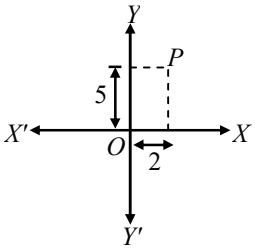
EXERCISE # 1

Q.1 In the adjoining figure find

(i) abscissa

(ii) ordinate

(iii) co-ordinates of point P.

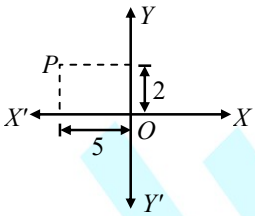


Q.2 Determine

(i) abscissa

(ii) ordinate

(iii) co-ordinate of point P in this given figure.

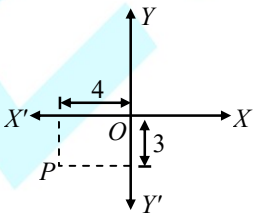


Q.3 Determine

(i) abscissa

(ii) ordinate

(iii) coordinates of point P, in the figure.

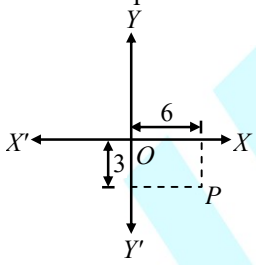


Q.4 In the given figure find

(i) abscissa

(ii) ordinate

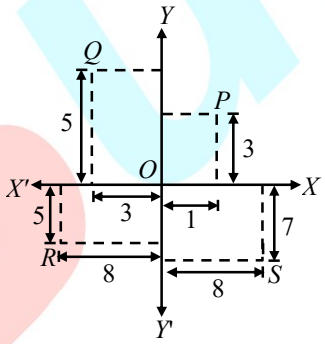
(iii) co-ordinates of point P.



Q.5 Write down

(i) abscissa (ii) ordinates and

(iii) co-ordinates of the points P, Q, R and S in the given figure.



Q.6 Draw X-axis and Y-axis and mark the point A (3, 9), B (4, – 7), C (–8, 9), D (– 3, – 5), E (4, – 2) and F (7, 5)

Q.7 Draw a triangle PQR whose vertices are P = (1, – 6), Q = (7, 4) and R = (– 4, 4).

Q.8 Draw a triangle ABC whose vertices A, B, and C are (– 3, 0), (3, 3) and (– 3, 3) respectively.

Q.9 Draw a rectangle ABCD such that its vertices A, B, C and D are (4, 3), (4, – 2), (– 7, – 2) and (– 7, 3) respectively.

Q.10 Draw a rectangle KLMN such that its vertices K, L, M, and N are (5, 0), (5, 3), (0, 3) and (0, 0) respectively.

Q.11 Construct a square ABCD such that its vertices A, B, C, and D are (1, 2,) (– 7, 2), (– 7, – 6) and (1, – 6) respectively.

Q.12 Construct a square PQRS whose vertices P, Q, R and S are (0, 0), (– 4, 0), (– 4 , – 4) and (0, – 4) respectively

Q.13 Draw a parallelogram ABCD whose vertices A, B, C, and D are (– 4, 8), (– 4, 2), (6, – 7) and (6, – 1) respectively.

Q.14 Construct a trapezium PQRS in which vertices P, Q, R and S are (3, 0), (7, 9), (– 6, 9) and (– 2, 0) respectively.

Q.15 Draw a rhombus ABCD whose vertices A, B, C and D are (1, 4·5), (– 1, 0) (1, – 4·5) and (3, 0) respectively

Q.16 Find the distance between the following pair of points :

(i) (– 6, 7) and (– 1, – 5)

(ii) (a + b, b + c) and (a – b, c – b)

(iii) (a sin α, – b cos α) and (– a cos α, b sin α)

(iv) (a, 0) and (0, b)

Q.17 Find the value of a when the distance between the points (3, a) and (4, 1) is $\sqrt{10}$.

Q.18 Which point on x-axis is equidistant from (5, 9) and (– 4, 6) ?

Q.19 Prove that the points (– 2, 5), (0, 1) and (2, – 3) are collinear.

Q.20 Three vertices of a parallelogram are (a + b, a – b), (2a + b, 2a – b), (a – b, a + b), find the fourth vertex.

