CBSE Test Paper 02

Chapter 7 Coordinate Geometry

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1. If one end of a diameter of a circle is (4, 6) and the centre is (– 4, 7), then the other end is **(1)**
   a. (– 12, 8)
   b. (8, – 12)
   c. (8, 10)
   d. (8, – 6)
2. The point where the perpendicular bisector of the line segment joining the points A(2, 5) and B(4, 7) cuts is: **(1)**
   a. (3, 6)
   b. (0, 0)
   c. (2, 5)
   d. (6, 3)
3. The point (– 3, 5) lies in the ___________ quadrant **(1)**
   a. IV
   b. II
   c. III
   d. I
4. If the mid – point of the line segment joining the points (a, b – 2) and (– 2, 4) is (2, – 3), then the values of ‘a’ and ‘b’ are **(1)**
   a. 6, 8
   b. 6, – 8
   c. 4, – 5
   d. – 6, 8
5. Find the value of ‘k’, if the point (0, 2) is equidistant from the points (3, k) and (k, 5) **(1)**
   a. 2
   b. 0
   c. 1
   d. -1
6. If origin is the mid-point of the line segment joined by the points (2, 3) and (x, y) then

find the value of (x, y). **(1)**

7. Find the number of points on x-axis which are at a distance of 2 units from (2, 4). **(1)**
8. Find the perimeter of a triangle with vertices (0, 4), (0,0) and (3,0). **(1)**
9. Find the distance between the points A and B in the following:A(1,-3), B(4, 1) **(1)**
10. Find the coordinates of the point , where the line x - y = 5 cuts Y-axis.**(1)**
11. Find the value of 'k' if the points (7, –2), (5, 1), (3, k) are collinear. **(2)**
12. The point R divides the line segment AB where A(-4, 0), B(0, 6) are such that AR = $\frac{3}{4}$ A B. Find the coordinates of R. **(2)**
13. Find the centroid of the triangle whose vertices are given below: (3, -5), (-7, 4), (10, -2). **(2)**
14. Prove that the lines joining the middle points of the opposite sides of a quadrilateral and the join of the middle points of its diagonals meet in a point and bisect one another. **(3)**
15. Find the value of m for which the points with coordinates (3, 5), (m, 6) and $\left(\frac{1}{2}, \frac{15}{2}\right)$ are collinear. **(3)**
16. If the points A (a, -11), B (5, b), C (2, 15) and D (1, 1) are the vertices of a parallelogram ABCD, find the values of a and b. **(3)**
17. In the given triangle ABC as shown in diagram D, E and F are the mid-points of AB, BC and AC respectively. Find the area of ΔDEF. **(3)**
18. Find the area of a quadrilateral PQRS whose vertices area P(- 5, 7), Q(- 4, - 5), R (-1, - 6) and S(4, 5). **(4)**
19. If the point A(2, –4) is equidistant from P(3, 8) and Q(–10, y) then find the values of y. Also find distance PQ. **(4)**
20. Name the type of quadrilateral formed, if any, by the following points, and give reasons for your answer:
    (-1, -2), (1, 0), (-1, 2), (-3, 0) **(4)**

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Solution

1. a. (– 12, 8)

   Explanation: one end of a diameter is A(4, 6) and the centre is O(- 4, 7) .... (Given)

   Let the other end be B

   therefore coordinates of centre O are $x = \frac{(4+x)}{2}$

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

   $\Rightarrow 4 + x = -8 \Rightarrow x = -12$

   And $y = \frac{6+y}{2}$

   7 = (6 + y) / 2

   $\Rightarrow 6 + y = 14 \Rightarrow y = 8$

   Therefore, the required coordinates of other ends of the diameter are $(-12, 8)$.

2. a. (3, 6)

   Explanation: Since, the point, where the perpendicular bisector of a line segment joining the points A(2, 5) and B(4, 7) cuts, is the mid-point of that line segment.

   $\therefore$ Coordinates of Mid-point of line segment AB = $\left(\frac{2+4}{2}, \frac{5+7}{2}\right)$ = $(3, 6)$

3. b. II

   Explanation: Since $x-$coordinate is negative and $y-$coordinate is positive. Therefore, the point $(-3, 5)$ lies in II quadrant.

4. b. 6, – 8

   Explanation: Let the coordinates of midpoint O$(2, -3)$ is equidistance from the points A$(a, b-2)$ and B$(-2, 4)$.

