

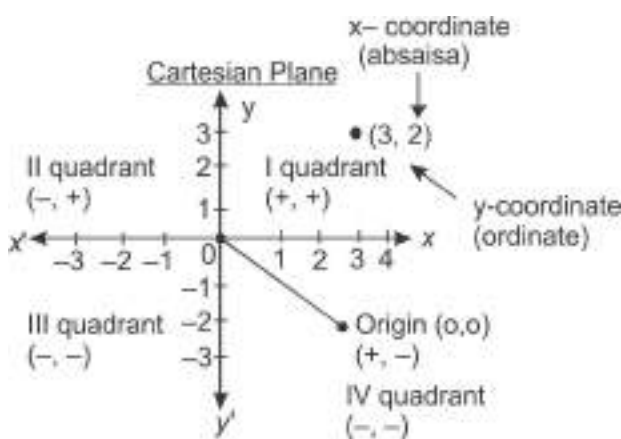
CHAPTER

7

Co-ordinate Geometry

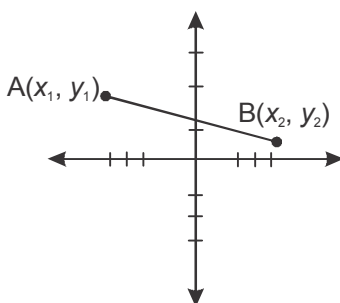
Key Points

1. The system of geometry where the position of points on the plane is described using an ordered pair of numbers.



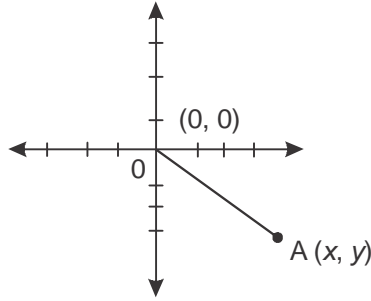
2. Distance Formula

Finding distance between two given points :



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

Distance of a point from origin :

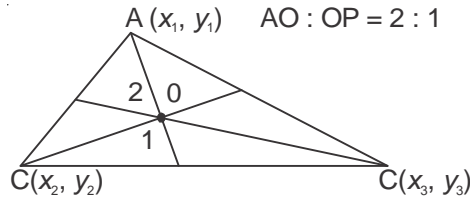


$$OA = \sqrt{x^2 + y^2}$$

Midpoint formula :

Coordinates of mid points of AB where $A(x_1, y_1)$ and $B(x_2, y_2)$ are: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Centroid of a triangle is given by :

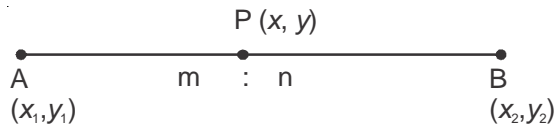


$$O\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

Section formula:

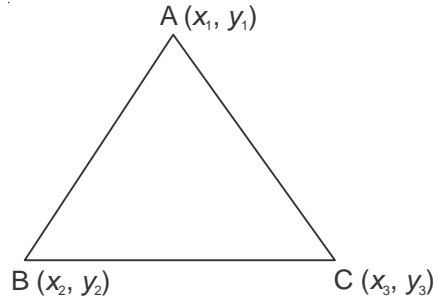
The coordinates of a point $P(x, y)$ which divides the line segment joining $A(x_1, y_1)$ and $B(x_2, y_2)$ internally in the ratio $m : n$ are given by

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



The area of triangle ABC

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



If area of a triangle is zero then points are collinear.

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 co-ordinates 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 ΔABC are $(-4, 2)$ and a point D which is mid point of BC are $(2, 5)$. The coordinates of centroid of ΔABC 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) $a = 3, b = 2$

State True or False

19. The point $P(-4, 2)$ lies on the line segment joining the points $A(-4, 6)$ and $B(-4, -6)$
20. The points $(0, 5)$, $(0, -9)$ and $(3, 6)$ are collinear.
21. For what value of P , the points $(2, 1)$, $(p, -1)$ and $(-1, 3)$ are collinear.
22. Find the area of ΔPQR , whose vertices are $P(-5, 7)$, $Q(-4, -5)$ and $R(4, 5)$.
23. Find the point of trisection of the linear 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. Find the value of x if the points $A(4, 3)$ and $B(x, 5)$ lie on a circle whose centre is $O(2, 3)$.
26. Find the ratio in which x -axis divides the line segment joining the points $(6, 4)$ and $(1, -7)$.
a n d
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 the y -axis which is equidistant from the points $(5, -2)$ and $(-3, 2)$.
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 line segment joining the points $(1, -3)$ and $(4, 5)$ is divided by x -axis. Also find the co-ordinates of this point on x -axis.
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. Find the area of a triangle whose vertices are given as $(1, -1)$, $(-4, 6)$ and $(-3, -5)$.