Q.21 If the coordinates of the mid-points of the sides of a triangle are (1, 1), (2, – 3) and (3, 4), find its vertices.

Q.22 Find the centroid of the triangle whose vertices are :

(i) (1, 4), (– 1, –1), (3, – 2)

(ii) (– 2, 3), (2, –1), (4, 0)

Q.23 Two vertices of a triangle are (1, 2), (3, 5) and its centroid is at the origin. Find the coordinates of the third vertex.

Q.24 If (– 2, 3), (4, – 3) and (4, 5) are the mid-points of the sides of a triangle, find the coordinates of its centroid.

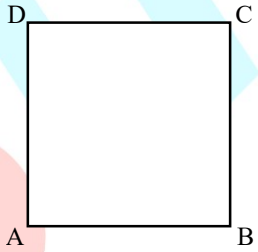
Q.25 Find the area of a triangle whose vertices are

(i) (6, 3), (– 3, 5) and (4, – 2)

(ii) $(at_1^2, 2at_1)$, $(at_2^2, 2at_2)$ and $(at_3^2, 2at_3)$

(iii) (a, c + a), (a, c) and (– a, c – a)

Q.26 Find the co-ordinates of the vertices of the square ABCD (side 2a)



(i) Taking AB and AD as axis,

(ii) Taking the centre of the square as origin and axes parallel to the sides AB, AD.

Q.27 Show that the points (– 4, – 1), (– 2, – 4), (4, 0) and (2, 3) are the vertices points of a rectangle.

Q.28 Show that the points A (1, – 2), B (3, 6), C (5, 10) and D (3, 2) are the vertices of a parallelogram.

Q.29 Prove that the point A (0, 1), B (1, 4), C (4, 3) and D (3, 0) are the vertices of a square.

Q.30 Prove that the points (3, 0), (6, 4) and (–1, 3) are the vertices of a right angled isosceles triangle.

Q.31 Prove that (2, – 2), (– 2, 1) and (5, 2) are the vertices of a right angled triangle. Find the area of the triangle and the length of the hypotenuse.

Q.32 Prove that the points (2a, 4a), (2a, 6a) and $(2a + \sqrt{3}\,a, 5a)$ are the vertices of an equilateral triangle.

Q.33 Prove that the points (2, 3), (– 4, – 6) and (1, 3/2) do not form a triangle

Q.34 An equilateral triangle has two vertices at the points (3, 4) and (– 2, 3), find the coordinates of the third vertex.

Q.35 Show that the quadrilateral whose vertices are (2, –1), (3, 4), (– 2, 3) and (– 3, – 2) is a rhombus.

Q.36 Two vertices of an isosceles triangle are (2, 0) and (2, 5). Find the third vertex if the length of the equal sides is 3.

Q.37 Find the value of k, if the point P (0, 2) is equidistant from (3, k) and (k, 5).

Q.38 Find the coordinates of the point which divides the line segment joining (– 1, 3), and (4, – 7) internally in the ratio. 3 : 4.

Q.39 Find the point of trisection of the line segment joining the points :
(i) (5, – 6) and (– 7, 5)
(ii) (3, – 2) and (– 3, – 4)
(iii) (1, 2) and (11, 9).

Q.40 Three consecutive vertices of a parallelogram are (–2, –1), (1, 0) and (4, 3). Find the fourth vertex.

Q.41 If A (–1, 3), B (1, –1) and C (5, 1) are the vertices of a triangle ABC, find the length of the median through A.

Q.42 If the coordinates of the mid-points of the sides of a triangle are (1, 1), (2, –3) and (3, 4), find the vertices of the triangle.

Q.43 If the mid-point of the line joining (3, 4) and (k, 7) is (x, y) and 2x + 2y + 1 = 0 find the value of k.

Q.44 Determine the ratio in which the straight line x – y – 2 = 0 divides the line segment joining (3, –1) and (8, 9).

Q.45 Prove that (4, 3), (6, 4), (5, 6) and (3, 5) are the angular points of a square.

Q.46 Determine the ratio in which the point P (m, 6) divides the join of A (–4, 3) and B (2, 8). Also find the value of m.