   $\therefore 2 = \frac{a-2}{2}$

   $\Rightarrow a - 2 = 4 \Rightarrow a = 6$

   Also $-3 = \frac{b-2+4}{2} \Rightarrow b + 2 = -6 \Rightarrow b = -8$

   Therefore, $a = 6$ and $b = -8$.

5. c. 1

Explanation: Let point C (0, 2) is equidistant from the points A$(3, k)$ and B $(k, 5)$.

i.e. AC = BC

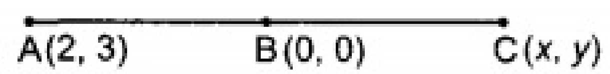
$\therefore AC^2 = BC^2$

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

$\Rightarrow 9 + k^2 + 4 - 4k = k^2 + 9$

$\Rightarrow 4k = 4$

$\Rightarrow k = 1$

6. 

$\frac{2+x}{2}$ = 0

$\Rightarrow$ x = - 2

$\frac{3+y}{2}$ = 0

$\Rightarrow$ y = - 3.

7. Distance of the point (2, 4) from x-axis is 4 units. There is no point on x-axis which is at a distance of 2 units from the given point.

8. Here, A$\rightarrow$(0,4),B$\rightarrow$(0,0),C$\rightarrow$(3,0)

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

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

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

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

   Therefore, Perimeter of triangle = 4 + 3 + 5 = 12

9. A(1, -3), B(4, 1)

   $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(4-1)^2 + [1-(-3)]^2}$

   $= \sqrt{(3)^2 + (4)^2} = \sqrt{9+16} = \sqrt{25} = 5units$

10. x - y = 5 is a given line

    x - y = 5 cuts Y-axis.

    Put $x = 0$ in the equation of line x- y = 5

    $\Rightarrow (0) - y = 5$

    $\Rightarrow y = -5$

Therefore , the point is (0,-5)cuts x - y = 5 at Y-axis..

11. (7, –2), (5, 1), (3, k)

Area of the triangle

$= \frac{1}{2}$ [7(1 – k) + 5(k – (–2)) + 3(–2 – 1)]

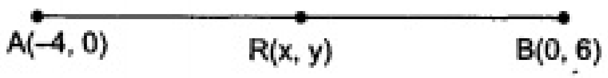
$= \frac{1}{2}$ [7 – 7k + 5k + 10 – 9]

$= \frac{1}{2}$ [8 – 2k] = 4– k

If the points are collinear, then area of the triangle = 0

$\Rightarrow$ 4 – k = 0

$\Rightarrow$ k = 4

12. 

Let coordinates of R be (x, y)

AR = $\frac{3}{4}$ AB [Given]

But AR + RB = AB

$\Rightarrow \frac{3}{4}$AB + RB = AB

$\Rightarrow$ RB = AB - $\frac{3}{4}$AB $= \frac{4AB-3AB}{4} = \frac{AB}{4}$

$\frac{AR}{RB} = \frac{\frac{3}{4}AB}{\frac{1}{4}AB} = \frac{3}{4} : \frac{1}{4} = \frac{3}{4} \times \frac{4}{1}$

= 3: 1

Thus, R divides AB in the raito 3 : 1.

x = $\frac{3\times0+1\times(-4)}{3+1} = \frac{0-4}{4} = \frac{-4}{4}$ = - 1

and y $= \frac{3\times6+1\times0}{3+1} = \frac{18+0}{4} = \frac{18}{4} = \frac{9}{2}$

Thus, coordinates of R are $\left(-1, \frac{9}{2}\right)$

13. The given vertices of triangle are (3, -5), (-7, 4) and (10, -2).

Let (x, y) be the coordinates of the centroid. Then

$x = \frac{x_1+x_2+x_3}{3} = \frac{3+(-7)+10}{3}$

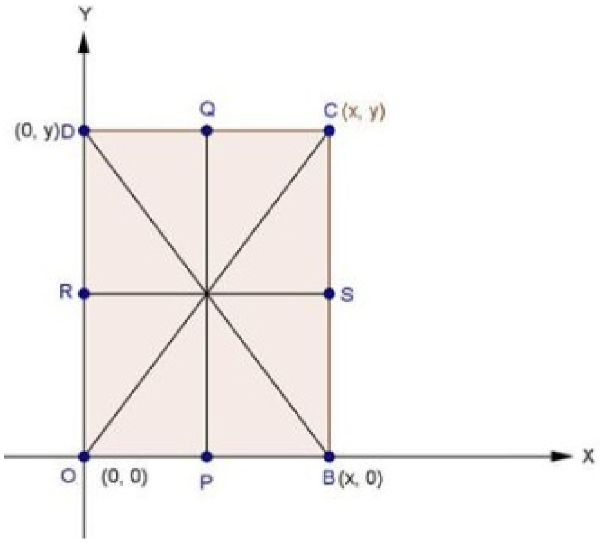
$= \frac{13-7}{3} = \frac{6}{3} = 2$

$y = \frac{y_1+y_2+y_3}{3} = \frac{-5+4+(-2)}{3}$

$= \frac{-7+4}{3} = \frac{-3}{3} = -1$

$\therefore$ The coordinates of the centroid are (2, –1)

