Previous Year Questions 2024

Q1: Assertion (A): The point which divides the line segment joining the points A (1, 2) and B (−1, 1) internally in the ratio 1 : 2 is $\left(\frac{-1}{3}, \frac{5}{3}\right)$.

Reason (R): The coordinates of the point which divides the line segment joining the points A(x_1, y_1) and B(x_2, y_2) in the ratio $m_1 : m_2$ are $\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$

(CBSE 2024)

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Ans: (d)

Assertion says that point $\left(\frac{-1}{3}, \frac{5}{3}\right)$

divides the line joining the points A(1, 2) and B(−1, 1) in 1 : 2.

∴ By section formula, $x = \frac{m_1x_2 + m_2x_1}{m_1 + m_2}$

$= \frac{1\times(-1)+2\times1}{3} = \frac{1}{3}$

$y = \frac{m_1y_2 + m_2y_1}{m_1 + m_2}$

$= \frac{1\times1+2\times2}{1+2}$

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

$= \frac{5}{3}$

which is not equal to RHS i.e 1/3

Q2: Find a relation between x and y such that the point P(x, y) is equidistant from the points A(7, 1) and B(3, 5). (CBSE 2024)

Ans:

Since, P(x, y) is equidistant from A(7, 1) and B(3, 5)

So, PA = PB

$\Rightarrow PA^2 = PB^2$

$\Rightarrow (x-7)^2 + (y-1)^2 = (x-3)^2 + (y-5)^2$

$\Rightarrow x^2 + 49 - 14x + y^2 + 1 - 2y = x^2 + 9 - 6x + y^2 + 25 - 10y$

$\Rightarrow 6x - 14x + 50 - 34 + 10y - 2y = 0$

$\Rightarrow -8x + 8y + 16 = 0$

$\Rightarrow 8x - 8y - 16 = 0$

$\Rightarrow 8(x - y - 2) = 0$

$\Rightarrow x - y - 2 = 0$

$\Rightarrow x - y = 2$

Q3: Points A(–1, y) and B(5, 7) lie on a circle with centre O(2, –3y) such that AB is a diameter of the circle. Find the value of y. Also, find the radius of the circle. (CBSE 2024)

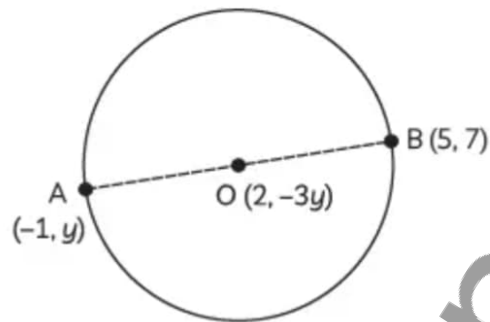
Ans: A (– 1, y); B(5, 7)

Since, AB is a diameter of circle and O is the centre of the circle.

OA = OB i.e., O divides AB in 1 : 1

So $m_1 : m_2 = 1 : 1$

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



$\Rightarrow \quad -3y = \frac{y+7}{2}$

$\Rightarrow -6y = y + 7$

$\Rightarrow -7y = 7$

$\Rightarrow y = -1$

Point O = (2, 3), A = (–1, – 1)

Now,

$$OA = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(-1-2)^2 + (-1-3)^2}$$
$$= \sqrt{(-3)^2 + (-4)^2}$$
$$= \sqrt{9+16}$$
$$= \sqrt{25}$$
$$= 5 \text{ units}$$

So, radius of circles = 5 units

Q4: Find the ratio in which the line segment joining the points (5, 3) and (–1, 6) is divided by Y-axis. (CBSE 2024)

Ans:

If y-axis divides points (5, 3) and (–1, 6) then coordinate of that point will be (0, y). Let P(0, y) divides A(5, 3) and B(–1, 6) in k : 1.

