

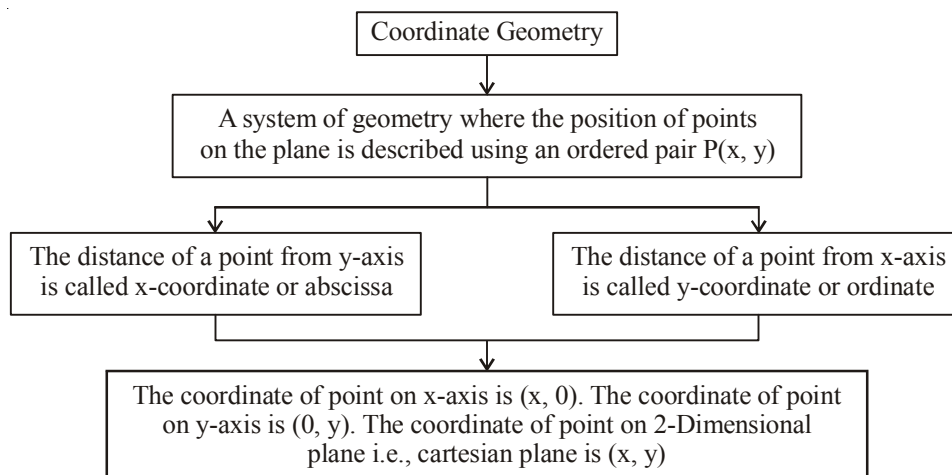
CHAPTER

7

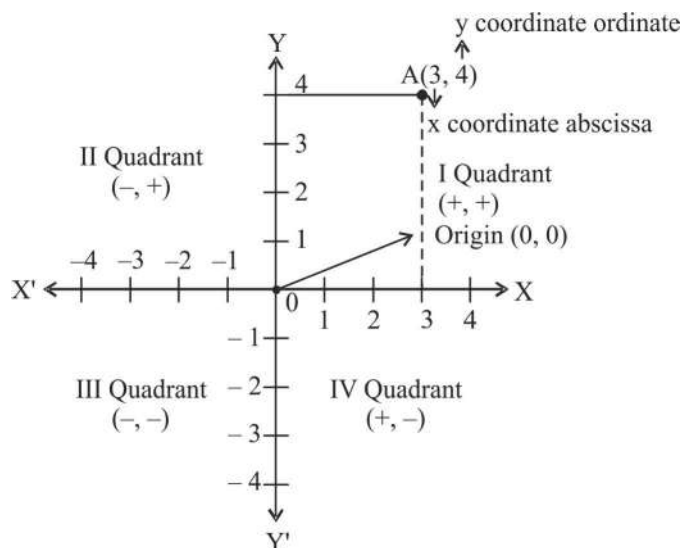
Co-ordinate Geometry

Key Points

1. Coordinate Geometry

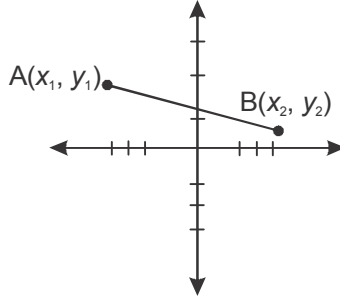


Cartesian Plane



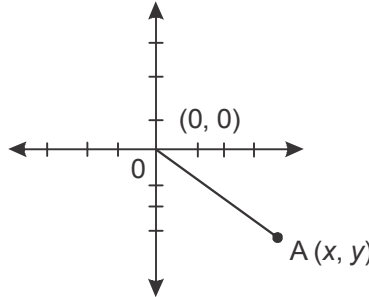
2. Distance Formula

Finding distance between two given points :



$$AB \text{ (Distance between A and B)} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

3. **Distance of a point from origin :**



Using distance formula

$$OA = \sqrt{(x-0)^2 + (y-0)^2} = \sqrt{x^2 + y^2}$$

4. **Midpoint formula :**

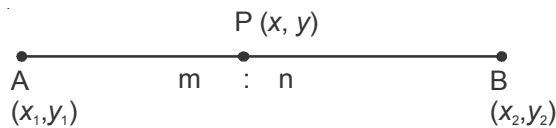
Coordinates of mid points of AB where $A(x_1, y_1)$ and $B(x_2, y_2)$ are :

