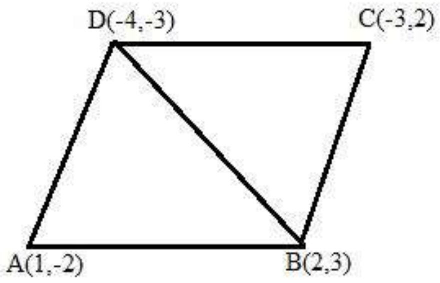
# 10th CBSE Solved Questions on Coordinate Geometry

Q.1 If the points (1,-2), (2,3), (-3,2) , (-4,-3) are the vertices of a parallelogram ABCD. Then taking AB as the base find height of the paralleloeam.




Ans: Let the vertices of the parallelogram be A(1,-2) B(2,3) C(-3,2) and D(-4,-3) .

Join BD to form two triangles ΔABD and ΔBCD.

$$\text{Area of a triangle} = \frac{1}{2}\{x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\}$$

$$Area\ of\ \Delta ABD = \frac{1}{2}[1(3+3) + 2(-3+2) + (-4)(-2-3)]$$

$$= \frac{1}{2}[6 - 2 + 20]$$

$$= \frac{1}{2}[24] = 12 square\ units.$$

$$Area\ of\ \Delta BCD = \frac{1}{2}[2(2+3) + (-3)(-3-3) + (-4)(3-2)]$$

$$= \frac{1}{2}[10 + 18 - 4]$$

$$= \frac{1}{2}[24] = 12 square\ units.$$

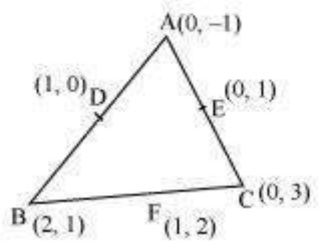
Now,

Area of parallelogram ABCD=Area of ΔABD + Area of ΔBCD=12 + 12 = 24 square units.

A B = $\sqrt{(2-1)^2 + (3+2)^2} = \sqrt{26}$

Height = Area/base = 24/$\sqrt{26}$

Q.2. Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (0, − 1), (2, 1) and (0, 3). Find the ratio of this area to the area of the given triangle.




Answer: Let the vertices of the triangle be A (0, −1), B (2, 1), C (0, 3).

$$D = \left(\frac{0+2}{2}, \frac{-1+1}{2}\right) = (1,0) \qquad E = \left(\frac{0+0}{2}, \frac{3-1}{2}\right) = (0,1) \qquad F = \left(\frac{2+0}{2}, \frac{1+3}{2}\right) = (1$$

$$\text{Area of a triangle} = \frac{1}{2}\{x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\}$$

$$\text{Area of } \Delta DEF = \frac{1}{2}\{1(2-1) + 1(1-0) + 0(0-2)\} \quad = \frac{1}{2}(1+1) = 1 \text{ square units}$$

Let D, E, F be the mid-points of the sides of this triangle. Coordinates of D, E, and F are given by

$$\text{Area of } \Delta ABC = \frac{1}{2}[0(1-3) + 2\{3-(-1)\} + 0(-1-1)] \quad = 4 \text{ square units}$$

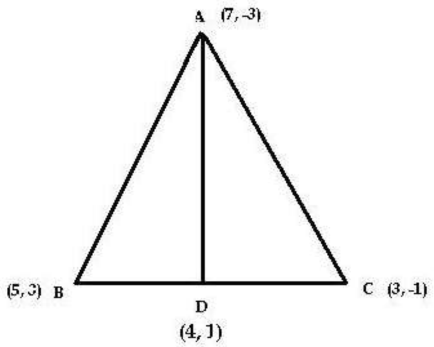
Therefore, required ratio = 1 : 4

Q.3. Find the length of the median ADof the triangle ABC whose vertics are A(7,-3), B(5,3) and C(3,-1) ,where D is mid-point of the side BC

Answer: Since D is the mid point of BC, therefore,

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

$$D=(4,1)$$




Now length of AD can be calculated using the distance formula, i.e.,

$$AD=\sqrt{(4-7)^2+[1-(-3)]^2} \quad =\sqrt{(-3)^2+(4)^2} \qquad AD=5$$

$\therefore$ The length of the median AD $=5$ units

Q.4. find the ratio in which point P(-1,y) lying on the line segment joining points A(-3,10) and B(6,-8) divides it. Also find the value of y.

