CO-ORDINATE GEOMETRY

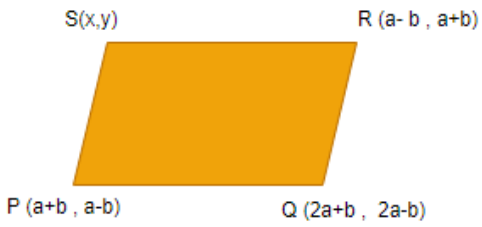
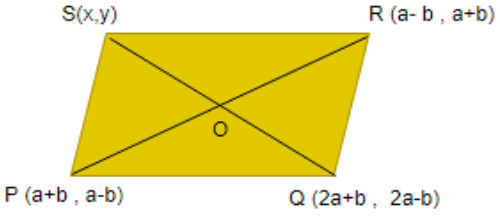
CLASS X (2025-26) *SUJITHKUMAR KP*

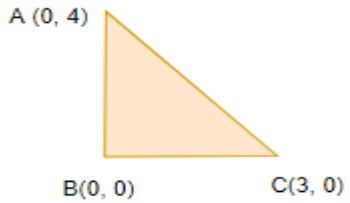
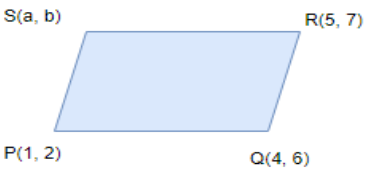
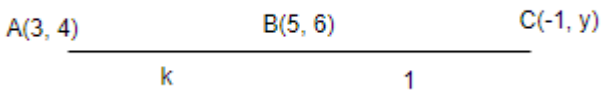
1.	Find the point on x-axis which is equidistant from (–2, 5) and (2, –3) (A) $(2,0)$ (B) $(-2,0)$ (C) $(1,0)$ (D) $(0,-2)$
	ANS: (B) $(-2,0)$
2.	Coordinates of the vertices of a triangle are $A\ (-2,2), B\ (0,4)\ and\ C\ (4,-2)$ then the midpoint of the side BC is___. (A) $(1,2)$ (B) $(2,1)$ (C) $(1,0)$ (D) $(-1,3)$
	ANS: (B) $(2,1)$
3.	Find a point on the *y*-axis which is equidistant from the points A(6, 5) and B(– 4, 3) (A) $(0,\ 9)$ (B) $(0,-9)$ (C) $(9,\ 9)$ (D) $(9,0)$
	ANS: (A) $(0,\ 9)$
4.	Find the distance of the point $(1,2)$ from the midpoint of the line segment joining the points $(6,8)$ and $(2,\ 4)$. (A) 6 (B) 4 (C) 2 (D) 5
	(D) 5
5.	Find the distance between the points $\left(-\frac{8}{5}, 2\right)\ and\ \left(\frac{2}{5}, 2\right)$. (A) 2 (B) 4 (C) 5 (D) 8
	ANS: (A) 2
6.	Find the coordinates of the point A , where AB is the diameter of a circle whose centre is $(2,-3)$ and B is $(1,4)$. (A) $(7,\ 3)$ (B) $(3, 10)$ (C) $(-3, 10)$ (D) $(3,-10)$
	ANS: (D) $(3,-10)$
7.	What point on the x-axis is equidistant from $(7,6)$ and $(-3, 4)$ (A) $(-3,\ 0)$ (B) $(-4,\ 0)$ (C) $(3,\ 0)$ (D) $(0, 3)$
	ANS: (C) $(3,\ 0)$
8.	If the mid- point of the line segment joining the points $P\ (6, b-2)$ and $Q\ (-2,4)$ is $(2,-3)$, find the value of b. (A) -8 (B) 8 (C) -2 (D) 5
9.	Find the ratio in which the line segment joining $A(1,-5)$ and $B\ (-4,5)$ is divided by the $x-\ axis$. (A) 1: 2 (B) 1: 1 (C) 2: 1 (D) 3: 1
10	If the points $A\ (4,3)$ and B $(x,\ 5)$ are on the circle with the centre $O(2,3)$, find the value of x (A) 2 (B) 4 (C) -5 (D) 5
11	AOBC is a rectangle whose three vertices are A (0, 3), O (0, 0) and B (5, 0). The length of its diagonal is ___ A) 8 B) $\sqrt{34}$ C) 5 D) 34
	ANS: B) $\sqrt{34}$
12	Given a Δ ABC with vertices $A(2,2), B(0,2)\ \ and\ C(2,-4)$. Find the length of the median from the vertex A. A) $\sqrt{37}$ B) $\sqrt{13}$ C) $\sqrt{10}$ D)) $\sqrt{12}$
13	The line segment AB joining the points $A\ (3,-4)\ and\ B\ (1,2)$ is trisected at the point

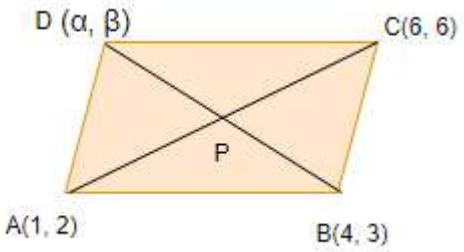