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

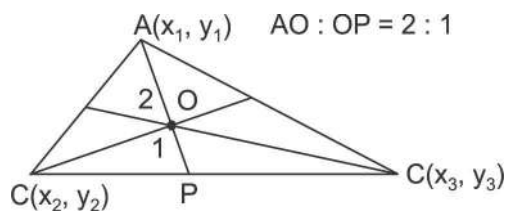
5. **Section formula:**

The coordinates of a point $P(x, y)$ which divides the line segment joining $A(x_1, y_1)$ and $B(x_2, y_2)$ internally in the ratio $m : n$ are given by

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



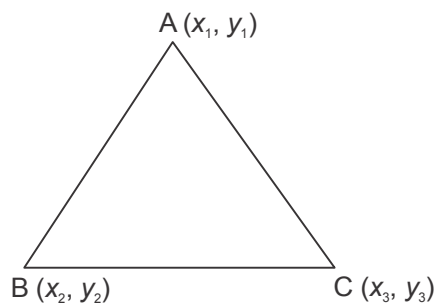
6. Centroid of a triangle is given by :



$$O\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

7. The area of ΔABC , where $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ are its vertices

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



8. If area of a triangle is zero then points are collinear and vice versa.

VERY SHORT ANSWER TYPE QUESTIONS

Fill in the blanks :

1. The distance of a point from the y -axis is called its x -coordinate or _____ .
2. The distance of a point from the x -axis is called its _____ or ordinate.
3. The point $(5, 0)$ lies on _____ axis.
4. A point which lies on y -axis are of the form _____ .
5. A linear equation of the form $ax + by + c = 0$ when represented graphically gives a _____ .
6. The distance of a point $P(x, y)$ from the origin is _____

Multiple Choice Question :

7. 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)
8. The distance of $P(3, -2)$ from y -axis is
 (a) 3 units (b) 2 units
 (c) -2 units (d) $\sqrt{13}$ units
9. The co-ordinates of two points are (6, 0) and (0, -8). The co-ordinates of the mid points are
 (a) (3, 4) (b) (3, -4)
 (c) (0, 0) (d) (-4, 3)
10. If the distance between $P(4, 0)$ and $Q(0, x)$ is 5 units, the value of x will be
 (a) 2 (b) 3
 (c) 4 (d) 5
11. The co-ordinates of the point where line $\frac{x}{a} + \frac{y}{b} = 7$ intersects y -axis are
 (a) (a, 0) (b) (0, b)
 (c) (0, 7b) (d) (2a, 0)
12. The area of triangle OAB, the co-ordinates of whose vertices are 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
13. The distance between the points $P\left(-\frac{11}{3}, 5\right)$ and $Q\left(-\frac{2}{3}, 5\right)$ is
 (a) 6 units (b) 4 units
 (c) 3 units (d) 2 units
14. The distance between the points $(5 \cos 35^\circ, 0)$ and $(0, 5 \cos 55^\circ)$ is
 (a) 10 units (b) 5 units
 (c) 1 unit (d) 2 units

15. The co-ordinates of vertex A of $\triangle ABC$ are $(-4, 2)$ and a point D which is mid point of BC are $(2, 5)$. The coordinates of centroid of $\triangle ABC$ are
- (a) $(0, 4)$ (b) $\left(-1, \frac{7}{2}\right)$
- (c) $\left(-2, \frac{7}{3}\right)$ (d) $(0, 2)$
16. 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
17. 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
18. If the centroid of the triangle formed by $(9, a)$, $(b, -4)$ and $(7, 8)$ is $(6, 8)$, then the value a and b are :
- (a) $a = 4, b = 5$ (b) $a = 5, b = 4$
- (c) $a = 5, b = 2$ (d) $a = 20, b = 2$

VERY SHORT ANSWER TYPE QUESTIONS

19. The centre of circle having end points of its diameter as $(-4, 2)$ and $(4, -3)$ is
- (a) $(2, -1)$ (b) $(0, -1)$
- (c) $\left(0, -\frac{1}{2}\right)$ (d) $\left(4, -\frac{5}{2}\right)$ **(CBSE 2020 Basic)**
20. The distance between the points $(0, 0)$ and $(a - b, a + b)$ is
- (a) $2\sqrt{ab}$ (b) $\sqrt{2a^2 + ab}$
- (c) $2\sqrt{a^2 + b^2}$ (d) $\sqrt{2a^2 + 2b^2}$ **(CBSE 2020 Standard)**