Solution:

*Let the point* $(-1, y)$ *divides the line segment joining points*

$A(-3,10)$ *and* $B(6,-8)$ *in the ration* $k:1$

*Then, the coordinate of point* $P=\left(\frac{6k-3}{k+1},\frac{-8k+10}{k+1}\right)$

*But, coordinate of point* $P=(-1,y)$ *(given)*

*Thus,* $-1=\frac{6k-3}{k+1} \quad \Rightarrow -k-1=6k-3 \quad \Rightarrow k=\frac{2}{7}$

$$y=\frac{-8k+10}{k+1} \qquad \Rightarrow y=\frac{-8\left(\frac{2}{7}\right)+10}{\frac{2}{7}+1} \qquad \Rightarrow y=6$$

*Hence, the ratio is* $2:7$ *and* $y=6$

Q.5. In what ratio is the line segment jionig A(2,-3) and B(5,6) divided by the x-axis ? Also , find the coordinates of the point of division.

Answer: Let the line passing through the points A(2,-3) and B(5,6) is

$$\frac{(y-6)}{(x-5)}=\frac{9}{3} \quad \Rightarrow 3x-y-9=0$$

Point where x-axis cuts this line can be obtained by putting y = 0

The required point is (3,0)

Now the point divides the line segment AB in the ratio

$$\frac{\sqrt{(5-3)^2+(6-0)^2}}{\sqrt{(2-3)^2+(-3-0)^2}} = \frac{\sqrt{4+36}}{\sqrt{1+9}} = \frac{\sqrt{40}}{\sqrt{10}} = \sqrt{4} = \frac{2}{1}$$

Q.6. line segment joining the points A (3,2) and B (5,1) is divided at the point P in ratio 1:2 and it lies on the line 3x-18y+k=0

Answer: P divides the line segment joining the points A(3,2) and B(5,1) in the ratio 1:2

The coordinates of P can be found put by the section formula

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

Here m : n = 1:2

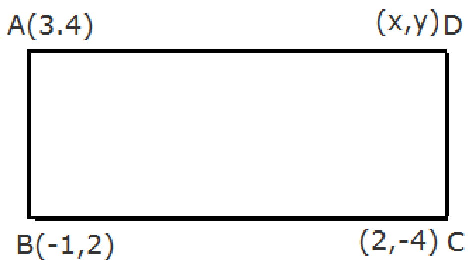
$(x_1, y_1) = (3, 2)$
$(x_2, y_2) = (5, 1)$

Coordinates of P = $\left(\frac{1(5)+2(3)}{1+2}, \frac{1(1)+2(2)}{1+2}\right) = \left(\frac{11}{3}, \frac{5}{3}\right)$

GIven that P lies on the line 3x - 18y + k = 0 $\Rightarrow$ 3(11/3) - 18(5/3) + k = 0 $\Rightarrow$ k = 19

Q.7. What are the co-ordinates of the fourth vertex if three vertices of a rectangle are the points (3,4), (-1,2), (2,-4)

Answer: Point A(3.4), B(-1,2), C(2,-4), D(x,y)
first divide rectangle in such a way that two triangles are formed
so now in triangle BDC we are going to use section formulae
which is x= [m x2+nx1]/ m+n ; y= [my2+ ny1]/ m+n
So since it is a triangle formed by rectangle so ratio is 2:1




$\therefore$ x = $\frac{(1)(2)+(2)(-1)}{1+2}$ $\Rightarrow$ x = $\frac{2-2}{3}$ = 0

y = $\frac{(1 x -4)+(2 x 2)}{3}$ 0

.'.The co – ordinate of point D(0,0)

Q8. Determine the ratio in which the line 2x + y − 4 = 0 divides the line segment joining the points A(2, − 2) and B(3, 7)

Answer: Let the given line divide the line segment joining the points A(2, −2) and B(3, 7) in a ratio *k* : 1.

Coordinates of the point of division = $\left(\frac{3k+2}{k+1}, \frac{7k-2}{k+1}\right)$

This point also lies on $2x + y - 4 = 0$

$$\therefore 2\left(\frac{3k+2}{k+1}\right)+\left(\frac{7k-2}{k+1}\right)-4=0 \qquad \Rightarrow \frac{6k+4+7k-2-4k-4}{k+1}=0 \qquad \Rightarrow 9k-2=0 \qquad \Rightarrow k=\frac{2}{9}$$

Therefore, the ratio in which the line $2x + y - 4 = 0$ divides the line segment joining the points A(2, −2) and B(3, 7) is 2:9

Q.9. Find the centre of a circle passing through the points (6, − 6), (3, − 7) and (3, 3).