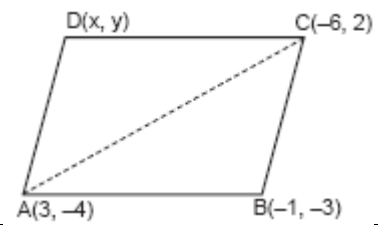
	$P\ (p, -2)\ and\ Q\ \left(\frac{5}{3}, q\right)$. Find the value of p. A) $p = 2$ B) $p = 3$ C) $p = \frac{7}{3}$ D) $p = \frac{5}{3}$
14.	If P(1, 2), Q(4, 6), R(5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then ____ A) a = 3, b = 4 B) a = 2, b = 4 C) a = 2, b = 3 D) a = 3, b = 3
15.	The point P which divides the line segment joining the points A(2, –5) and B(5, 2) in the ratio 2 : 3 lies in the quadrant____ A) I B) II C) III D) IV
16.	The area (in square units) of the triangle formed by the points A(a, 0), O(0, 0) and B(0, b) is_____ A) ab B) $\frac{1}{2}ab$ C) $\frac{1}{2}a^2b^2$ D) $\frac{1}{2}b^2$
17.	The distance of the point (4, 6) from y -axis is _____ A) 6 B) 4 C) 2 D) 10
18.	If the distance of the point $(4,\ a)$ from x-axis is half its distance from y-axis, then a = _____ A) 4 units B) 8 units C) 2 units D) 6 units
19.	If the distance between the points (8, p) and (4, 3) is 5 units, then value of p is_____ A) 6 B) 0 C) 6 and 0 D) 5
20.	If the origin is the mid-point of the line segment joined by the points (2, 3) and (x, y), then the value of (x, y) is_____ A) (2, 3) B) (– 2, 3) C) (– 2, – 3) D) (2, – 3)
21.	If four vertices of a parallelogram taken in order are $(-3, -1), (a, b), (3, 3)\ and\ (4, 3)$, then $a : b$ =_____ A) 1 : 4 B) 4 : 1 C) 1 : 2 D) 2 : 1
22.	What is the distance between the points A(c, 0) and B(0, –c)? A) $\sqrt{2c}$ B) $\sqrt{2}\,c$ C) $\sqrt{2}$ D) c
23.	If A and B are the points (–6, 7) and (–1, –5) respectively, then find the distance 3AB. A) 26 B) 13 C) 25 D) 39
24.	Find the point on y-axis which is equidistant from the points (5, – 2) and (–3, 2). A) -2 B) 2 C) 3 D) 16
25.	Find the ratio in which the line segment joining the points (6, 4) and (1, –7) is divided by *x*-axis. A) 4: 5 B) 7: 4 C) 4: 7 D) 1: 7
26.	The coordinates of the point which divides the line segment joining the points (4, – 3) and (8, 5) in the ratio 3 : 1 internally is _____. A) $(7, 3)$ B) $(-7, 3)$ C) $(7, -3)$ D) $(-7, -3)$
27.	If the points $A\ (4, 3)$ and B $(x,\ 5)$ are on the circle with the centre $O(2, 3)$, find the value of x A) 2 B) 4 C) -5 D) 5
28.	Find the value of *k* if P (4, –2) is the mid-point of the line segment joining the points A (5*k*, 3) and B (–*k*, –7). A) – 2 (B) 2 (C) 3 (D) 1