$m_1 : m_2 = k : 1$

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

$\Rightarrow 0 \times (k + 1) = -k + 5$

$\Rightarrow 0 = -k + 5$

$\Rightarrow k = 5$

So, $m_1 : m_2 = 5 : 1$

Previous Year Questions 2023

Q5: The distance of the point (-1, 7) from the x-axis is (2023)

(a) -1

(b) 7

(c) 6

(d) √50 [2023, 1 Mark]

Ans: (b)

Distance from x-axis = y-coordinate of point = 7 units

Q6: Assertion (A): Point P(0, 2) is the point of intersection of the y-axis with the line 3x + 2y = 4. (2023)

Reason (R): The distance of point P(0, 2) from the x-axis is 2 units.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

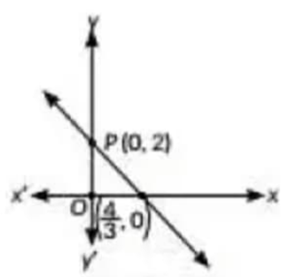
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

Ans: (b)

Point P(0, 2) is the point of intersection of y-axis with line 3x + 2y = 4



Also, the distance of point P(0, 2) from x-axis is 2 units.

Q7: The distance of the point (-6, 8) from origin is (2023)

(a) 6

(b) -6

(c) 8

(d) 10

Ans: (d)

Distance of the point (-6, 8) from origin (0, 0)

$= \sqrt{(-6-0)^2 + (8-0)^2} = \sqrt{36+64} = \sqrt{100}$

= 10 Units

Q8: The points (-4, 0), (4, 0) and (0, 3) are the vertices of a (CBSE 2023)

(a) right triangle

(b) isosceles triangle

(c) equilateral triangle

(d) scalene triangle

Ans: (b)

The points be A(-4, 0), B(4, 0) and C(0, 3).

Using distance formula

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

$$AB=\sqrt{(4-(-4))^2+(0-0)^2}=\sqrt{(4+4)^2}=\sqrt{8^2}$$

= 8 units

$$BC=\sqrt{(0-4)^2+(3-0)^2}=\sqrt{16+9}=\sqrt{25}$$

= 5 units

$$CA=\sqrt{(-4-0)^2+(0-3)^2}=\sqrt{16+9}=\sqrt{25}$$

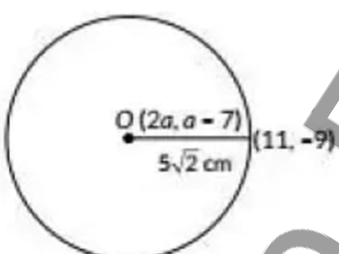
= 5 units

And, $AB^2 \neq BC^2 + CA^2$ [$\because$ BC = CA]

$\therefore$ ΔABC is an isosceles triangle.

Q9: The centre of a circle is (2a, a - 7). Find the values of 'a' if the circle passes through the point (11, -9). Radius of the circle is 5√2 cm. (2023)

Ans: Given centre of a circle is (2a, a - 7)



Radius of the circle is 5√2 cm.

$\therefore$ Distance between centre (2a, a - 7) and (11, - 9) = radius of circle.

$$\therefore \quad \sqrt{(11-2a)^2+(-9-a+7)^2}=5\sqrt{2}$$
$$\Rightarrow \quad (11-2a)^2+(-2-a)^2=25\times 2=50$$
$$\Rightarrow \quad 121+4a^2-44a+4+a^2+4a=50$$
$$\Rightarrow \quad a^2-8a+15=0 \Rightarrow (a-3)(a-5)=0 \Rightarrow a=3 \text{ or } a=5$$

Q10: In what ratio, does the x-axis divide the line segment joining the points A(3, 6) and B(-12, -3) ? (2023)

(a) 1 : 2

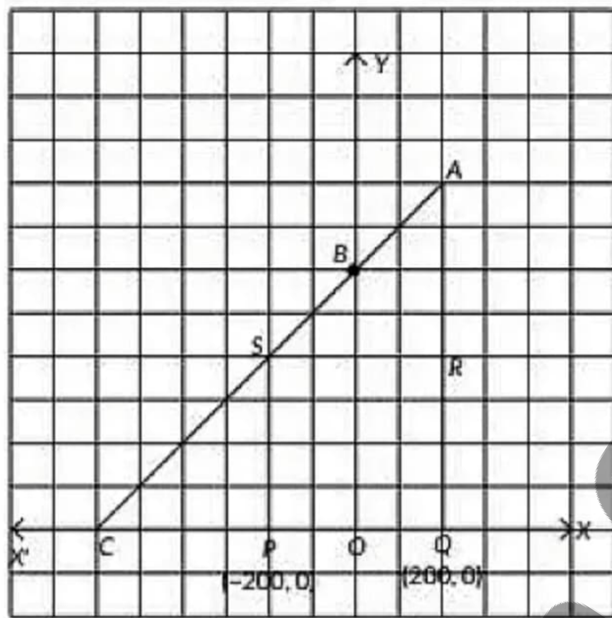
(b) 1 : 4

(c) 4 : 1

(d) 2 : 1

Ans: (d)

Q11: Case Study: Jagdish has a Field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O. **(CBSE 2023)**



Based on the above information, answer the following questions:

(i) Taking O as origin, coordinates of P are (-200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?

