Practice Questions - Term I

Date: 15/11/2021

Subject: Mathematics

Topic : Coordinate Geometry | Class: X

1. Find the point (x,y) that divides the join of A(3,6) and B(7,10) in the ratio 3:1

   - **A.** (8,9).
   - **B.** (4,5)
   - **C.** (6,9) ✔
   - **D.** None of these

If (x,y) divides the join of A(x_1, y_1) and (x_2, y_2) in the ratio m:n

Then, x = $\frac{mx_2+nx_1}{m+n}$ and y = $\frac{my_2+ny_1}{m+n}$

Here, $x_1 = 3$, $x_2 = 7$, $y_1 = 6$, $y_2 = 10$, m = 3 and n = 1.

x = $\frac{3\times7+1\times3}{3+1}$ and y = $\frac{3\times10+1\times6}{3+1}$

x = 6 and y = 9

Therefore the point is (6,9)

2. 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

Given points are P(4, x), Q(-2, 4) and mid-point is C(y-1)

$\because$ Mid point (x, y) of the line joining the points (x_1, y_1) and (x_2, y_2) is x = $(\frac{x_2+x_1}{2})$ and y = $(\frac{y_2+y_1}{2})$

$\therefore \frac{4-2}{2} = y \ \ and \ \ \frac{4+x}{2} = -1$

$\Rightarrow y = 1 \ and \ x = -6$

3. Find the point that divides A(2, 4) and B(6, 8) in the ratio a : 1.

A. $(\frac{6a+1}{a+1}, \frac{8a+4}{a+1})$

B. $(\frac{6a+2}{a+1}, \frac{8a+4}{a+1})$

C. $(\frac{6+2a}{a+1}, \frac{8+4a}{a+1})$

D. $(\frac{6a+8}{a+1}, \frac{2a+4}{a+1})$

The point, say P(x, y), divides the line AB into the ratio a : 1.

The equation for the point that divides a line segment joining the points (x_1, y_1) *and* (x_2, y_2) in the ratio m : n is: $(\frac{(n\times x_1+m\times x_2)}{m+n}, \frac{n\times y_1+m\times y_2}{m+n})$

Here, $(x_1, y_1) = (2, 4)$ and $(x_2, y_2) = (6, 8)$

Applying the formula, we get $(\frac{(1\times 2+a\times 6)}{a+1}, \frac{(1\times 4+a\times 8)}{a+1})$

$= (\frac{6a+2}{a+1}, \frac{8a+4}{a+1})$

4. If the distance between the points (4, p) and (1, 0) is 5, then p=___

A. ± 4

B. ± 2

C. $\pm 2\sqrt{2}$

D. $\pm 4\sqrt{2}$

Distance between the points = 5

$\sqrt{(4-1)^2 + (p-0)^2} = 5$

$\Rightarrow 9 + p^2 = 25 \Rightarrow p^2 = 16 \therefore p = \pm 4$

5. The distance between the points (5, 5) and (3, 3) is ___.

A. $2\,units$

B. $2\sqrt{2}\,units$

C. $\sqrt{2}\,units$

D. $8\sqrt{2}\,units$

The distance between two points $(x_1, y_1)\ and\ (x_2, y_2)$ is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Distance between points $(5, 5)$ and $(3, 3)$

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

Hence, the distance between the given points is $2\sqrt{2}$ units.

6. The distance of the point (–2, –2) from the origin is __________units.

A. $\sqrt{9}$

B. $2\sqrt{2}$

C. 8

D. $\sqrt{2}$

Let the origin be O and the point A be (-2, -2)

Using distance formula between two points,

$OA^2 = (2^2 + 2^2)$
$\Rightarrow OA^2 = 8$
$\Rightarrow OA = \sqrt{8} = 2\sqrt{2}$

7. P is the point on the y-axis which is equidistant from A(-5,-2) and B(3, 2), then PA = ___ cm.

A. 2

B. 6

C. 3

D. 5

Given, A(-5, -2), B(3, 2).

