If the points $A(4,3)$ and $B(x,5)$ are on the circle with centre $O(2,3)$, then the value of x is

(a) 0 (b) 1

(c) 2 (d) 3

Since, A and B lie on the circle having centre O.

$$OA = OB$$

$$\sqrt{(4-2)^2+(3-3)^2} = \sqrt{(x-2)^2+(5-3)^2}$$

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

$$4 = (x-2)^2+4$$

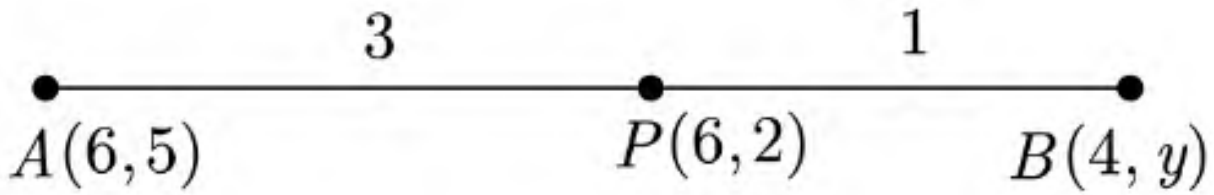
$$(x-2)^2 = 0 \Rightarrow x = 2$$

Thus (c) is correct option.

If the point P (6, 2) divides the line segment joining $A(6, 5)$ and $B(4, y)$ in the ratio 3:1 then the value of y is

(a) 4 (b) 3

(c) 2 (d) 1



Here, $x_1 = 6,\ y_1 = 5$

and $x_2 = 4\ \ y_2 = y$

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

$$2 = \frac{3 \times y + 1 \times 5}{3+1}$$

$$2 = \frac{3y+5}{4}$$

$$3y + 5 = 8$$

$$3y = 8 - 5 = 3 \Rightarrow y = 1$$

Thus (d) is correct option.

The ratio in which the point $(2, y)$ divides the join of $(-4, 3)$ and $(6, 3)$, hence the value of y is

(a) $2:3, y = 3$

(b) $3:2, y = 4$

(c) $3:2, y = 3$

(d) $3:2, y = 2$

Let the required ratio be $k:1$

Then, $$2 = \frac{6k - 4(1)}{k+1}$$

or $$k = \frac{3}{2}$$

The required ratio is $\frac{3}{2}:1$ or $3:2$

Also, $$y = \frac{3(3) + 2(3)}{3+2} = 3$$

Thus (c) is correct option.

C is the mid-point of PQ, if P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$, then x and y respectively are

(a) -6 and 1

(b) -6 and 2

(c) 6 and -1

(d) 6 and -2

Since, $C(y, -1)$ is the mid-point of $P(4, x)$ and $Q(-2, 4)$.

We have, $\frac{4-2}{2} = y \Rightarrow y = 1$

and $\frac{4+x}{2} = -1 \Rightarrow x = -6$

Thus (a) is correct option.

QUESTION

Find the coordinates of a point A on y-axis, at a distance of 4 units from x-axis and below it.

Because the point is 4 units down the x-axis i.e., co-ordinate is -4 and on y-axis abscissa is 0. So, the coordinates of point A is $(0, -4)$.

Find the distance between the points $(a\cos\theta + b\sin\theta,\ \ 0)$, and $(0,\ \ a\sin\theta - b\cos\theta)$?

We have $x_1 = a\cos\theta + b\sin\theta$ and $y_1 = 0$

and $x_2 = 0$ and $y_2 = a\sin\theta - b\cos\theta$

$$\begin{aligned} d^2 &= (x_2 - x_1)^2 + (y_2 - y_1)^2 \\ &= (0 - a\cos\theta - b\sin\theta)^2 + (a\sin\theta - b\cos\theta - 0)^2 \\ &= (-1)^2(a\cos\theta + b\sin\theta)^2 + (a\sin\theta - b\cos\theta)^2 \\ &= a^2\cos^2\theta + b^2\sin^2\theta + 2ab\cos\theta\sin\theta + \\ &\quad + a^2\sin^2\theta + b^2\cos^2\theta - 2ab\sin\theta\cos\theta \\ &= a^2(\sin^2\theta + \cos^2\theta) + b^2(\sin^2\theta + \cos^2\theta) \\ &= a^2 \times 1 + b^2 \times 1 = a^2 + b^2 \end{aligned}$$

Thus $d^2 = a^2 + b^2$

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

The ordinate of a point A on y-axis is 5 and B has co-ordinates $(-3, 1)$. Find the length of AB.

We have $A(0,5)$ and $B(-3,1)$.

Distance between A and B

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

$$= \sqrt{(-3-0)^2 + (1-5)^2}$$

$$= \sqrt{9+16} = \sqrt{25} = 5$$

If three points $(0, 0)$, $(3, \sqrt{3})$ and $(3, \lambda)$ form an equilateral triangle, then what is the value of λ?

Let the given points are $A(0,0)$, $B(3,\sqrt{3})$ and $C(3,\lambda)$.
Since, ΔABC is an equilateral triangle, therefore

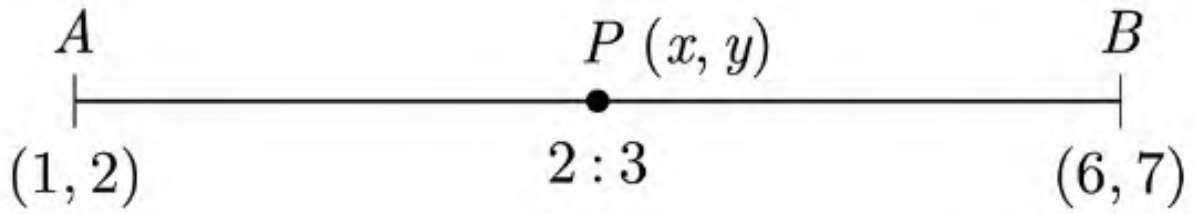
$$AB = AC$$

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

$$9+3 = 9+\lambda^2$$

$$\lambda^2 = 3 \Rightarrow \lambda = \pm\sqrt{3}$$

Find the co-ordinate of a point P on the line segment joining $A(1,2)$ and $B(6,7)$ such that $AP = \frac{2}{5}AB$.



We have $AP = \frac{2}{5}AB \Rightarrow AP:PB = 2:3$

Section formula :

$$x = \frac{mx_2 + nx_1}{m+n} \text{ and } y = \frac{my_2 + nx_1}{m+n}$$

Applying section formula we get

$$x = \frac{2 \times 6 + 3 \times 1}{2+3} = \frac{12+3}{5} = 3$$

and $$y = \frac{2 \times 7 + 3 \times 2}{2+3} = \frac{14+6}{5} = 4$$

Thus $$P(x, y) = (3, 4)$$

If $A(-2,1)$, $B(a,0)$, $C(4,b)$ and $D(1,2)$ are the vertices of a parallelogram $ABCD$, find the values of a and b. Hence find the lengths of its sides.

$$\left(\frac{a+1}{2}, \frac{2}{2}\right) = \left(\frac{-2+4}{2}, \frac{b+1}{2}\right)$$

$$\frac{a+1}{2} = 1 \Rightarrow a = 1$$

and $$\frac{b+1}{2} = 1 \Rightarrow b = 1$$

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

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

$$= \sqrt{9+1} = \sqrt{10} \text{ unit}$$

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

$$= \sqrt{(4-1)^2 + (1-0)^2}$$

$$= \sqrt{9+1} = \sqrt{10} \text{ unit}$$

Since $ABCD$ is a parallelogram,