(ii) (a) What is the area of square PQRS?

OR

(b) What is the length of diagonal PR in square PQRS?

(iii) If S divides CA in the ratio K: 1, what is the value of K, where point A is (200, 800)?

Ans: (i) We have. P = (-200, 0) and Q = (200, 0)

The coordinates of R and S are (200, 400) and (-200, 400).

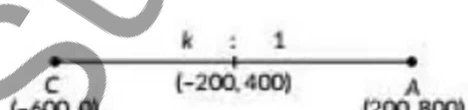
(ii) (a) The length PQ = 200 + 200 = 400 units.

Area of square PQRS = 400 x 400 = 160000 sq. units.

OR

(b) Length of diagonal PR = √2 length of side = 400√2 units.

(iii) Here,



Using section formula, we have

$$(-200, 400) = \left(\frac{(200)k + (-600)1}{k+1}, \frac{(800)k + (0)1}{k+1}\right)$$

$$\Rightarrow \quad 400 = \frac{800k}{k+1}$$

$$\Rightarrow \quad k + 1 = 2k \Rightarrow k = 1$$

Previous Year Questions 2022

Q12: The line represented by 4x - 3y = 9 intersects the y-axis at (2022)

(a) (0, -3)

(b) (9/4, 0)

(c) (-3, 0)

(d) (0, 9/4)

Ans: (a)

Given, the equation of line is $4x - 3y = 9$.

Putting $x = 0$, we get $4 \times 0 - 3y = 9 \Rightarrow y = -3$

So, the line $4x - 3y = 9$ intersects the y-axis at (0, -3).

Q13: The point on x-axis equidistant from the points P(5, 0) and Q(-1, 0) is (2022)

(a) (2, 0)

(b) (-2, 0)

(c) (3, 0)

(d) (2, 2)

Ans: (a)

Let coordinates of the point on the x-axis be R (x, 0).

Given, PR = QR

$\Rightarrow PR^2 = QR^2$

$\Rightarrow (x - 5)^2 + (0 - 0)^2 = (x + 1)^2 + (0 - 0)^2$

$\Rightarrow x^2 - 10x + 25 = x^2 + 2x + 1$

$\Rightarrow 12x = 24$

$\Rightarrow x = 2$

Required point is (2, 0).

Q14: The x-coordinate of a point P is twice its y-coordinate. If P is equidistant front Q(2, -5) and R(-3, 6), then the coordinates of P are (2022)

(a) (8, 16)

(b) (10, 20)

(c) (20, 10)

(d) (16, 8)

Ans: (d)

Let coordinate of point P= t

So, .(x-coordinate of point P = 2t $\therefore$ Point is P (2t, t).

Given, PQ = RP $\Rightarrow PQ^2 = RP^2$

$\Rightarrow (2t - 2)^2 + (t + 5)^2 = (2t + 3)^2 + (t - 6)^2$ [By distance formula]

$\Rightarrow 4t^2 - 8t + 4 + t^2 + 10t + 25 = 4t^2 + 12t + 9 + t^2 - 12t + 36$

$\Rightarrow 2t = 16$

$t = 8$

Coordinates of P are (16, 8).

Q15: The ratio in which the point (-4, 6) divides the line segment joining the points A(-6, 10) and B(3, -8) is (2022)

(a) 2 : 5

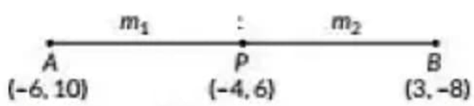
(b) 7 : 2

(c) 2 : 7

(d) 5 : 2

Ans: (c)

Let point P(-4, 6) divides the line segment AB in the ratio $m_1 : m_2$.