Let, the coordinates of P be (0, y)

We have,

PA = PB

$\Rightarrow PA^2 = PB^2$

$\Rightarrow (-5-0)^2 + (-2-y)^2 = (3-0)^2 + (2-y)^2$

$\Rightarrow 25 + 4 + y^2 + 4y = 9 + 4 + y^2 - 4y$

$\Rightarrow 8y = -16$

$\Rightarrow y = -2$

Therefore coordinates of P is (0, -2)

$$\begin{aligned} \mathrm{PA} &= \sqrt{(-5-0)^2 + (-2+2)^2} \\ &= \sqrt{25} \\ &= 5\ cm \end{aligned}$$

8. The ratio in which the line segment PQ, where P (-5, 2) and Q (2, 3), is divided by the y-axis is

A. $6 : 5$

B. $3 : 5$

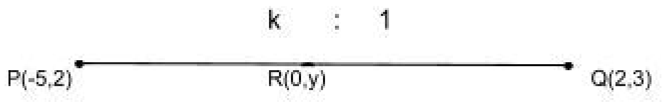
C. $7 : 2$

D. $5 : 2$ ✔

All points on Y-axis can be expressed as (0, y) where y is the y-coordinate of the point.

Therefore, let the point of intersection of Y-axis and line PQ be R(0, y).

Let the ratio in which the line segment PQ is divided by point R be k:1.



Applying section formula, we get

$0 = \frac{2k+1(-5)}{k+1}$

$2k - 5 = 0$

$k = \frac{5}{2}$

$\therefore$ The required ratio is 5 : 2.

9. Determine the ratio in which the graph of the equation 3x + y = 9 divides line segment joining the points A (2,7) and B (1,3).

A. $\frac{4}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. $\frac{3}{4}$

Let P(x, y) be the point which lies on line representing 3x + y = 9 and dividing AB in the ratio k:1

So x = $\frac{k\times1+1\times2}{k+1} = \frac{k+2}{k+1}$

And y = $\frac{k\times3+1\times7}{k+1} = \frac{3k+7}{k+1}$

Thus point P is $(\frac{k+2}{k+1}, \frac{3k+7}{k+1})$

As P lies on 3x + y = 9,

So, $3\frac{k+2}{k+1} + \frac{3k+7}{k+1} = 9$

$\Rightarrow 3k + 6 + 3k + 7 = 9k + 9$

$\Rightarrow 3k = 4$

$\Rightarrow k = \frac{4}{3}$

Thus the required ratio is k : 1, i.e., 4 : 3

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10. If Point P (-4,6) divides the line segment AB with A(-6,10) and B(x,y) in the ratio 3:2, find the co-ordinates of B.

- A. $(\frac{11}{3}, \frac{14}{3})$
- B. $(\frac{8}{3}, \frac{-10}{3})$
- C. $(\frac{-8}{3}, \frac{10}{3})$ ✓
- D. $(\frac{-16}{3}, \frac{8}{3})$

The equation for the point that divides a line segment joining the points (x_1, y_1) and (x_2, y_2) in the ratio m : n is: $(\frac{(n\times x_1+m\times x_2)}{m+n}, \frac{n\times y_1+m\times y_2}{m+n})$

Here,
$(x_1, y_1) = (-6, 10),$
$(x_2, y_2) = (x, y),$
$m : n = 3 : 2$
According to Section Formula:
$(x, y) = (\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n})$
$\Rightarrow (-4, 6) = (\frac{3x+(-12)}{3+2}, \frac{3y+20}{3+2})$
$\Rightarrow -4 = \frac{3x-12}{5} \text{and } 6 = \frac{3y+20}{5}$
$\Rightarrow 3x = -20 + 12 \text{ and } 3y = 30 - 20$
$\Rightarrow x = \frac{-8}{3} \text{and } y = \frac{10}{3}$
$\therefore$ Co-ordinates of B are $(\frac{-8}{3}, \frac{10}{3})$.