29.	Find the point on *y*-axis which is equidistant from the points (5, – 2) and (–3, 2).
30.	Distance of the point $(2, -4)$ from the origin is _____. a) $2\sqrt{5}$ b) 4 c) $\sqrt{2}$ d) $2\sqrt{2}$

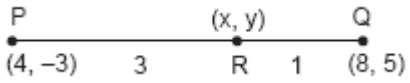
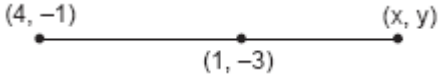
31.	If the opposite angular points of a square are (4,3) and (-2 ,-3) then the side of the square is___ a) 6 b) $6\sqrt{2}$ c) $\sqrt{6}$ d) none
32.	End points of a diameter of a circle are (2, 3) and (5, 6) . Its centre is ___ a) (7, 9) b) (2,1) c) $\left(\frac{7}{2},\frac{9}{2}\right)$ d) (-3,-3)
33.	If the points (-1,-1); (0, 0) and (2, k) are collinear then the value of k is ……. a) -3 b) 3 c) 2 d) none
34.	The ratio in which the x-axis divides the line joining (4, 8) and (3,-5) is …….. a) 5:7 b) 8:3 c) 8:5 d) none
35.	What point on the *x*-axis is equidistant from (7, 6) and (– 3, 4)? a) (3, 0). b) (8, 0) c) (4,0) d) (–3, 0)
36.	If the points A (4, 3) and B (*x*, 5) are on the circle with the centre O (2, 3), find the value of *x*. a) 5 b) 3 c) 2 d) 4
37.	The centre of a circle is (2x – 1, 7) and it passes through the point (– 3, –1). If the diameter of the circle is 20 units, then find the value of x. a) – 4, 2 b) – 4, 3 c) 4, – 2 d) – 4, –2
	ANS: a) – 4, 2
38.	If the mid-point of the line segment joining the points P (6, b – 2) and Q (– 2, 4) is (2, – 3), find the value of *b*. (a) – 8 (b) 8 (c) – 6 (d) – 12
39.	If P (1, 2), Q (4, 6), R (5, 7) and S (*a*, *b*) are the vertices of a parallelogram PQRS then find the value of *a* and *b*. a) $a = 2$ and $b = -3$ b) $a = 2$ and $b = 3$ c) $a = -2$ and $b = 3$ d) $a = -2$ and $b = -3$
40.	If P $\left(\frac{a}{3}, 4\right)$ is the mid-point of the line segment joining the points Q (– 6, 5) and R (–2, 3), then the value of a is _____ (a) –4 (b) –12 (c) 12 (d) –6
41.	The coordinates of the point which divides the line segment joining the points (4, – 3) and (8, 5) in the ratio 3 : 1 internally is _____. A) $(7, 3)$ B) $(-7, 3)$ C) $(7, -3)$ D) $(-7, -3)$
42.	Find the ratio in which line formed by joining (–1, 1) and (5, 7) is divided by the line $x + y = 4$. ANS: 1 : 2.
43.	Find the ratio in which the point $(2, 1)$ divides the join of the points $(1, -2)$ and $(4, 7)$ A) 1: 4 B) 2: 3 C) 1: 2 D) 2 : 1
44.	If the point C (–1, 2) divides the line segment AB in the ratio 3 : 4, where the coordinates of A are (2, 5), find the coordinates of B. ANS: (–5, –2).