SHORT ANSWER TYPE QUESTIONS-I

21. For what value of P , the points $(2, 1)$, $(p, -1)$ and $(-1, 3)$ are collinear.

22. Find the area of triangle formed by $A(0, 0)$, $B(4, 0)$ and $C(0, 9)$
(CBSE 2020 Basic)
23. Find the point of trisection of the line segment joining the points $(1, -2)$ and $(-3, 4)$.
24. The midpoints of the sides of a triangle are $(3, 4)$, $(4, 1)$ and $(2, 0)$. Find the vertices of the triangle.
25. A circle has its centre at $(4, 4)$. If one end of a diameter is $(4, 0)$ then find the coordinates of the other end.
(CBSE 2020 Standard)
26. Find the ratio in which $P(4, m)$ divides the line segment joining the points $A(2, 3)$ and $B(6, -3)$. Hence find m .
(CBSE 2018)
27. Show that the points $(-2, 3)$, $(8, 3)$ and $(6, 7)$ are the vertices of a right angle triangle.
28. Find the point on y -axis which is equidistant from the points $(5, -2)$ and $(-3, 2)$.
(CBSE 2019)
29. Find the ratio in which y -axis divides the line segment joining the points $A(5, -6)$ and $B(-1, -4)$.
30. Find the co-ordinates of a centroid of a triangle whose vertices are $(3, -5)$, $(-7, 4)$ and $(10, -2)$.
31. Find the relation between x and y such that the points (x, y) is equidistant from the points $(7, 1)$ and $(3, 5)$.
32. Find the ratio in which the segment joining the points $(1, -3)$ and $(4, 5)$ is divided by x -axis. Also find the coordinates of the point on x -axis.
(CBSE 2019)
33. What is the value of a if the points $(3, 5)$ and $(7, 1)$ are equidistant from the point $(a, 0)$?
34. Find a relation between x and y if the points $A(x, y)$, $B(-4, 6)$ and $C(-2, 3)$ are collinear.
35. If the points $A(2, 0)$, $B(6, 1)$ and $C(p, q)$ form a triangle of area 12 sq units (positive only) and $2p + q = 10$, then find the values of p and q .
(CBSE 2020 Standard)

36. Name the type of triangle formed by the points $A(-5, 6)$, $B(-4, -2)$ and $C(7, 5)$.
(NCERT Exemplar)
37. Find the points on the x -axis which are at a distance of $2\sqrt{5}$ from the point $(7, -4)$. How many such points are there?
(NCERT Exemplar)
38. A line intersects the y -axis and x -axis at the point P and Q . If $(2, -5)$ is the midpoint of PQ then find the co-ordinates of P and Q .
(CBSE 2017)
39. If $A(-2, 1)$, $B(a, 0)$, $C(4, b)$ and $D(1, 2)$ are the vertices of a parallelogram $ABCD$, find the values of a and b . Hence find the lengths of its sides.
(CBSE 2018)
40. Let P and Q be the points of trisection of the line segment joining the points $A(2, -2)$ and $B(-7, 4)$ such that P is nearer to A . Find the co-ordinates of P and Q .

SHORT ANSWER TYPE QUESTIONS-II

41. The line segment joining the points $A(2, 1)$ and $B(5, -8)$ is trisected at the point P and Q such that P is nearer to A . If P also lies on the line given by $2x - y + k = 0$, find the value of k .
(CBSE 2019)
42. Find the ratio in which the line $x - 3y = 0$ divides the line segment joining the points $(-2, -5)$ and $(6, 3)$. Find the co-ordinates of the point of intersection.
(HOTS)
43. Point A lies on the line segment XY joining $X(6, -6)$ and $Y(-4, -1)$ in such a way that $\frac{XA}{XY} = \frac{2}{5}$. If point A also lies on the line $3x + k(y + 1) = 0$, find the value of k .
(HOTS)
44. Find the area of the triangle formed by joining the mid points of the sides of the triangle ABC , whose vertices are $A(0, -1)$, $B(2, 1)$ and $C(0, 3)$.
45. Find the value of k so that the area of triangle ABC with $A(k + 1, 1)$, $B(4, -3)$ and $C(7, -k)$ is 6 square units.
46. Point P divides the line segment joining the points $A(2, 1)$ and $B(5, -8)$ such that $\frac{AP}{PB} = \frac{1}{3}$. If P lies on the line $2x - y + k = 0$. Find the value of k .