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

A. (-2, 0)

B. (2, 0)

C. (-7, 0)

D. (7, 0)

We know that a point on the x-axis is of form (x, 0). Let the point on the x-axis be P(x,0) and the given points are A(2, -5) and B(-2, 9)

Now, PA = $\sqrt{(2-x)^2+(-5-0)^2}$ and

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

Since PA = PB

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

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

$\Rightarrow$ 4 - 4x + x^2 + 25 = 4 + 4x + x^2 + 81

$\Rightarrow$ - 8x = 56

$\Rightarrow$ x = -7

Hence, the required point is (-7, 0)

12. If A (–2, –1), B (a, 0), C (4, b) and D (1, 2) are the vertices of a parallelogram, find the values of a and b.

A. a = 1 and b = 3

B. a = 2 and b = 3

C. a = 1 and b = 1

D. a = 1 and b = 4

We know that the diagonals of a parallelogram bisect each other. Therefore, the coordinates of the mid-point of AC are same as the coordinates of the mid-point of BD.

The coordinates of the mid-point of a line formed by joining two points $(x_1, y_1)\ and\ (x_2, y_2)$ are $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$

Midpoint of AC = $(\frac{-2+4}{2}, \frac{-1+b}{2})$

Midpoint of BD = $(\frac{a+1}{2}, \frac{0+2}{2})$

⇒ $(\frac{-2+4}{2}, \frac{-1+b}{2})$ = $(\frac{a+1}{2}, \frac{0+2}{2})$

⇒ $(1, \frac{b-1}{2}) = (\frac{a+1}{2}, 1)$

⇒ $\frac{a+1}{2}$ = 1 and $\frac{b-1}{2}$ = 1

⇒ a + 1 = 2 and b - 1 = 2

⇒ a = 1 and b = 3

13. If the points A(1, 2), B(4, 3), C(1, 0) and D(p, -1) are the vertices of a parallelogram then, find the value of p.

A. 3

B. -2

C. 4

D. 0

In a parallelogram, the diagonals bisect each other.

So the midpoints of both the diagonals will coincide.

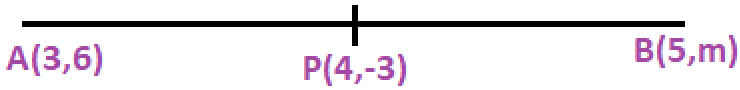
Midpoint of AC = Midpoint of BD

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

$$\Rightarrow (1, 1) = \left(\frac{4+p}{2}, 1\right)$$

$$\Rightarrow 1 = \frac{4+p}{2}$$

$$\Rightarrow p = -2$$

14. 

In the given figure, P is the Midpoint of AB. Find the value of m.

A. - 10

B. - 1

C. - 6

D. - 12

Co-ordinates of P (4,-3) by midpoint theorem,
$\mathrm{P}(x, y)=(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$

Here,
$x_1=3, x_2=5, y_1=6\ \&\ y_2=m$

$\Rightarrow -3=\frac{y_1+y_2}{2}$
$\Rightarrow -3=\frac{6+m}{2}$
$\Rightarrow m+6=-6$
$\therefore m=-12.$

15. The distance between A (1, 3) and B (x, 7) is 5. The value of x if x > 0 is :

A. 4

B. 2

C. 1

D. 3

Given points are A = (1,3) and B = (x, 7)

∵ The distance between two points (x_1, y_1) and (x_2, y_2) is

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

$\Rightarrow AB^2 = (x-1)^2 + (7-3)^2$

Given, distance between A and B is 5 units.