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. What type of quadrilateral do the points $A(2, -2)$, $B(7, 3)$, $C(11, -1)$ and $D(6, -6)$, taken in that order, form?
39. Find the co-ordinates of the point Q on the x -axis which lies on the perpendicular bisector of the line-segment joining the points $A(-5, -2)$ and $B(4, -2)$. Name the type of triangle formed by the points Q , A and B .
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 .
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. A point P on the x -axis divides the line segment joining the points $(4, 5)$ and $(1, -3)$ in certain ratio. Find the co-ordinates of point P .
48. In right angled $\triangle ABC$, $\angle B = 90^\circ$ and $AB = \sqrt{34}$ units. The co-ordinates of points B, C are $(4, 2)$ and $(-1, y)$ respectively. If ar $\triangle ABC = 17$ sq. units, then find the value of y .
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 $3b - 4a = 0$.

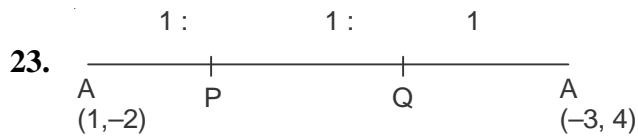
LONG ANSWER TYPE QUESTIONS-III

51. If $A(-5, 7)$, $B(-4, -5)$, $C(-1, -6)$ and $D(4, 5)$ are vertices of a quadrilateral $ABCD$. Find the area of quadrilateral $ABCD$.
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 $(x, \sqrt{1-x^2})$ is at a distance of 1 unit from the origin.
56. If $R(x, y)$ is point on the line segment joining the points $A(a, b)$ and $B(b, a)$, then prove that $x + y = a + b$.
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 $\triangle PQG$ and $\triangle PRG$.
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. False | 20. False |
| 21. $P = 3$ | 22. 25 sq. units |



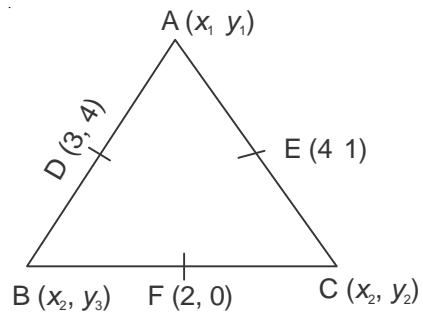
$$AP : PB = 1 : 2$$

$$AQ : QB = 2 : 1$$

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

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

24.



$$\frac{x_1 + x_3}{2} = 3,$$

$$x_1 + x_3 = 6$$

Similarly,

$$x_1 + x_2 = 8$$

$$x_2 + x_3 = 4$$

$$x_3 = 1, \quad x_2 = 3, \quad x_1 = 5$$

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

$$\frac{y_1 + y_3}{2} = 4$$

$$y_1 + y_3 = 8$$

$$y_1 + y_3$$

25. $x = 0$
 26. $4 : 7$
 27. Show using pythagoras and distance formula.
 28. $y = 4$
 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. 28 sq. units.
 36. Using distance formula, scalene triangle.
 37. $x = 1, x = -15$
 Two such points are there.
 38. Rhombus.

39. Use distance formula and midpoint formula.

$$Q\left(-\frac{1}{2}, 0\right)$$

Δ is isosceles.

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

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

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. $m : n = 5 : 3$

$$P\left(\frac{17}{8}, 0\right)$$

48. $y = -1, y = 5$
 49. $2x + y = 1$
 50. $3b - 4a = 0$ proved by using distance formula.
 51. Area of quadrilateral ABCD = Area of $\triangle ABC$ + Area of $\triangle ADC$
 Ar (ABCD) = 72 sq. units.
 52. Prove by section formula.
 53. Prove by area of $\triangle = 0$ if points are collinear.
 54. Prove by distance formula.
 55. Prove by distance formula.
 56. Prove by using area of triangle = 0 if points are collinear.
 58. Find co-ordinates of mid points of AB, BC, CA
 then $DO = OE = OF$

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

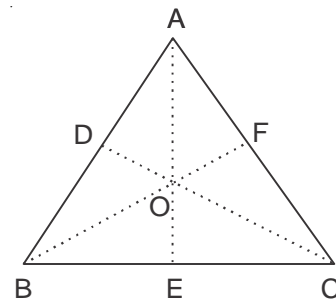
$$\text{circumradius } AO = \frac{\sqrt{17}}{2}$$

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

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

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

60. Use distance formula



PRACTICE-TEST

Coordinate Geometry

Time : 1 Hr.

M.M. : 20

SECTION - A

1. Find the value of m in 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