Q.47 Determine the ratio in which the point (– 6, a) divides the join of A (– 3, 1) and B (– 8, 9). Also find the value of a.

Q.48 Find the area of the quadrilaterals, the coordinates of whose vertices are
(i) (– 3, 2), (5, 4), (7, – 6) and (– 5, – 4)
(ii) (1, 2) , (6, 2), (5, 3) and (3, 4)

Q.49 The four vertices of a quadrilateral are (1, 2), (–5, 6), (7, –4) and (k, –2) taken in order. If the area of the quadrilateral is zero, find the value of k.

Q.50 Show that the following sets of points are collinear.
(i) (2, 5), (4, 6) and (8, 8)
(ii) (1, –1), (2, 1) and (4, 5).

Q.51 Prove that the points (a, 0), (0, b) and (1, 1) are collinear if, $\frac{1}{a} + \frac{1}{b} = 1$.

Q.52 Prove that the points (3, –2), (4, 0), (6, –3) and (5, –5) are the vertices of a parallelogram.

Q.53 Find the centre of the circle passing through (5, – 8), (2, – 9) and (2, 1).

Q.54 Show that the points A (5, 6), B (1, 5), C (2, 1) and D (6, 2) are the vertices of a square.

Q.55 Find the value of x such that PQ = QR where the coordinates of P, Q and R are (6, – 1), (1, 3) and (x, 8) respectively.

Q.56 Prove that the points (0, 0), (5, 5) and (– 5, 5) are the vertices of a right isosceles triangle.

Q.57 Find the centre of the circle passing through (6, –6), (3, –7) and (3, 3).

Q.58 Two opposite vertices of square are (–1, 2) and (3, 2). Find the coordinates of other two vertices.

Q.59 The area of a triangle is 5. Two of its vertices are (2, 1) and (3, –2). The third vertex lies on $y = x + 3$. Find the third vertex.

Q.60 If $a \neq b \neq c$, prove that the points (a, a^2), (b, b^2), (c, c^2) can never be collinear.

Q.61 Four points A (6, 3), B (– 3, 5), C (4, – 2), and D (x, 3x) are given in such a way that $\frac{\Delta DBC}{\Delta ABC} = \frac{1}{2}$, find x.

Q.62 For what value of a the point (a, 1), (1, – 1) and (11, 4) are collinear ?

Q.63 Prove that the points (a, b), (a_1, b_1) and $(a - a_1, b - b_1)$ are collinear if $ab_1 = a_1b$.

Q.64 If three points (x_1, y_1), (x_2, y_2), (x_3, y_3) lie on the same line, prove that

$$\frac{y_2 - y_3}{x_2 x_3} + \frac{y_3 - y_1}{x_3 x_1} + \frac{y_1 - y_2}{x_1 x_2} = 0.$$

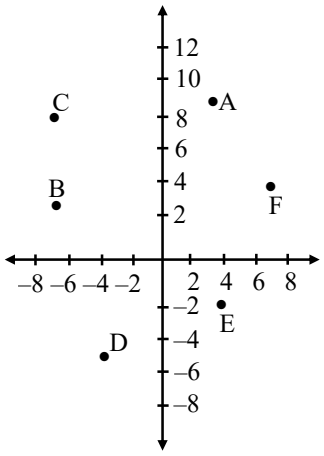
ANSWER KEY

1. (i) 2 (ii) 5 (iii) (2, 5) **2.** (i) –5 (ii) 2 (iii) (–5, 2)

3. (i) –4 (ii) –3 (iii) (–4, –3) **4.** (i) 6 (ii) –3 (iii) (6, –3)

5. (i) 1, –3, –8, 8 (ii) 3, 5, –5, –7 (iii) P(1, 3), Q (–3, 5), R(–8, –5), S(8, –7)

6.