$\Rightarrow 5^2 = (x-1)^2 + 16$

$\Rightarrow 9 = (x-1)^2$

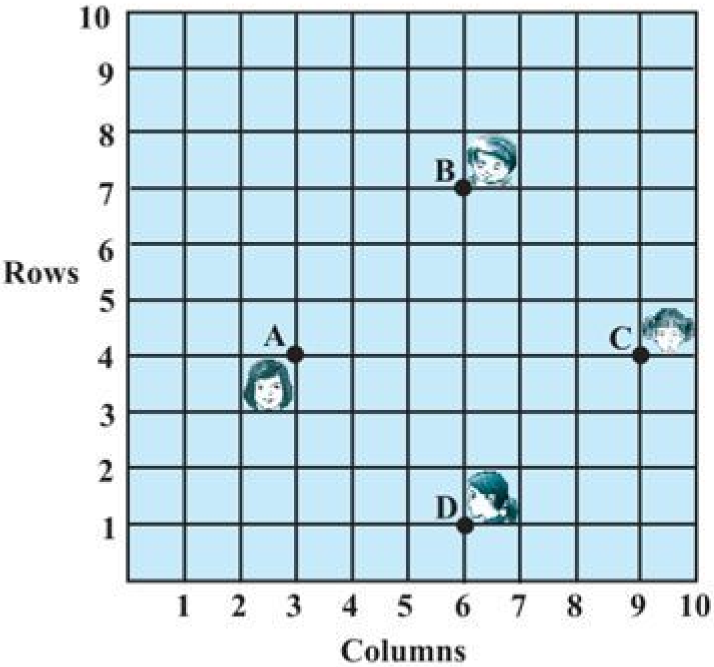
$\Rightarrow x - 1 = \pm 3$

$\Rightarrow x = 4, -2$

Since, x > 0

Therefore, the value of 'x' is 4.

16. In a classroom, 4 friends are seated at the points A, B, C and D as shown in the following figure. The point A(3, 4), B(6, 7), C(9, 4) and D(6, 1) taken in order form the vertices of ________________



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A. Square

B. Rectangle

C. Rhombus

D. Rhombus

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Distance between two points (x_1, y_1) and (x_2, y_2)

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

$AB^2 = (6-3)^2 + (7-4)^2$
= 9 + 9
= 18
AB = $\sqrt{18}$ units

$BC^2 = (9-6)^2 + (4-7)^2$
= 9 + 9
= 18
BC = $\sqrt{18}$ units

$CD^2 = (6-9)^2 + (1-4)^2$
= 9 + 9
= 18
CD = $\sqrt{18}$ units

$DA^2 = (3-6)^2 + (4-1)^2$
= 9 + 9
= 18
DA = $\sqrt{18}$ units

Since all the sides are equal, from the given options we can say that the figure is a square

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17. From the figure, find the ratio in which the line segment joining the points A(3, 4) and C(9, 4) is divided by x = 5.

A. 1:1

B. 2:1

C. 1:2

D. 3:1

Let $O(5, y)$ divide AB in the ratio $k:1$.

By section formula, the coordinates of O are given by: $(\frac{9k+3}{k+1}, \frac{4k+4}{k+1})$

But $O(5, y) = (\frac{9k+3}{k+1}, \frac{4k+4}{k+1}) \Rightarrow \frac{9k+3}{k+1} = 5$

$\Rightarrow 9k + 3$ = 5k+5
$\Rightarrow 4k$ = 2
$\Rightarrow k$ = $\frac{1}{2}$

i.e., the line x = 5 divides AB in the ratio $1:2$.

18. From the figure, the distance between the points A(3, 4) and C(9, 4) is

A. 3

B. 4

C. 5

D. 6

Given A(3,4), C(9,4)
$\because$ Distance between points $(x_1,\ y_1),\ (x_2,\ y_2) is \sqrt{(x_2 - x_1)^2\ +\ (y_2 - y_1)^2}$
$\therefore AB = \sqrt{(9-3)^2 + (4-4)^2} = \sqrt{36+0} =\ 6$

19. Mid-point of the line-segment joining the points A(3, 4) and C(9, 4) is:

A. (3, 6)

B. (4, 3)

C. (6, 4)

D. (4, 6)

Midpoint of the line segment joining (x_1, y_1) and (x_2, y_2) is given by $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

∴ Mid-point of the line-segment joining the points (3, 4) and (9, 4) = $\left(\frac{3+9}{2}, \frac{4+4}{2}\right)$ = (6,4)

20. From the figure, find the ratio in which the line segment joining the points B(6, 7) and D(6, 1) is divided by y = 4.

A. 1:1

B. 1:2

C. 2:1

D. 3:2

Let $P(x, 4)$ divide AB in the ratio $k : 1$.

By section formula, the coordinates of P are given by: $(\frac{6k+6}{k+1}, \frac{k+7}{k+1})$

But $P(x, 4) = (\frac{6k+6}{k+1}, \frac{k+7}{k+1}) \Rightarrow \frac{k+7}{k+1} = 4$

$\Rightarrow k + 7$ = 4k+4

$\Rightarrow 3k$ = 3

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

i.e., the line y = 4 divides AB in the ratio $1 : 1$.