45.	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 also lies on the line given by $2x – y + k = 0$, find the value of *k*. ANS: $k = -8$
46.	If C is a point lying on the line segment AB joining A(1, 1) and B(2, – 3) such that 3AC = CB, then find the coordinates of C. ANS: $\left(\frac{5}{4}, 0\right)$
47.	The coordinates of the mid-point of the line joining the points (3*p*, 4) and (– 2, 2*q*) are (5, *p*). Find the

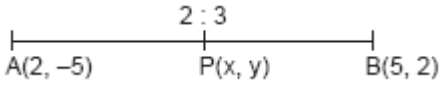
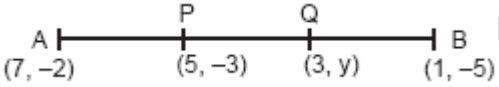
	values of p and q. ANS: $p = 4$ and $q = 2$
48.	Find the ratio in which the line segment joining (2, – 3) and (5, 6) is divided by x-axis. ANS: 2 : 1 internally
49.	Point A is on the y-axis at a distance of 4 units from the origin. If coordinates of point B are (–3, 0) then find the length of AB. ANS : 5 units
50.	Find the point on x-axis which is equidistant from the points (2, – 5) and (–2, 9). *ANS: $a = -7$*
51.	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? ANS: (9, 0) and (5, 0).
52.	The centre of a circle is $(2a, a - 7)$. Find the values of a if the circle passes through the point (11, –9) and has diameter $10\sqrt{2}$ units. *ANS: $a = 5, 3$*
53.	Find the perimeter of the triangle with vertices (0, 4), (0, 0) and (3, 0). ANS: 12 units.
54.	Find the ratio in which the y-axis divides the line segment joining the points (5, – 6) and (–1, –4). ANS: 5 : 1.
55.	Find the fourth vertex of a rectangle whose three vertices taken in order are (4, 1), (7, 4) and (13, –2). *ANS:* D(10, –5).
56.	If origin is the mid-point of the line segment joined by the points (2, 3) and (x, y) then find the value of (x, y). *ANS: $x = -2$ $y = -3$.*
57.	If (–2, –1); $(a, 0)$; $(4, b)$ and (1, 2) are the vertices of a parallelogram, find the values of a and b. *ANS: $a = 1$; $b = 3$*
58.	In what ratio does the line $x - y - 2 = 0$ divide the line segment joining (3, –1) and (8, 9)? *ANS:* 2 : 3.
59.	If the line $3x + 4y = 24$ cuts the x-axis at A and y-axis at B, then find the area of AOB. *ANS:* 24 sq. units
60.	Find the ratio in which the line segment joining the points (6, 4) and (1, –7) is divided by x-axis *ANS:* 4 : 7.
61.	Determine k, so that the following points are collinear: (2, 3), $(k, 6)$ and (3, 2). *ANS: $k = -1$*
62.	Point P divides the line segment joining the points A (2 , –5) and B (5, 2) in the ratio 2 : 3. Name the quadrant in which P lies.
63.	The coordinates of one end point of a diameter of a circle are (4, –1) and the coordinates of the centre are (1, –3). Find the coordinates of the other end of the diameter.
64.	The centre of a circle is (2a +3, 2a -1). Find the value of a if the circle passes through the point (11, 9) and has a diameter of length 20 units.
