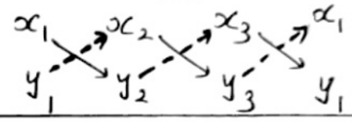
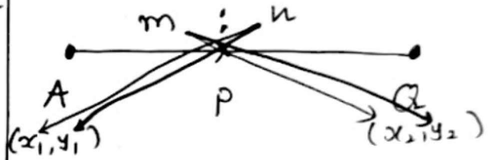
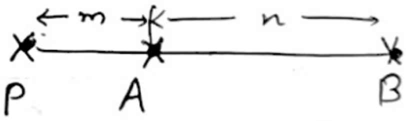
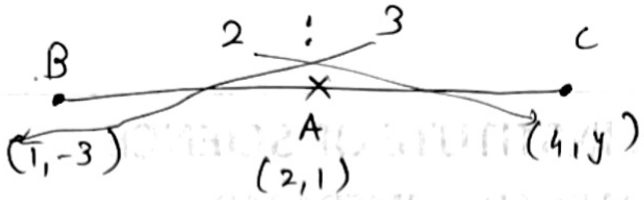
No.	Title	Known / Given	Formula / Equation
1.	To find distance between two points	2-points are given (say) $A(x_1, y_1)$, $B(x_2, y_2)$	$AB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
2.	Area of Triangle	3-points are given (say) $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$	Area of ΔABC $= \frac{1}{2}\left[(x_1 y_2 - x_2 y_1) + (x_2 y_3 - x_3 y_2) + (x_3 y_1 - x_1 y_3)\right]$ $\boxed{OR}$ 
3.	Internal Division of Line Segment (To determine the co-ordinates of a point of division)	2-points are given (say) $A(x_1, y_1)$, $B(x_2, y_2)$	 Co-ordinates of P are $\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$ $m+n \neq 0$
4.	External Division of Line Segment (To determine the co-ordinates of a point of division)	2-points are given (say) $A(x_1, y_1)$, $B(x_2, y_2)$	 Co-ordinates of P are $\left(\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right)$ $m-n \neq 0$

N
2022
Q-3
(A)(ii)



$$\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right) = (2,1)$$

$$\therefore \left(\frac{2(4)+3(1)}{2+3}, \frac{2(y)+3(-3)}{2+3}\right) = (2,1)$$

$$\therefore \frac{2y-9}{5} = 1$$

$$\therefore 2y - 9 = 5$$

$$\therefore 2y = 14$$

$$\therefore \boxed{y = 7}$$

D
2018
Q-3
(A) (i)

$$\begin{matrix} 4 & & 3 & & 3 & & 4 \\ & \searrow & & \searrow & & \searrow & \\ 4 & & -2 & & -16 & & 4 \end{matrix}$$

$$= \frac{1}{2}\left[\left(4(-2) - 3(4)\right) + \left(3(-16) - 3(-2)\right) + \left(3(4) - 4(-16)\right)\right]$$

$$= \frac{1}{2}\left[\overset{-2}{\cancel{-8}} \cancel{-12} - 48 + \cancel{6} + \cancel{12} + 64\right]$$

$$= \frac{1}{2}[14] = 7$$

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

(B)

(ii) Let the co-ordinates (6, 6), (2, 3) and (4, 7) denoted by A, B and C respectively.

we know that

$$AB = \sqrt{(6-2)^2+(6-3)^2} = \sqrt{16+9} = \sqrt{25} = 5$$

$$BC = \sqrt{(2-4)^2+(3-7)^2} = \sqrt{4+16} = \sqrt{20}$$

$$AC = \sqrt{(6-4)^2+(6-7)^2} = \sqrt{4+1} = \sqrt{5}$$

It is easy to see that,

$$AB^2 = 25 \quad , \quad AC^2 + BC^2 = 20 + 5 = 25$$

Thus, $AB^2 = AC^2 + BC^2$

(2) (i) Let $\underset{A}{(-1,1)}, \ \underset{B}{(3,-2)}, \ \underset{C}{(-5,4)}$

$$\left.\begin{aligned} AB &= \sqrt{(-1-3)^2 + (1+2)^2} = \sqrt{16+9} = \sqrt{25} = 5 \\ BC &= \sqrt{(3+5)^2 + (-2-4)^2} = \sqrt{64+36} = \sqrt{100} = 10 \end{aligned}\right\} - *$$

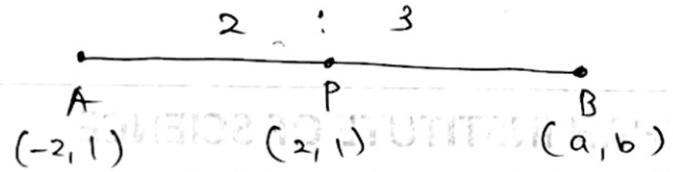
$$AC = \sqrt{(-1+5)^2 + (1-4)^2} = \sqrt{16+9} = \sqrt{25} = 5$$

It is clear that,

$$BC = AB + AC \quad (\because *)$$

$\therefore$ The given three points are collinear.

(ii)



$$\left(\frac{2a + 3(-2)}{2+3}, \frac{2b + 3(1)}{2+3} \right) = (2, 1)$$

$$\therefore \frac{2a-6}{5} = 2 \quad \text{and} \quad \frac{2b+3}{5} = 1$$

$\therefore 2b + 3 = 5$

$\therefore 2a - 6 = 10$

$\therefore 2b = 5 - 3$

$\therefore \cancel{2}a = \cancel{16}\,8$

$\therefore \cancel{2}b = \cancel{2}$

$\therefore \boxed{a = 8}$

$\therefore \boxed{b = 1}$

$\therefore$ The co-ordinates of B are $(8, 1)$.

No.	Title	Known/Given	Formula/Equation
1.	To find the slope of line	2-points $A(x_1, y_1)$, $B(x_2, y_2)$	$m = \frac{y_2 - y_1}{x_2 - x_1}$
2.	To find angle between two lines	Slopes or points of two lines	$\tan \alpha = \left\lvert \frac{m_1 - m_2}{1 + m_1 . m_2} \right\rvert$
3.	Point-slope form of the equation à line	point + slope (say) (x_1, y_1) & m	$y - y_1 = m(x - x_1)$
4.	Slope-intercept form of line	Slope & intercept (say) m & c	$y = mx + c$
5.	Two-point form of line	2 points (say) (x_1, y_1), (x_2, y_2)	$\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$
6.	Intercept form of line with co-ordinate axis	2 intercept (say) 'a' & 'b'	$\frac{x}{a} + \frac{y}{b} = 1$

Note:

1. "Two lines are parallel $\Leftrightarrow$ their slopes are equal."
2. "Two lines are perpendicular to each other $\Leftrightarrow$ The product of the slopes is -1.