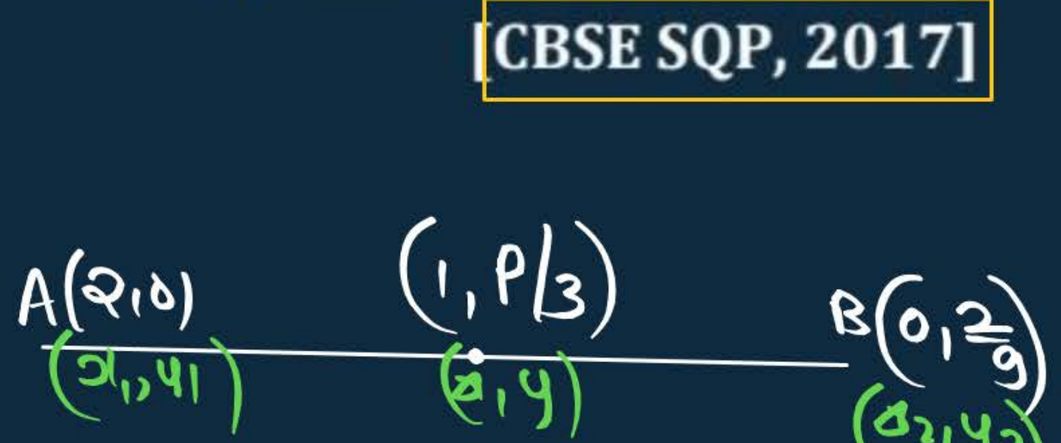
$5x+3y+2=0$

$5(-1)+3(1)+2=0$

$-5+3+2=0$

$0=0$

After putting $(-1, 1)$ in the eqn, the eqn gets satisfied. ∴ $5x+3y+2$ will pass through $(-1, 3p)$.



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

$\frac{p}{3} = \frac{\frac{2}{9}+0}{2}$

$\frac{p}{3} = \frac{2}{9} \times \frac{1}{2}$

$\frac{p}{3} = \frac{2}{18}$

$p = \frac{2}{18} \times 3$

$p = \frac{1}{3}$

Topic : Section Formulae

#Q. If A and B are two points having coordinates (–2, –2) and (2, –4) respectively, find the coordinates of P such that $AP = \frac{3}{7}AB$.

[NCERT, CBSE 2008, 2009]

A $\left(\frac{-2}{7}, \frac{-20}{7}\right)$

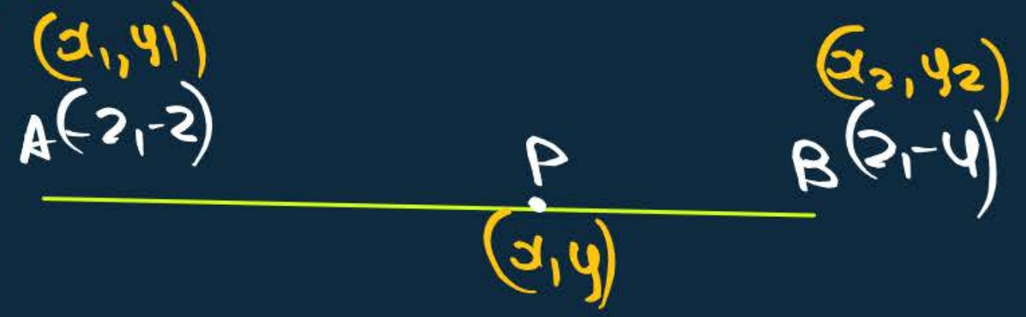
B $\left(\frac{-2}{14}, \frac{-20}{14}\right)$