65	The end points of diameter of circle are (2, 4) and (–3, –1). The radius of the circle is _____. (A) $\frac{5}{2}$ (B) $\frac{5}{\sqrt{2}}$ (C) $\frac{10}{\sqrt{2}}$ (D) $5\sqrt{2}$
	ANS: (B) $\frac{5}{\sqrt{2}}$
66	Three vertices of a parallelogram ABCD are A(1, 4), B(–2, 3) and C(5, 8). The abscissa of the fourth vertex D is ____

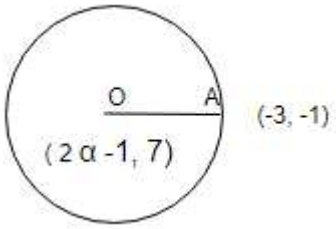
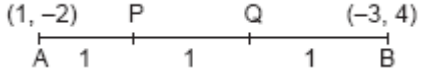
	(A) 9 (B) 8 (C) 6 (D) 3
	ANS: (B) 8
67	Points $A\ (-1, y)\ and\ B(5, 7)$ lie on a circle with centre $O\ (2, -3y)$. The values of y are _____ (A) $-1, 7$ (B) $1, -7$ (C) $2, 7$ (D) $-7,\ 7$
	ANS: (A) $-1, 7$
68	If (a, b) is the midpoint of the line segment joining the points $A\ (10, -6)\ and\ B\ (k, 4)$ and $a - 2b = 18$, the values of k is _____ (A) -22 (B) 10 (C) 11 (D) 22
	(D) 22
69	The point P which divides the line segment joining the points $A(2, -5)$ and $B\ (5, 2)$ in the ratio 2 : 3 lies in the quadrant____ (A) I (B) II (C) III (D) IV
	ANS: (D) IV
70	If the distance of the point $(4, a)$ from x-axis is half its distance from $y - axis$, then a = ___ (A) $\frac{1}{2}$ (B) 4 (C) 8 (D) 2
	ANS: D) 2
71	The coordinates of one end point of a diameter of a circle are (4, –1) and the coordinates of the centre are (1, –3). Find the coordinates of the other end of the diameter. (A) $(-2, -5)$ (B) $(2, -5)$ (C) $(-2, 5)$ (D) $(2, 5)$
	ANS : (A) $(-2, -5)$ Let coordinates of the other end of the diameter be (x, y). We know that the centre of the circle (1, –3) is the mid-point of diameter. $\Rightarrow \frac{4+x}{2} = 1,\ \frac{-1+y}{2} = -3$ $\Rightarrow$ 4 + x = 2 and –1 + y = –6 $\Rightarrow$ x = – 2 and y = –6 + 1 = –5 Thus, coordinates of the other end of the diameter are (–2, –5).
72	If $P(a+b, a-b), Q(2a+b, 2a-b), R(a-b, a+b)$ and $S(x, y)$ are the vertices of a parallelogram PQRS, then find the fourth vertex $S(x, y)$. (A) (b, b) (B) $(b, -b)$ (C) $(-b, b)$ (D) (a, b)
	
	ANS: Since Diagonals of parallelogram bisect each other, Mid-point of PR and SQ is same . Coordinates of O $\left(\frac{a+b+a-b}{2}, \frac{a-b+a+b}{2}\right)$ $= (a, a)$) Coordinates of O $\left(\frac{2a+b+x}{2}, \frac{2a-b+y}{2}\right)$ Equate both $\frac{2a+b+x}{2} = a \Rightarrow x = -b$ $\frac{2a-b+y}{2} = a \Rightarrow y = b$ $S(x, y) = S(-b, b)$
	
73	C is the mid -point of PQ , P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$ then $x\ and\ y$ respectively are ____. (A) $x = -6,\ y = 1$ (B) $x = -6,\ y = 2$ (C) $x = 6,\ y = -1$ (D) $x = 6,\ y = -2$