Answer : Let O ($x$, $y$) be the centre of the circle. And let the points (6, −6), (3, −7), and (3, 3) be representing the points A, B, and C on the circumference of the circle.

$$\therefore \text{OA}=\sqrt{(x-6)^2+(y+6)^2} \qquad \text{OB}=\sqrt{(x-3)^2+(y+7)^2} \qquad \text{OC}=\sqrt{(x-3)^2+(y-3)^2}$$

However, OA = OB (Radii of the same circle)

$$\Rightarrow \sqrt{(x-6)^2+(y+6)^2}=\sqrt{(x-3)^2+(y+7)^2}$$
$$\Rightarrow x^2+36-12x+y^2+36+12y=x^2+9-6x+y^2+49+14y$$
$$\Rightarrow -6x-2y+14=0 \qquad \Rightarrow 3x+y=7 \qquad \ldots(1)$$

Similarly, OA = OC (Radii of the same circle)

$$\Rightarrow \sqrt{(x-6)^2+(y+6)^2}=\sqrt{(x-3)^2+(y-3)^2}$$
$$\Rightarrow x^2+36-12x+y^2+36+12y=x^2+9-6x+y^2+9-6y$$
$$\Rightarrow -6x+18y+54=0$$
$$\Rightarrow -3x+9y=-27 \qquad \ldots(2)$$

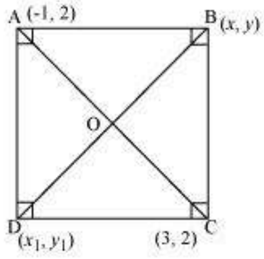
On adding equation (1) and (2), we obtain , $10y = -20 \Rightarrow \quad y = -2$

From equation (1), we obtain , $3x - 2 = 7 \Rightarrow \quad 3x = 9 \Rightarrow \quad x = 3$

Therefore, the centre of the circle is (3, −2)

Q.10. The two opposite vertices of a square are (− 1, 2) and (3, 2). Find the coordinates of the other two vertices.

Answer: Let ABCD be a square having (−1, 2) and (3, 2) as vertices A and C respectively. Let ($x$, $y$), ($x_1$, $y_1$) be the coordinate of vertex B and D respectively.




We know that the sides of a square are equal to each other.

∴ AB = BC

$$\Rightarrow \sqrt{(x+1)^2+(y-2)^2} = \sqrt{(x-3)^2+(y-2)^2}$$

$$\Rightarrow x^2+2x+1+y^2-4y+4 = x^2+9-6x+y^2+4-4y \quad \Rightarrow x=1$$

We know that in a square, all interior angles are of 90°.

In ΔABC,

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

$$\Rightarrow \left(\sqrt{(1+1)^2+(y-2)^2}\right)^2 + \left(\sqrt{(1-3)^2+(y-2)^2}\right)^2 = \left(\sqrt{(3+1)^2+(2-2)^2}\right)^2$$

$\Rightarrow 4 + y^2 + 4 - 4y + 4 + y^2 - 4y + 4 = 16$

$\Rightarrow 2y^2 + 16 - 8y = 16 \Rightarrow 2y^2 - 8y = 0 \Rightarrow y(y - 4) = 0$

$\Rightarrow y = 0$ or $4$

We know that in a square, the diagonals are of equal length and bisect each other at 90°. Let O be the mid-point of AC. Therefore, it will also be the mid-point of BD.

$$\text{Coordinate of point O} = \left(\frac{-1+3}{2}, \frac{2+2}{2}\right) \quad \left(\frac{1+x_1}{2}, \frac{y+y_1}{2}\right) = (1,2) \Rightarrow \frac{1+x_1}{2} = 1$$

$$\Rightarrow 1+x_1 = 2 \Rightarrow x_1 = 1 \quad \text{and} \quad \frac{y+y_1}{2} = 2$$

$y + y_1 = 4$ If $y = 0$, $y_1 = 4$

If $y = 4$, $y_1 = 0$

Therefore, the required coordinates are (1, 0) and (1, 4).