16. (i) 13 (ii) $2b\sqrt{2}$ (iii) $\sqrt{a^2+b^2}$ $(\sin\alpha + \cos\alpha)$ (iv) $\sqrt{a^2+b^2}$

17. 4, –2 **18.** (3, 0) **20.** (–b, b) **21.** (2, 10), (0, – 4), (4, 2) **22.** (i) (1,1/3), (4/3, 2/3)

23. (–4, –7) **24.** (2, 5/3) **25.** (i) 49/2 sq. units (ii) $a^2 (t_1 - t_2) (t_2 - t_3) (t_1 - t_3)$ (iii) a^2

26. (i) A(0, 0), B(2a, 0), C (2a, 2a), D (0, 2a) (ii) A (–a, –a), B(a, – a), C(a, a), D(–a, a)

34. $\left(\frac{1+\sqrt{3}}{2}, \frac{7-5\sqrt{3}}{2}\right), \left(\frac{1-\sqrt{3}}{2}, \frac{7+5\sqrt{3}}{2}\right)$ **36.** $\left(2-\frac{\sqrt{11}}{2}, \frac{5}{2}\right), \left(2+\frac{\sqrt{11}}{2}, \frac{5}{2}\right)$

37. 1 **38.** (8/7, –9/7) & (–16, 33)

39. (i) (1, –7/3), (–3, 4/3) (ii) (1, –8/3), (–1, –10/3) (iii)(13/3,13/3), (23/3, 20/3)

40. (1, 2) **41.** 5 **42.** (4, 0), (2, 8), (0, –6) **43.** k = – 15

44. 2 : 3 Internally **46.** 3 : 2, m = – 2/5 **47.** 3 : 2, a = 29/5

48. (i) 80 sq. units (ii) 11/2 sq. units **49.** k = 3

53. (2, –4) **55.** 5, –3 **57.** (3 , –2)

58. (1, 0) and (1, 4) **59.** (7/2, 13/2) or (–3/2, 3/2) **61.** 11/8 **62.** a = 5

EXERCISE # 2

Q.1 Find the distance between the points $(\cos\theta, \sin\theta)$ and $(\sin\theta, -\cos\theta)$.

Q.2 Find the distance between the points $(a\cos 35^\circ, 0)$ and $(0, a\cos 65^\circ)$.

Q.3 Find the distance between the points $(a\cos\theta + b\sin\theta, 0)$ and $(0, a\sin\theta - b\cos\theta)$

Q.4 If the distance between the points (4, p) and (1, 0) is 5, then find p.

Q.5 A line segment is of length 10 units. If the coordinates of its one end are (2, –3) and the abscissa of the other end is 10, then find its ordinate.

Q.6 Find the perimeter of the triangle formed by the points (0, 0), (1, 0) and (0, 1).

Q.7 If A (2, 2), B (–4, –4) and C(5, –8) are the vertices of a triangle, then find the length of the median through vertex C.

Q.8 If three points (0, 0) $(3, \sqrt{3})$ and $(3, \lambda)$ form an equilateral triangle, then find λ.

Q.9 If the points (k, 2k), (3k, 3k) and (3, 1) are collinear, then find k.

Q.10 Find the coordinates of the point of X-axis which are equidistant from the points (–3, 4) and (2, 5).

Q.11 If (–2, –1), (a, 0), (4, b) and (1, 2) vertices of a parallelogram then find value of a and b.

Q.12 If A (5, 3), B (11, –5) and P (12, y) are the vertices of a right triangle right angled at P, then find y.

Q.13 Find the area of the triangle formed by $(a, b + c)$, $(b, c + a)$ and $(c, a + b)$.

Q.14 If (x, 2), (–3, –4) and (7, –5) are collinear, then find x.

Q.15 If points (t, 2t), (–2, 6) and (3, 1) are collinear then find t.

Q.16 If the area of the triangle formed by the points (x, 2x), (–2, 6) and (3, 1) is 5 square units, then find x.

Q.17 If points (a, 0), (0, b) and (1, 1) are collinear, then find $\frac{1}{a}+\frac{1}{b}$.

Q.18 If the centroid of a triangle is (1, 4) and two of its vertices are (4, –3) and (–9, 7), then find the area of the triangle.

Q.19 Find the ratio in which line segment joining points (–3, –4) and (1, –2) is divided by y-axis.

Q.20 Find the ratio in which (4, 5) divides the join of (2, 3) and (7, 8).

Q.21 The ratio in which the x-axis divides the segment joining (3, 6) and (12, –3).