By section formula, we have

$$(-4,6)=\left(\frac{3m_1-6m_2}{m_1+m_2},\frac{-8m_1+10m_2}{m_1+m_2}\right)$$

Now, $-4=\dfrac{3m_1-6m_2}{m_1+m_2}$

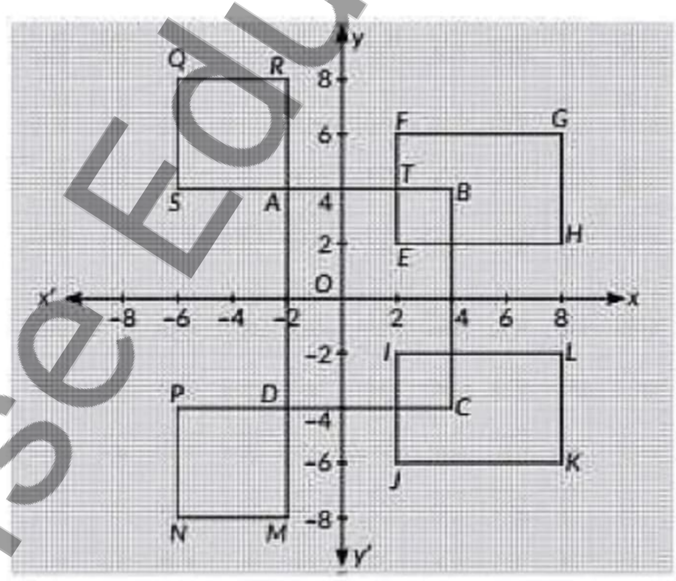
$\Rightarrow\ 3m_1-6m_2=-4m_1-4m_2 \Rightarrow 7m_1=2m_2 \therefore m_1:m_2=2:7$

Putting the value of $m_1 : m_2$ in y-coordinate, we get

$$\frac{-8\frac{m_1}{m_2}+10}{\frac{m_1}{m_2}+1}=\frac{-8\times\frac{2}{7}+10}{\frac{2}{7}+1}=6$$

Hence, required ratio is 2:7.

Q16: Case Study: Shivani is an interior decorator. To design her own living room, she designed wail shelves. The graph of intersecting wail shelves is given below: **(2022)**



Based on the above information, answer the following questions:

(i) If O is the origin, then what are the coordinates of S?

(a) (-6, -4)

(b) (6, 4)

(c) (-6, 4)

(d) (6, -4)

Ans: (c)

Coordinates of S are (-6, 4).

(ii) The coordinates of the mid-point of the line segment joining D and H is

(a) $(-3, \frac{2}{3})$

(b) (3, -1)

(c) (3, 1)

(d) $(-3, -\frac{2}{3})$

(iii) The ratio in which the x-axis divides the line-segment joining the points A and C is

(a) 2 : 3

(b) 2 : 1

(c) 1 : 2

(d) 1 : 1

Ans: (d)

Coordinates of A are (-2, 4) and coordinates of C are (4, -4).

Let (x, 0) divides the line segment joining the points A and C in the ratio $m_1 : m_2$

By section formula, we have

$$(x, 0) = \left(\frac{4m_1 - 2m_2}{m_1 + m_2}, \frac{-4m_1 + 4m_2}{m_1 + m_2}\right)$$

$$\text{Now, } 0 = \frac{-4m_1 + 4m_2}{m_1 + m_2}$$

$$\Rightarrow \quad -4m_1 + 4m_2 = 0$$

$$\Rightarrow \quad m_1 : m_2 = 1 : 1$$

(iv) The distance between the points P and G is

(a) 16 units

(b) 3√74 units

(c) 2√74 units

(d) √74 units

Ans: (c)

Coordinates of P are (-6, -4) and coordinates of G are (8, 6).

$$\therefore \quad PG = \sqrt{(8+6)^2 + (6+4)^2}$$

$$= \sqrt{196 + 100} = 2\sqrt{74} \text{ units}$$

(v) The coordinates of the vertices of rectangle IJKL are

(a) I(2, 0), J(2, 6), K(8,6), L(8, 2)

(b) I(2, -2), J(2, -6), K(8, - 6), L(8, -2)

(c) I(-2, 0), J(-2, 6), K(-8, 6), L(-8, 2)