14. Let OBCD be the quadrilateral P, Q, R, S be the mid-points of OB, CD, OD and BC.



Let the coordinates of O,B, C, D are (0, 0), (x, 0), (x, y) and (0, y)

Coordinates of P are $\left(\frac{x}{2}, 0\right)$

Coordinates of Q are $\left(\frac{x}{2}, y\right)$

Coordinates of R are $\left(0, \frac{y}{2}\right)$

Coordinates of S are $\left(x, \frac{y}{2}\right)$

Coordinates of mid-point of PQ are

$$\left(\frac{\frac{x}{2}+\frac{x}{2}}{2}, \frac{0+y}{2}\right) = \left(\frac{x}{2}, \frac{y}{2}\right)$$

Coordinates of mid-point of RS are $\left(\frac{(0+x)}{2}, \frac{\left(\frac{y}{2}+\frac{y}{2}\right)}{2}\right) = \left(\frac{x}{2}, \frac{y}{2}\right)$

Since, the coordinates of the mid-point of PQ = coordinates of mid-point of RS.

∴ PQ and RS bisect each other.

15. If points are collinear, then one point divides the other two in the same ratio.

Let point (m, 6) divides the join of (3, 5) and $\left(\frac{1}{2}, \frac{15}{2}\right)$ in the ratio k: 1.

Then, (m, 6) = $\left(\frac{\frac{k}{2}+3}{k+1}, \frac{15k}{k+1}\right)$

$\Rightarrow$ m = $\frac{\frac{k}{2}+3}{k+1}$ ...(i)

and 6 = $\frac{\frac{15}{2}k+5}{k+1}$ ...(ii)

From (ii), we get 6k + 6 = $\frac{15k}{2} + 5$

$\Rightarrow 6k - \frac{15k}{2}$ = - 1

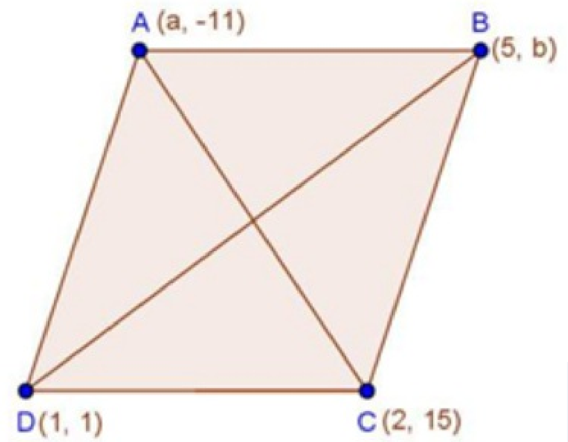
$\Rightarrow -\frac{3}{2}k$ = - 1

$\Rightarrow \quad k = \frac{2}{3}$

Substituting, k = $\frac{2}{3}$ in (i), we get

m = $\frac{\frac{1}{2}\times\frac{2}{3}+3}{\frac{2}{3}+1} = \frac{\frac{1}{3}+3}{\frac{2}{3}+1} = \frac{\frac{10}{3}}{\frac{5}{3}}$ = 2

Hence, for m = 2 points are collinear.

16. 

Let A(a, -11), B(5, b), C(2, 15) and D(1, 1) be the given points.

We know that diagonals of parallelogram bisect each other.

Therefore, Coordinates of mid-point of AC = Coordinates of mid-point of BD

$\left(\frac{a+2}{2}, \frac{15-11}{2}\right) = \left(\frac{5+1}{2}, \frac{b+1}{2}\right)$

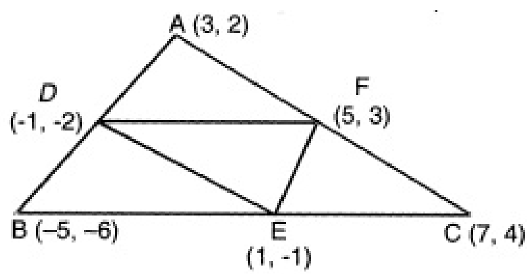
$\Rightarrow \frac{a+2}{2} = 3 \quad \text{and} \quad \frac{b+1}{2} = 2$

$\Rightarrow$ a + 2 = 6 and b + 1 = 4

$\Rightarrow$ a = 6 - 2 and b = 4 - 1

$\Rightarrow$ a = 4 and b = 3

Hence value of a and b is equal to 4 and 3 respectively.