C $\left(\frac{-3}{7}, \frac{-300}{7}\right)$

D None of these

ratio = $\frac{AP}{PB}$

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



$\frac{AP}{AP+PB} = \frac{3}{7}$

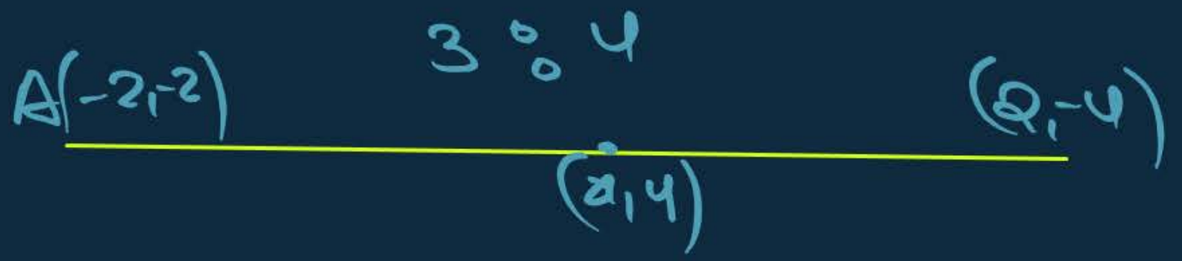
$7AP = 3AP + 3PB$

$4AP = 3PB$

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

$$x = \frac{6t - 8}{7}, \quad y = \frac{-12t - 8}{7}$$

$$x = \frac{-2}{7}, \quad y = \frac{-20}{7}$$



Topic : Section Formulae

#Q. If A(–1, 3), B(1, –1) and C(5, 1) are the vertices of a triangles ABC, find the length of the median through A.

A $\sqrt{43}$ units

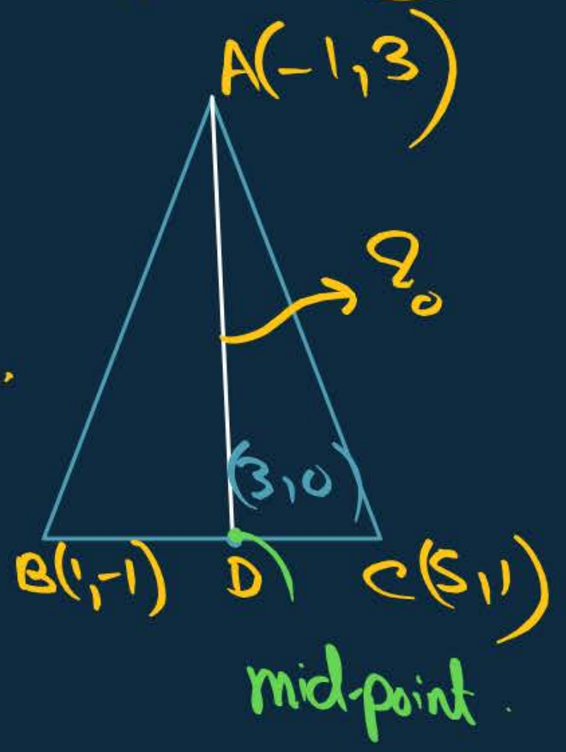
B $\sqrt{41}$ units

C $\sqrt{45}$ units

D None of these

$D(x,y) = D\left(\frac{1+5}{2}, \frac{-1+1}{2}\right)$

$D(x,y) = D(3,0)$



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

$AD = \sqrt{(-1-3)^2+(3-0)^2}$

$AD = \sqrt{16+9}$

$AD = 5$ units

Topic : Section Formulae

#Q. A point P divides the line segment joining the point A(3, –5) and B(–4, 8) such that $\frac{AP}{PB} = \frac{k}{1}$. If P lies o the line x + y = 0, then find the value of k. **[CBSE 2012]**

H.W

#Q. A (4, 2), B(6, 5) and C(1, 4) are the vertices of ΔABC.

(i) The median from A meets BC in D. Find the coordinates of the points D.

(ii) Find the coordinates of point P on AD such that AP : PD = 2 : 1.

(iii) Find the coordinates of the points Q and R on medians BE and CF respectively such that BQ : QE = 2 : 1 and CR : RF = 2 : 1.

(iv) What do you observe?

[NCERT, CBSE, 2009, 10]

H·w


THANK
YOU