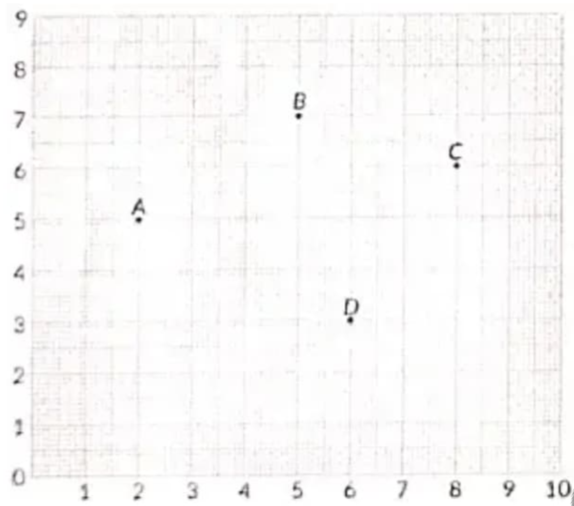
(d) I(-2, 0), J(-2, -6), K(-8, -6), L(-8, -2)

Ans: (b)

Coordinates of vertices of rectangle IJKL are respectively I(2, -2), J(2, -6), K(8, -6),L(8, -2).

Previous Year Questions 2021

Q17: Case Study : Students of a school are standing in rows and columns in their school playground to celebrate their annual sports day. A, B, C and D are the positions of four students as shown in the figure. (2021)



Based on the above, answer the following questions:

(i) The figure formed by the four points A, B, C and D is a

(a) square

(b) parallelogram - v

(c) rhombus

(d) quadrilateral

Ans: (d)

From figure coordinates are A(2, 5), B(5, 7), C(8, 6) and D(6, 3)

Now, $AB = \sqrt{(2-5)^2+(5-7)^2} = \sqrt{9+4} = \sqrt{13}$ units

$BC = \sqrt{(5-8)^2+(7-6)^2} = \sqrt{9+1} = \sqrt{10}$ units

$CD = \sqrt{(8-6)^2+(6-3)^2} = \sqrt{4+9} = \sqrt{13}$ units

$DA = \sqrt{(6-2)^2+(3-5)^2} = \sqrt{16+4} = \sqrt{20}$ units

Clearly, ABCD is a quadrilateral

(ii) If the sports teacher is sitting at the origin, then which of the four students is closest to him?

(a) A

(b) B

(c) C

(d) D

Ans: (a)

Here, sports teacher is at O(0,0).

Now, $OA = \sqrt{2^2+5^2} = \sqrt{29} = 5.3$ units

$OB = \sqrt{5^2+7^2} = \sqrt{74} = 8.6$ units

$OC = \sqrt{8^2+6^2} = \sqrt{100} = 10$ units

$OD = \sqrt{6^2+3^2} = \sqrt{45} = 6.7$ units

$\therefore$ OA is the minimum distance

$\therefore$ A is closest to sports teacher.

(iii) The distance between A and C is

(a) √37 units

(b) √35 units

(c) 6 units

(d) 5 units

Ans: (a)

Required distance = $AC=\sqrt{(8-2)^2+(6-5)^2}$

$=\sqrt{(6)^2+(1)^2}=\sqrt{36+1}=\sqrt{37}$ units

(iv) The coordinates of the mid point of line segment AC are

(a) $\left(\frac{5}{2}, 11\right)$

(b) $\left(\frac{5}{2}, \frac{11}{2}\right)$

(c) $\left(5, \frac{11}{2}\right)$

(d) (5, 11)

Ans: (c)

Coordinates of mid-point of AC are

$\left(\frac{2+8}{2}, \frac{5+6}{2}\right)=\left(\frac{10}{2}, \frac{11}{2}\right)=\left(5, \frac{11}{2}\right)$

(v) If a point P divides the line segment AD in the ratio 1: 2, then coordinates of P are

(a) $\left(\frac{8}{3}, \frac{8}{3}\right)$

(b) $\left(\frac{10}{3}, \frac{13}{3}\right)$

(c) $\left(\frac{13}{3}, \frac{10}{3}\right)$

(d) $\left(\frac{16}{3}, \frac{11}{3}\right)$

Ans: (b)

Let point P(x, y) divides the line segment AD in the ration 1: 2.