17. 

Let $D(x_1, y_1)$ be the mid-point of AB,then,

x_1 = $\frac{3-5}{2} = -1$ and y_1 = $\frac{2-6}{2} = -2$

∴D = (-1 ,-2)

Let E(x_2, y_2)be the mid-point of BC,then,

x_2 = $\frac{-5+7}{2} = 1$

and $y_2 = \frac{-6+4}{2} = -1$

$\therefore$ E = (1, -1)

Let F(x_3, y_3) be the mid-point of AC,then

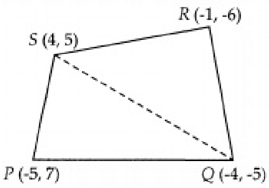
$x_3 = \frac{7+3}{2} = 5$ and $y_3 = \frac{4+2}{2} = 3$

Now, area ΔDEF

$= \frac{1}{2}$ [- (- 1 - 3) + 1(3 + 2) + 5(- 2 + 1)]

$= \frac{1}{2}$ [4 + 5 - 5]

= 2 units

18. 

Area ☐PQRS = ar△PQS + ar△QRS

Ar △PQS $= \frac{1}{2}$ [(-5)(- 5 - 5) + (-4)(5 -7) + 4(7 + 5)]

= $\frac{1}{2}$ [50 + 8 + 48]

= $\frac{1}{2} \times 106$ = 53 units

Ar △QRS = $\frac{1}{2}$ [(-4)(- 6 - 5) + (-1)(5 + 5) + 4(-5 + 6)]

= $\frac{1}{2}$ [44 + (-10) + 4]

= $\frac{1}{2} \times 38$ = 19 units

Hence, area ☐PQRS = 53 + 19 = 72 sq. units

19. According to the question,we are given that,

PA = QA

⇒ $PA^2 = QA^2$

⇒ $(3 – 2)^2 + (8 + 4)^2 = (–10 – 2)^2 + (y + 4)^2$

⇒ $1^2 + 12^2 = (–12)^2 + y^2 + 16 + 8y$

⇒ $y^2 + 8y + 16 – 1 = 0$

⇒ $y^2 + 8y + 15 = 0$

⇒ $y^2 + 5y + 3y + 15 = 0$

⇒ y(y + 5) + 3(y + 5) = 0

⇒ (y + 5) (y + 3) = 0

⇒ y + 5 = 0 or y + 3 = 0

⇒ y = –5 or y = –3

So, the co–ordinates are P(3, 8), Q_1(–10, –3), Q_2(–10, –5).

Now, PQ_1^2 = $(3 + 10)^2 + (8 + 3)^2 = 13^2 + 11^2$

⇒ PQ_1^2 = 169 + 121

⇒ $PQ_1 = \sqrt{290}$ units

and PQ_2^2 = $(3 + 10)^2 + (8 + 5)^2 = 13^2 + 13^2$

= $13^2[1 + 1]$

⇒PQ_2^2 = $13^2 \times 2$

⇒ $PQ_2 = 13\sqrt{2}$ units

Hence, y = –3, –5 and PQ = $\sqrt{290}$ units and $13\sqrt{2}$ units.

20. (-1, -2), (1, 0), (-1, 2), (-3, 0)

Let A $\rightarrow$ (-1, -2), B $\rightarrow$ (1, 0)

C $\rightarrow$ (-1, 2) and D $\rightarrow$ (-3, 0)

Then, $AB = \sqrt{[1-(-1)]^2 + [0-(-2)]^2}$

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

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

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

$CD = \sqrt{[(-3)-(-1)]^2 + (0-2)^2}$

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

$DA = \sqrt{[(-1)-(-3)]^2 + (-2-0)^2}$

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

$AC = \sqrt{[(-1)-(-1)]^2 + [(2)-(-2)]^2} = 4$

$BD = \sqrt{[(-3)-(1)]^2 + (0-0)^2} = 4$

Since AB = BC = CD = DA (i.e., all the four sides of the quadrilateral ABCD are equal) and AC = BD (i.e. diagonals of the quadrilateral ABCD are equal). Therefore, ABCD is a square.