Q.11. The area of the triangle is 5 sq.units,Two of its vertices are (2,1)and (3,-2).T he third vertex lies on y = x + 3.Find the third vertex

$$Area\ of\ \Delta = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$
$$5 = \frac{1}{2}[2(-1 - x - 3) + 3(x + 3 - 1) + x(1 + 1)]$$
$$10 = 2(-x - 4) + 3(x + 2) + 2x$$
$$10 = -2x - 8 + 3x + 6 + 2x$$
$$10 = 3x - 2$$
$$\Rightarrow x = 4$$
$$and\ y = 4 + 3 = 7$$

Therefore, coordinates of third vertex is ( 4, 7)

Q. 12. What is the value of x/a + y/b if the points (a,0) , (0,b) , (x,y) are collinear ?

Answer:

Let A(*a* , 0) , B(0 , *b)* and C(*x* , *y*) are the coordinates of the vertices of ΔABC.

Now the area of ΔABC is given by,

$$ar(\Delta ABC) = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

Now we have,

$$x_1 = a, y_1 = 0; x_2 = 0, y_2 = b; x_3 = x, y_3 = y$$

$$ar(\Delta ABC) = \frac{1}{2}[a(b - y) + 0(y - 0) + x(0 - b)]$$
$$= \frac{1}{2}[ab - ay + 0 - bx]$$
$$= \frac{1}{2}[ab - ay - bx]$$

Since points A(a , 0) , B(0 , b) and C(x , y) are collinear , then ar(ΔABC) = 0

$$so, \frac{1}{2}[ab - ay - bx] = 0$$
$$ab - ay - bx = 0$$
$$-ay - bx = -ab$$
$$ay + bx = ab$$

On dividing both sides by $ab$, we get

$$\frac{y}{b} + \frac{x}{a} = 1$$

$$so, \frac{x}{a} + \frac{y}{b} = 1$$

Q.13: Find the point on the x – axis which is equidistant from point ( 2,-5) AND ( -2, 9 )

Solution:

Let ( *x* , 0) be the point on *x* -axis which is equidistant from (2, - 5) and (- 2, 9)

therefore, by using distance formula,

$$\sqrt{(x-2)^2+(0+5)^2} = \sqrt{(x+2)^2+(0-9)^2} \quad \Rightarrow \sqrt{x^2+4-4x+25} = \sqrt{x^2+4x+4+81}$$

$$\Rightarrow \sqrt{x^2-4x+29} = \sqrt{x^2+4x+85} \quad \Rightarrow x^2-4x+29 = x^2+4x+85$$

$$\Rightarrow -4x-4x = 85-29 \quad \Rightarrow -8x = 56 \quad \Rightarrow x = \frac{-56}{8} \quad \Rightarrow x = -7$$

Thus, (-7, 0) be the point on *x* -axis which is equidistant from (2, -5) and (-2, 9).

Q.14. Find the value of k if the points A(k+1, 2k), B(3k, 2k+3) and C (5k – 1, 5k) are collinear.

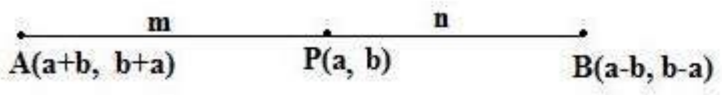
Answer: Since points A, B and C are collinear, we have

Slope of AB = Slope of BC, i.e., (2k+3)-2k/3k-(k+1) = 5k-(2k+3)/5k-1-3k

3/2k-1 = 3k-3/2k-1 ⇒ 3k = 6 ⇒ k = 2 Ans.

Q.15. Find the ratio in which the line joining points (a+b , b+a) and (a-b , b-a) is divided by point (a+b).

Ans:




Let the point P(a, b) divided the line joining points A(a+b, b+a) and B( a-b, b-a) in the ratio of m:n. Therefore, By section formula,

$$a = \frac{m(a-b)+n(a+b)}{m+n} \quad .......(1) \qquad and\ b = \frac{m(b-a)+n(b+a)}{m+n} \quad ......(2)$$

$$From\ equation\ (1), \quad a(m+n) = m(a-b)+n(a+b) \quad \Rightarrow am+an = am-mb+an+bn$$

$$\Rightarrow bm = bn \quad \Rightarrow m = n \quad Therefore,\ m:n = n:n = 1:1 \quad Thus,\ point\ P\ divides\ the\ line\ segment\ AB\ in\ 1:1.$$