1 : 2

A(2, 5) P(x, y) D(6, 3)

$\therefore \quad x=\frac{1(6)+2(2)}{1+2}, y=\frac{1(3)+2(5)}{1+2}$

$\Rightarrow \quad x=\frac{6+4}{3}, y=\frac{3+10}{3} \Rightarrow x=\frac{10}{3}, y=\frac{13}{3}$

$\therefore$ Coordinates of P are $\left(\frac{10}{3}, \frac{13}{3}\right)$

Previous Year Questions 2020

Q18: The distance between the points <m, -n) and (-m, n) is (2020)

(a) $\sqrt{m^2+n^2}$

(b) m + n

(c) $2\sqrt{m^2+n^2}$

(d) $\sqrt{2m^2+2n^2}$

Ans: (c)

Q19: The distance between t he points (0, 0) and (a - b, a + b) is (2020)

(a) $2\sqrt{ab}$

(b) $\sqrt{2a^2+ab}$

(c) $2\sqrt{a^2+b^2}$

(d) $\sqrt{2a^2+2b^2}$

Ans: (d)

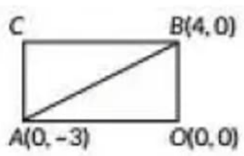
Required distance = $\sqrt{(a-b-0)^2+(a+b-0)^2}$

$=\sqrt{(a-b)^2+(a+b)^2}=\sqrt{a^2+b^2-2ab+a^2+b^2+2ab}$

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

Q20: AOBC is a rectangle whose three vertices are A[0, -3), O(0, 0) and B(4, 0). The length of its diagonal is _____. (2020)

Ans: In rectangle AOBC. AB is a diagonal.



So,

$AB=\sqrt{(0-4)^2+(-3-0)^2}\quad=\sqrt{4^2+3^2}=\sqrt{16+9}=\sqrt{25}$

= 5 Units

Q21: Show that the points (7, 10), (-2, 5) and (3, -4) are vertices of an isosceles right triangle. (2020)

Ans: Let the given points be A(7, 10), B(-2, 5) and C(3, - 4].

Using distance Formula, we have

$AB=\sqrt{(7+2)^2+(10-5)^2}=\sqrt{81+25}=\sqrt{106}$

$BC=\sqrt{(-2-3)^2+(5+4)^2}=\sqrt{25+81}=\sqrt{106}$

$CA=\sqrt{(7-3)^2+(10+4)^2}=\sqrt{16+196}=\sqrt{212}$

Since. AB = BC ∴ ABC is an isosceles triangle.

Also, $AB^2 + BC^2 = 106 + 106 = 212 = AC^2$

So. ABC is an isosceles right angled triangle with ∠B = 90°.

Q22: The point on the x-axis which is equidistant from (-4, 0) and (10, 0) is (2020)

(a) (7, 0)

(b) (5, 0)

(c) (0, 0)

(d) (3, 0)

Ans: (d)

Q23: If the point P(k, 0) divides the line segment joining the points A(2, -2) and B(-7, 4) in the ratio 1:2 then the value of k is (2020)

(a) 1

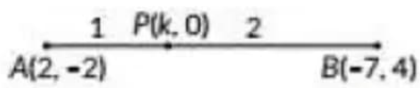
(b) 2

(c) -2

(d) -1

Ans: (d)

Since, the point P(k 0) divides the line segment joining A(2, -2) and B(-7, 4) in the ratio 1 : 2.



$$\therefore \quad k=\frac{1(-7)+2(2)}{1+2}=\frac{-7+4}{3}=\frac{-3}{3}=-1$$

Q24: The centre of a circle whose end points of a diameter are (-6, 3) and (6, 4) is (2020)

(a) (8, -1)

(b) (4, 7)

(c) $\left(0,\frac{7}{2}\right)$

(d) $\left(4,\frac{7}{2}\right)$

Q25: Find the ratio in which the y-axis divides the line segment joining the points (6, -4) and (-2, -7). Also, find the point of intersection. (2020)

Ans: Let the point P(0, y) on y-axis divides the line segment joining the points A(6, -4) and B(-2, -7) in the ratio k : 1.

By section formula, we have

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

$$\Rightarrow -2k+6=0 \Rightarrow k=3 \qquad \text{...(i)}$$

$$\text{and } \frac{-7k-4}{k+1}=y \Rightarrow \frac{-7(3)-4}{3+1}=y \qquad \text{[Using (i)]}$$

$$\Rightarrow 4y=-21-4=-25 \Rightarrow y=\frac{-25}{4}$$

Hence, the required point is $\left(0,\frac{-25}{4}\right)$ and required ratio is 3 : 1