47. If the distances of $P(x, y)$ from $A(5, 1)$ and $B(-1, 5)$ are equal then prove that $3x = 2y$. **(CBSE 2017)**
48. In what ratio does the point $\left(\frac{24}{11}, y\right)$ divides the line segment joining the points $P(2, -2)$ and $Q(3, 7)$? **(CBSE 2017)**
49. 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 $(2x + y)$.
50. 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 $3b - 4a = 0$.

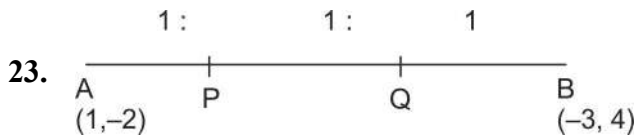
LONG ANSWER TYPE QUESTIONS-III

51. Find the area of the quadrilateral ABCD whose vertices are $A(-4, -3)$, $B(3, -1)$, $C(0, 5)$ and $D(-4, 2)$. **(CBSE 2020 Standard)**
52. If $P(x, y)$ is any point on the line joining $A(a, 0)$ and $B(0, b)$ then show that $\frac{x}{a} + \frac{y}{b} = 1$.
53. If the points (x, y) , $(-5, -2)$ and $(3, -5)$ are collinear, prove that $3x + 8y + 31 = 0$.
54. Find the relation between x and y if $A(x, y)$, $B(-2, 3)$ and $C(2, 1)$ form an isosceles triangle with $AB = AC$.
55. Prove that the point $\left(x, \sqrt{1-x^2}\right)$ is at a distance of 1 unit from the origin.
56. If the points $A(k + 1, 2k)$, $B(3k, 2k + 3)$ and $C(5k - 1, 5k)$ are collinear then find the value of k . **(CBSE 2017)**
57. If the points (a, b) , (c, d) and $(a - c, b - d)$ are collinear show that $bc = ad$.
58. Find the co-ordinates of the circumcenter of the triangle whose vertices are $(3, 7)$, $(0, 6)$ and $(-1, 5)$. Find the circumradius. **(HOTS)**
59. In a triangle PQR, the co-ordinates of points P , Q and R are $(3, 2)$, $(6, 4)$ and $(9, 3)$ respectively. Find the co-ordinates of centroid G . Also find the areas of ΔPQG and ΔPRG .
60. If the points $(5, 4)$ and (x, y) are equidistant from the point $(4, 5)$, prove that $x^2 + y^2 - 8x - 10y + 39 = 0$.

ANSWERS AND HINTS

VERY SHORT ANSWER TYPE QUESTIONS-I

- | | |
|---------------------------------|-------------------------|
| 1. abscissa | 2. y-coordinate |
| 3. x-axis | 4. $(0, y)$ |
| 5. straight line | 6. $\sqrt{x^2 + y^2}$ |
| 7. (iii) $(-3, 0)$ | 8. (i) 3 units |
| 9. (ii) $(3, -4)$ | 10. (ii) 3 |
| 11. (iii) $(0, 7b)$ | 12. (iv) 14 sq. units |
| 13. (c) 3 units | 14. (b) 5 units |
| 15. (a) $(0, 4)$ | 16. (d) 7 units |
| 17. (d) $(4 + 2\sqrt{2})$ units | 18. (d) $a = 20, b = 2$ |
| 19. (c) | 20. (d) |
| 21. $P = 3$ | 22. 18 sq. units |



$$AP : PB = 1 : 2$$

$$AQ : QB = 2 : 1$$

$$P = \left(-\frac{1}{3}, 0\right)$$

$$Q = \left(-\frac{5}{3}, 2\right)$$

24. Let $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ are vertices of given triangle

Let

$$\text{Midpoints of } AB = D(3, 4)$$

$$\text{Midpoints of } BC = E(4, 1)$$

$$\text{Midpoints of } AC = F(2, 0)$$

Apply Midpoint formula on AB, BC, AC

We get

$$x_1 + x_2 = 6, \quad y_1 + y_2 = 8$$

$$x_2 + x_3 = 8, \quad y_2 + y_3 = 2$$

$$x_1 + x_3 = 4, \quad y_1 + y_3 = 0$$

Solving we get

$$x_1 = 1 \quad y_1 = 3$$

$$x_2 = 5 \quad y_2 = 5$$

$$x_3 = 3 \quad y_3 = -3$$

$\therefore A(1, 3), B(5, 5), C(3, -3)$

25. $(4, 8)$

26. Ratio $1 : 1, m = 0$

27. Show using pythagoras theorem and distance formula.

28. $(0, -2)$

29. $5 : 1$

30. $(2, -1)$

31. $x - y = 2$

32. $3 : 5 ; \left(\frac{17}{8}, 0 \right)$

33. $a = 2$

34. $3x = -2y$

35. $p = 2, q = 6$

36. Using distance formula, scalene triangle.

37. $x = 1, x = -15$

Two such points are there.

