CHAPTER

7 Co-ordinate Geometry

1.

Coordinate Geometry

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A system of geometry where the position of points on the plane is described using an ordered pair P(x, y)

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The distance of a point from y-axis is called x-coordinate or abscissa

The distance of a point from x-axis is called y-coordinate or ordinate

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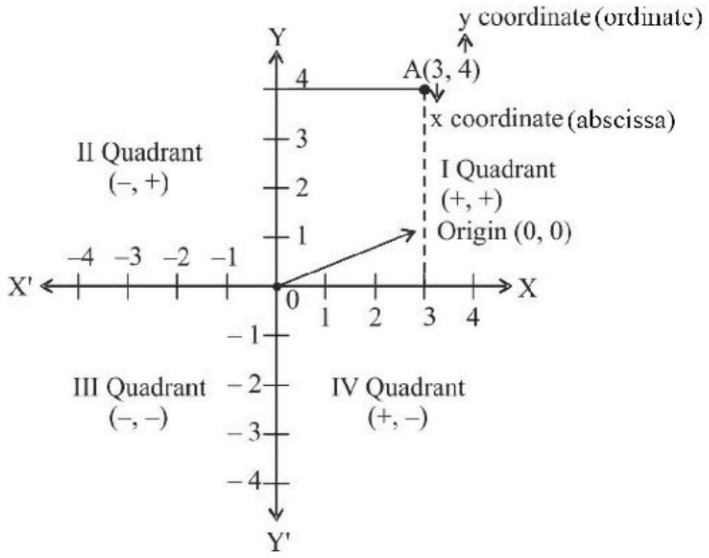
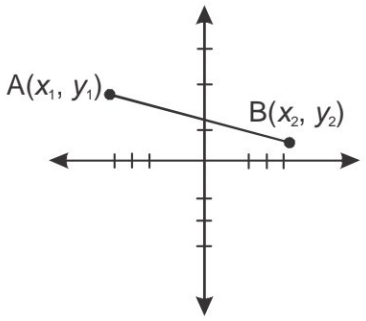
The coordinate of point on x-axis is (x, 0). The coordinate of point on y-axis is (0, y). The coordinate of point on 2-Dimensional plane i.e., cartesian plane is (x, y)

Cartesian Plane



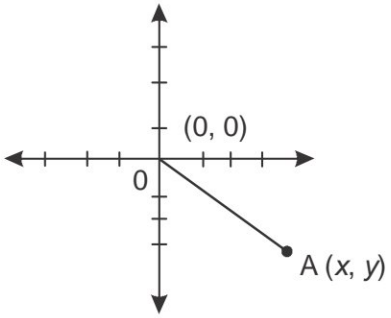
2. Distance Formula

Finding distance between two given points :



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

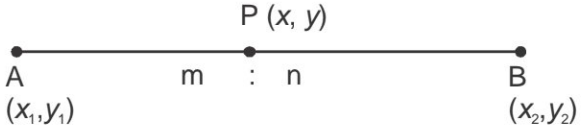
4. ***Midpoint formula :***

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

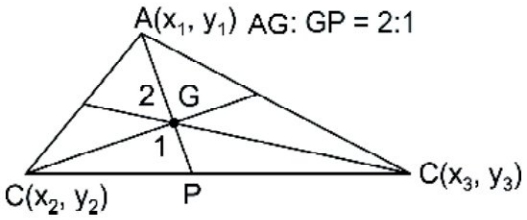
5. ***Section formula:***

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 given triangle is given by :***



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

VERY SHORT ANSWER TYPE QUESTIONS

Multiple Choice Question :

1. 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)

2. The distance of $P(3, -2)$ from y-axis is

(a) 3 units (b) 2 units

(c) – 2 units (d) $\sqrt{13}$ units

3. 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)

4. 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

5. 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)

6. 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

7. 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

8. The co-ordinate of the point which is reflection of point (–3, 5) in x axis are

(a) (3, 5) (b) (3, –5)

(c) (–3, –5) (d) (–3, 5)

9. 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)

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 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

12. 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) $a = 20, b = 2$

13. The centre of circle having end points of its diameter as (–4, 2) and (4, –3) is

(*a*) (2, –1) (*b*) (0, –1)

(*c*) $(0, -\frac{1}{2})$ (*d*) $(4, -\frac{5}{2})$ **(CBSE 2020 Basic)**

14. 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

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

16. Three consecutive vertices of a parallelgram are (–2, –1), (1, 0) and (4, 3). Find the co-ordinates of the fourth vertex.

