CHAPTER 3

CO-ORDINATE GEOMETRY

KEY POINTS

1. The length of a line segment joining A and B is the distance between two points A (x_1, y_1) and B (x_2, y_2) is $\sqrt{\{(x_2 - x_1)^2 + (y_2 - y)^2\}}$.

2. The distance of a point (x, y) from the origin is $\sqrt{(x^2 + y^2)}$. The distance of P from x-axis is y units and from y-axis is x-units.

3. The co-ordinates of the points $p(x, y)$ 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

$$\left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$$

we can take ratio as $k : 1$, $k = \dfrac{m_1}{m_2}$.

4. The mid-points of the line segment joining the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

5. The area of the triangle formed by the points (x_1, y_1), (x_2, y_2) and (x_3, y_3) is the numeric value of the expressions

$$\frac{1}{2} \left[x_1 (y_2 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2) \right].$$

6. If three points are collinear then we can not draw a triangle, so the area will be zero *i.e.*

$$|x_1(y_2 - y_3) + x_2 (y_3 - y_1) + x_3(y_1 - y_2)| = 0$$

MULTIPLE CHOICE QUESTIONS

1. *P* is a point on *x* axis at a distance of 3 unit from *y* axis to its left. The coordinates of *P* are

   (a) (3, 0)   (b) (0, 3)

   (c) (–3, 0)   (d) (0, –3)

2. The distance of point *P* (3, –2) from *y*-axis is

   (a) 3 units   (b) 2 units

   (c) –2 units   (d) $\sqrt{13}$ units

3. The coordinates of two points are (6, 0) and (0, –8). The coordinates of the mid point are

   (a) (3, 4)   (b) (3, –4)

   (c) (0, 0)   (d) (–4, 3)

4. If the distance between (4, 0) and (0, *x*) is 5 units, the value of *x* will be

   (a) 2   (b) 3

   (c) 4   (d) 5

5. The coordinates of the point where line $\dfrac{x}{a} + \dfrac{y}{b} = 7$ intersects *y*-axis are

   (a) (*a*, 0)   (b) (0, *b*)

   (c) (0, 2*b*)   (d) (2*a*, 0)

6. The area of triangle *OAB*, the coordinates of the points *A* (4, 0) *B* (0, –7) and *O* origin, is

   (a) 11 sq. units   (b) 18 sq. units

   (c) 28 sq. units   (d) 14 sq. units

7. The distance between the points $P\left(-\dfrac{11}{3}, 5\right)$ and $Q\left(-\dfrac{2}{3}, 5\right)$ is

   (a) 6 units   (b) 4 units

   (c) 3 units   (d) 2 units

8. The line $\dfrac{x}{2} + \dfrac{y}{4} = 1$ intersects the axes at *P* and *Q*, the coordinates of the mid point of *PQ* are

(a) (1, 2) (b) (2, 0)

(c) (0, 4) (d) (2, 1)

9. The coordinates of vertex *A* of $\triangle ABC$ are (–4, 2) and point *D*(2, 5), *D* is mid point of *BC*. The coordinates of centroid of $\triangle ABC$ are

(a) (0, 4) (b) $\left(-1, \dfrac{7}{2}\right)$

(c) $\left(-2, \dfrac{7}{3}\right)$ (d) (0, 2)

10. The distance between the line $2x + 4 = 0$ and $x - 5 = 0$ is

(a) 9 units (b) 1 unit

(c) 5 units (d) 7 units

11. The distance between the points (5 cos 35°, 0) and (0, 5 cos 55°) is

(a) 10 units (b) 5 units

(c) 1 unit (d) 2 units

12. The points (–4, 0), (4, 0) and (0, 3) are the vertices of a :

(a) right triangle (b) Isosceles triangle

(c) equilateral triangle (d) Scalene triangle

13. The perimeter of triangle formed by the points (0, 0), (2, 0) and (0, 2) is

(a) 4 units (b) 6 units

(c) $6\sqrt{2}$ units (d) $4 + 2\sqrt{2}$ units

14. *AOBC* is a rectangle whose three vertices are A (0, 3), 0 (0, 0), B (5, 0). The length of its diagonal is :

(a) 5 units (b) 3 units

(c) $\sqrt{34}$ units (d) 4 units

15. If the centroid of the triangle formed by (9, *a*), (*b*, –4) and (7, 8) is (6, 8) then (*a, b*) is

    (a)   (4, 5)   (b)   (5, 4)

    (c)   (5, 2)   (d)   (3, 2)

SHORT ANSWER TYPE QUESTIONS

16. Find the value of *a* so that the point (3, *a*) lies on the line represented by $2x - 3y = 5$.

17. A line is drawn through a point *P*(3, 2) parallel to *x*-axis. What is the distance of the line from *x*-axis?

18. What is the value of a if the points (3, 5) and (7, 1) are equidistant from the point (*a*, 0)?

19. Prove that the points $(0, 9), \left(\dfrac{b}{2}, \dfrac{a}{2}\right)$ and (*b*, 0) are collinear.

20. *AB* is diameter of circle with centre at origin. What are the coordinates of *B* if coordinates of *A* are (3, –4)?

21. *A* (3, 2) and *B* (–2, 1) are two vertices of ΔABC, whose centroid *G* has coordinates $\left(\dfrac{5}{3}, -\dfrac{1}{3}\right)$. Find the coordinates of the third vertex *C* of ΔABC.

22. For what value of *p*, are the points (–3, 9), (2, *p*) and (4, –5) collinear?

23. Find the relation between *x* and *y* such that the point (*x*, *y*) is equidistant from the points (7, 1) and (3, 5).