38. $(4, -10)$

39. $a = 1, b = 1, AB = CD = \sqrt{10}, AD = BC = \sqrt{10}$

40. $P(-1, 0), Q(-4, 2)$

41. $P(3, -2)$

Put value of $x = 3, y = -2$ in equation, then $k = -8$.

42. Let $P(x, y)$ be the point and $m : n$ is the ratio

$$\text{then } x = \frac{6n - 2m}{m + n}, \quad y = \frac{3n - 5m}{m + n} \quad \dots(1)$$

$$\text{From equation of line } x = 3y \Rightarrow \frac{x}{y} = 3$$

By putting $x = 3y$ or $\frac{x}{y} = 3$ in (1)

$$m : n = 3 : 13$$

$$\text{Then } P(x, y) = \left(\frac{9}{2}, \frac{3}{2} \right)$$

43. Find $\frac{XA}{AY} = \frac{2}{3}$.

Let $A(x, y)$ is the point.

$$x = 2, y = -4$$

$$A(2, -4)$$

Put $x = 2$ and $y = -4$ in equation.

$$\therefore K = 2$$

44. 1 sq. unit

45. $K = 3$

46. $K = \frac{-17}{4}$

47. $PA = PB$, Use distance formula

48. $2 : 9$

49. $2x + y = 1$

50. $3b - 4a = 0$ proved by using distance formula.

51. Area of quadrilateral = 34 sq units.

52. Prove by section formula.

53. Prove by area of $\Delta = 0$ if points are collinear.

54. Prove by distance formula.

55. Prove by distance formula.

56. $k = \frac{1}{2}, k = -2$

58. Find co-ordinates of mid points of AB, BC, CA
then $DO = OE = OF$

then (circumcentre) $O(x, y) = \left(1, \frac{13}{2}\right)$

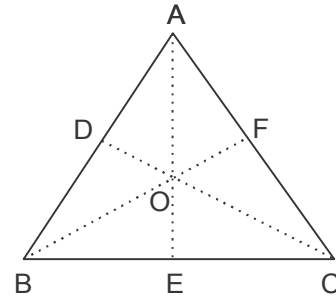
circumradius $AO = \frac{\sqrt{17}}{2}$.

59. $G(x, y) = (6, 3)$

ar $\Delta PQG = \frac{3}{2}$ sq. units

ar $\Delta PRG = \frac{3}{2}$ sq. units

60. Use distance formula



PRACTICE-TEST

Coordinate Geometry

Time : 1 Hr.

M.M. : 20

SECTION - A

1. Find the value of m for which the points $(3, 5)$, $(m, 6)$ and $\left(\frac{1}{2}, \frac{15}{2}\right)$ are collinear. 1
2. What is the distance between the points $A(c, 0)$ and $B(0, -c)$ 1
3. The distance of point $P(-6, 8)$ from the origin is _____ . 1
4. Find the value of ' a ' so that the point $(3, a)$ lies on the line segment $2x - 3y = 5$. 1

SECTION B

5. For what value of p , the points $(-3, 9)$, $(2, p)$ and $(4, -5)$ are collinear. 2
6. If the points $A(8, 6)$ and $B(x, 10)$ lie on the circle whose centre is $(4, 6)$ then find the value of x . 2
7. Find the perimeter of a triangle with vertices $(0, 4)$, $(0, 0)$ and $(3, 0)$. 2

SECTION C

8. Show that the points $A(-3, 2)$, $B(-5, -5)$, $C(2, -3)$ and $D(4, 4)$ are the vertices of a rhombus. 3
9. Find the ratio in which the point $(2, y)$ divides the line segment joining the points $A(-2, 2)$ and $B(3, 7)$. Also find the value of y . 3

SECTION D

10. If the point P divides the line segment joining the points $A(-2, -2)$ and $B(2, -4)$ such that $\frac{AP}{AB} = \frac{3}{7}$, then find the coordinate of P . 4