17. Find the points of trisection of the line segment joining the points (1, – 2) and (– 3, 4).

18. 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)**

19. 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)**

20. Show that the points (– 2, 3), (8, 3) and (6, 7) are the vertices of a right angle triangle.

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

(CBSE 2019)

22. Find the ratio in which *y*-axis divides the line segment joining the points A(5, – 6) and B(– 1, – 4).

23. Find the co-ordinates of a centroid of a triangle whose vertices are (3, – 5), (– 7, 4) and (10, – 2).

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

25. 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)

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

27. If the points A(4, 3) and B(x, 5) are on the circle with centre O(2, 3). Find the value of x.

28. A(5, 1), B(1, 5) and C(–3, –1) are the vertices of ΔABC. Find the length of median passing through A. **(CBSE 2018)**

29. Name the type of triangle formed by the points A(– 5, 6), B(– 4, – 2) and C(7, 5).

(NCERT Exemplar)

30. 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)**

31. 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)**

32. 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)

33. 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

34. 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)**

35. 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)

36. Find the ratio in which line x + 3y – 14 = 0 divides the line segment joining A (–2, 4) and B(1, 7).

37. Find the centre of circle passing through (5, –8), (2, –9) and (2, 1).

38. 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.

39. If the distances of $P(x, y)$ from $A(5, 1)$ and $B(-1, 5)$ are equal then prove that $3x = 2y$. **(CBSE 2017)**

40. 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)**

41. 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 $(2x + y)$.

42. 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

43. If the co-ordinates of the mid-points of the sides ofa triangle are (3, 1), (5, 6) and (–3, 2). Find the co-ordinates of its vertices and centroid.

(CBSE 2020 Standard)

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

45. Find the co-ordinates of the point which divides the line segment joining the points A(2, 6) and B(10, –10) in to 4 equal points. **(CBSE-2011)**

46. Find the relation between x and y if $A(x, y)$, $B(-2, 3)$ and $C(2, 1)$ form an isosceles triangle with $AB = AC$.

47. Prove that the point $\left(x, \sqrt{1 - x^2}\right)$ is at a distance of 1 unit from the origin.

48. Prove that the points (1, 2), (9, 3) and (17, 4) are collinear by section formula.

(CBSE 2017)

49. Determine the ratio in which the line $3x + y - 9 = 0$ divides the segment joining the points (1, 3) and (2, 7).

50. 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.

51. If co-ordinates of two adjacent vertices of a parallelogram are (3, 2) and (1, 0) and diagonats bisect each other at (–2, 5). Find the co-ordinates of the other vertices.

ANSWERS AND HINTS

VERY SHORT ANSWER TYPE QUESTIONS-I

1. (*iii*) (– 3, 0)

2. (i) 3 units

3. (ii) (3, – 4)

4. (ii) 3

5. (iii) (0, 7*b*)

6. (iv) 14 sq. units

7. (c) 3 units

8. (iii) (–3, –5)

9. (a) (0, 4)

10. (d) 7 units

11. (d) $\left(4+2\sqrt{2}\right)$ units

12. (d) a = 20, b = 2

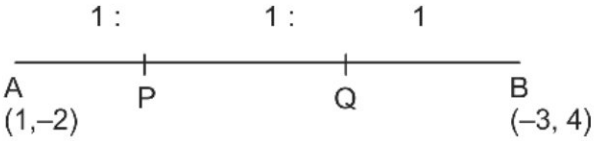
13. (c)

14. (d)

15. (1, 2)

16. 18 sq. units

17.



AP : PB = 1 : 2

AQ : QB = 2 : 1

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

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

18. (4, 8)

19. Ratio 1 : 1, m = 0

20. Show using pythagoras theorem and distance formula.

21. (0, –2)