Q.22 If the centroid of the triangle formed by the points (a, b), (b, c) and (c, a) is at the origin, then find $a^3 + b^3 + c^3 =$

Q.23 If the centroid of the triangle formed by (7, x), (y, –6) and (9, 10) is at (6, 3) then find (x, y)

Q.24 The line joining the points A(4, –5) and B(4, 5) is divided by the point P such that AP : AB = 2 : 5, find the coordinates of P.

Q.25 The line segment joining A(–3, 1) and B(5, –4) is a diameter of a circle whose centre is C. Find the coordinates of the point C.

Q.26 The mid-point of the line joining (a, 2) and (3, 6) is (2, b). Find the values of a and b.

Q.27 The mid-point of the line segment joining (2a, 4) and (–2, 3b) is (1, 2a + 1). Find the values of a and b.

Q.28 The centre of a circle is (2, –3) and one end of a diameter is (1, 4), find the other end.

Q.29 The point P(–4, 1) divides the line segment joining the points A(2, –2) and B in the ratio 3 : 5. Find the point B.

Q.30 If A(1, 1) and B(–2, 3) are two points and C is a point on AB produced such that AC = 3AB, find the co-ordinates of C.

Q.31 In what ratio does the point (–4, 6) divide the line segment joining the points A(–6, 10) and B(3, –8) ?

Q.32 The line segment joining A $\left(-1,\frac{5}{3}\right)$ and B (a, 5) is divided in the ratio 1 : 3 at P, the point where the line segment AB intersects y-axis. Find
(i) the value of a
(ii) the co-ordinates of P.

Q.33 Find the ratio in which the y-axis divides the line segment joining the points (5, – 6,) and (– 1, – 4). Also find the co-ordinates of the point of intersection.

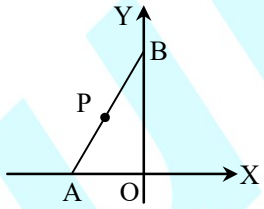
Q.34 Calculate the ratio in which the line joining A(6, 5) and B(4, –3) is divided by the line y = 2. Also find the co-ordinates of the point of division.

Q.35 Determine the ratio in which the line 2x + y – 4 = 0 divide the line segment joining the points A(2, –2) and B(3, 7). Also find the coordinates of the point of division.

Q.36 A(10, 5), B(6, –3) and C(2, 1) are the vertices of a triangle ABC. L is the mid-point of AB and M is the mid-point of AC. Write down the co-ordinates of L and M. Show that LM = $\frac{1}{2}$BC.

Q.37 Find the third vertex of a triangle if its two vertices are (–1, 4) and (5, 2) and mid-point of one side is (0, 3).

Q.38 In the adjoining figure, P(–2, 3) is the mid-point of the line-segment AB. Find the coordinates of A and B.



Q.39 Prove that the coordinates of the centroid of a ΔABC, with vertices $A(x_1,y_1)$, $B(x_2,y_2)$ and $C(x_3,y_3)$ are given by

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

ANSWER KEY

1. $\sqrt{2}$ **2.** a **3.** $\sqrt{a^2+b^2}$ **4.** ±4 **5.** (3, –9) **6.** $2+\sqrt{2}$

7. $\sqrt{85}$ **9.** $-\frac{1}{3}$ **11.** a = –2, b = 6,

12. 2, –4 **13.** 0 **14.** –63 **15.** $\frac{4}{3}$ **16.** $\frac{2}{3}$ **17.** 1

18. $\frac{183}{2}$ **19.** 3 : 1 **20.** 2 : 3 **21.** 2 : 1 **22.** 3abc **23.** (5, 2)

24. (4, –1) **25.** $\left(1,-\frac{3}{2}\right)$ **26.** a = 1, b = 4 **27.** a = 2, b = 2

28. (3, –10) **29.** (–14, 6) **30.** (–8, 7) **31.** 2 : 7

32. (i) 3 (ii) $\left(0,\frac{5}{2}\right)$ **33.** 5 : 1, $\left(0,-\frac{13}{3}\right)$ **34.** 3 : 5 ; $\left(\frac{21}{4},2\right)$

35. 2 : 9, $\left(\frac{24}{11},-\frac{4}{11}\right)$ **37.** (–5, 4) or (1, 2) **38.** A(–4, 0), B(0, 6)