24. Find the coordinates of point *P* if *P* and *Q* trisect the line segment joining the points *A*(1, –2) and *B* (–3, 4).

25. Find *x* if the distance between the points (*x*, 2) and (3, 4) be $\sqrt{8}$ units.

26. Find the area of triangle whose vertices are (1, –1), (–3, 5) and (2, –7).

27. Find a point on *y*-axis which is equidistant from the points (–2, 5) and (2, –3).

28. The mid point of the line segment joining the points (5, 7) and (3, 9) is also the mid point of the line segment joining the points (8, 6) and (*a, b*). Find *a* and *b*.

29. Find the coordinates of the point which divides the line segment joining the points (1, 3) and (2, 7) in the ratio 3 : 4.

30. Find the value(s) of *x* for which the distance between the points *P* (2, –3) and *Q* (*x*, 5) is 10 units.

31. The point *K* (1, 2) lies on the perpendicular bisector of the line segment joining the points *E* (6, 8) and *F* (2, 4). Find the distance of the point *K* from the line segment *EF*.

32. The vertices of $\triangle ABC$ are *A* (–1, 3), *B* (1, –1) and *C* (5, 1). Find the length of the median drawn from the vertex *A*.

33. Find the distance between the points *A* (*a, b*) and *B* (*b, a*) if *a* – *b* = 4.

34. Three vertices of a parallelogram taken in order are (–3, 1), (1, 1) and (3, 3). Find the coordinates of fourth vertex.

35. Triangle *ABC* is an isosceles triangle with *AB* = *AC* and vertex *A* lies on *y*-axis. If the coordinates of *B* and *C* are (–5, –2) and (3, 2) respectively then find the coordinates of vertex *A*.

36. If *A* (3, 0), *B* (4, 5), *C* (–1, 4) and *D* (–2, –1) are four points in a plane, show that *ABCD* is a rhombus but not a square.

37. Find the coordinates of a point which is $\dfrac{3}{4}$ of the way (3, 1) to (–2, 5).

38. The area of a triangle with vertices (6, –3), (3, *K*) and (–7, 7) is 15 sq. unit. Find the value of *K*.

39. Find the abscissa of a point whose ordinate is 4 and which is at a distance of 5 units from (5, 0).

40. A point *P* on the *x*-axis divides the line segment joining the points (4, 5) and (1, –3) in certain ratio. Find the coordinates of point *P*.

41. In right angled $\triangle ABC$, $\angle B$ = 90° and $AB = \sqrt{34}$ unit. The coordinates of points *B, C* are (4, 2) and (–1, *y*) respectively. If *ar* ($\triangle ABC$) = 17 sq. unit, then find the value of *y*.

42. If A (–3, 2) B (x, y) and C (1, 4) are the vertices of an isosceles triangle with $AB = BC$. Find the value of ($2x + y$).

43. If the point P (3, 4) is equidistant from the points A ($a + b, b - a$) and B ($a - b, a + b$) then prove that $3b - 4a = 0$.

44. The vertices of quadrilateral $ABCD$ are A (–5, 7), B (–4, 5), C (–1, –6) and D (4, 5). Find the area of quadrilateral $ABCD$.

45. If midpoints of sides of a ΔPQR are (1, 2), (0, 1) and (1, 0) then find the coordinates of the three vertices of the ΔPQR.

46. The line segment joining the points A (2, 1) and B (5, –8) is trisected at the points P and Q such that P is nearer to A. If P is also lies on line given by $2x - y + k = 0$, find the value of K.

47. The line segment joining the points (3, –4) and (1, 2) is trisected at the point P and Q. If the coordinates of P and Q are (p –2) and $\left(\dfrac{5}{3}, q \right)$ respectively, find the values of p and q.

48. If A (–5, 7), B (–4, –5), C (–1, –6) and D (4, 5) are vertices of quadrilateral $ABCD$. Find the area of quadrilateral $ABCD$.

49. If P (x, y) is any point on the line joining the points A(a, 0) and B (0, b), then show that $\dfrac{x}{a} + \dfrac{y}{b} = 1$.

50. If the points (x, y), (–5, –2) and (3, –5) are collinear, prove that $3x + 8y + 31 = 0$.

ANSWERS

1.	c	2.	a
3.	b	4.	b
5.	c	6.	d
7.	c	8.	a
9.	a	10.	d
11.	b	12.	b

13. d

14. c

15. c

16. $a = \dfrac{1}{3}$

17. 2 units

18. $a = 2$

20. $(-3, 4)$

21. $C\ (4,\ -4)$

22. $p = -1$

23. $x - y = 2$

24. $\left(-\dfrac{1}{3},\ 0\right)$

25. $x = 1,\ 5$

26. 5 sq. unit

27. $(0,\ 1)$

28. $a = 0,\ b = 10$

29. $\left(\dfrac{10}{7},\ \dfrac{33}{7}\right)$

30. $4,\ -8$

31. 5 units

32. 5 units

33. $4\sqrt{2}$ units

34. $(-1,\ 3)$

35. $(0,\ -2)$

37. $\left(-\dfrac{3}{4},\ 4\right)$

38. $K = \dfrac{21}{13}$

39. $2,\ 8$

40. $\left(\dfrac{17}{8},\ 0\right)$

41. -1

42. 1

44. 72 sq. unit

45. Coordinates of the vertices are $(2, 1)$, $(0, 3)$, $(0\ -1)$

46. $K = -8$

47. $p = \dfrac{7}{3},\ q = 0$

48. 7289 units