	a) $x = -6,\ y = 1$

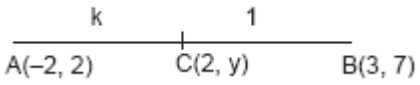
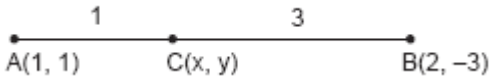
74	If the distance between the points (4, p) and (1, 0) is 5 units, then the value of p is (A) 4 only (B) ± 4 (C) –4 only (D) 0
	ANS: (b) $\sqrt{(4-1)^2+(p-0)^2}=5$ $\Rightarrow 3^2+p^2=5^2 \Rightarrow p^2=25-9=16 \Rightarrow p=\pm 4$
75	The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is _____ (A) 5 (B) 12 (C) 11 (D) $7+\sqrt{5}$
	 ANS: Perimeter of ΔABC = AB + BC + AC = $4+3+\sqrt{4^2+3^2}=7+\sqrt{25}=7+5=12$
76	If $P(1,2), Q(4,6), R(5,7)$ *and* $S(a,b)$ are the vertices of a parallelogram PQRS, then (A) a = 2, b = 4 (B) a = 3, b = 4 (C) a = 2, b = 3 (D) a = 3, b = 5
	 Midpoint of PR = $\left(\frac{1+5}{2},\frac{2+7}{2}\right)=\left(3,\frac{9}{2}\right)$
	Mid-points of SQ = $\left(\frac{4+a}{2},\frac{6+b}{2}\right)$ = Diagonals of parallelogram bisect $\therefore \quad \left(3,\frac{9}{2}\right)=\left(\frac{4+a}{2},\frac{6+b}{2}\right)$ $\Rightarrow \quad 3=\frac{4+a}{2}, \quad \frac{9}{2}=\frac{6+b}{2}$ $\Rightarrow \quad a=2, \quad b=3.$
77	If P $\left(\frac{a}{3}, 4\right)$ is the mid-point of the line segment joining the points Q (– 6, 5) and R (–2, 3), then the value of a is _____ (A) –4 (B) –12 (C) 12 (D) –6
	ANS: (b) Mid-point of QR = $\left(\frac{-6-2}{2},\frac{5+3}{2}\right)$ = (– 4, 4) P = $\left(\frac{a}{3}, 4\right)$ So, $\frac{a}{3}=-4 \Rightarrow a=-12$
78	A straight line is drawn joining the points (3, 4) and (5, 6). If the line is extended, the ordinate of the point on the line, whose abscissa is –1 is _____.
	 ANS: Let line is extended to C(– 1, y) such that AB : BC = k : 1 $\frac{(-1)\times k+3}{k+1}=5 \Rightarrow k=-\frac{1}{3},$

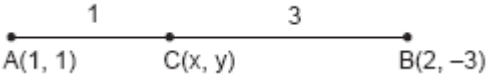
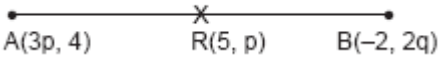
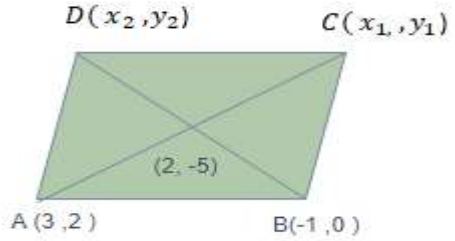
	$\frac{y\times\frac{-1}{3}+4}{-\frac{1}{3}+1}=6 \Rightarrow \frac{-y+12}{2}=6 \Rightarrow y=0$
79	Find the distance between the points, $\left(\frac{-8}{5},2\right)$ and $\left(\frac{2}{5},2\right)$.
	ANS: Distance between $\left(\frac{-8}{5},2\right)$ and $\left(\frac{2}{5},2\right)$ is $\sqrt{\left(-\frac{8}{5}-\frac{2}{5}\right)^2+(2-2)^2}=\sqrt{4}=2$
80	If A and B are the points (–6, 7) and (–1, –5) respectively then find the distance 2AB.
	ANS: A (–6, 7), B(–1, –5) Let $x_1 = -6$, $y_1 = 7$; $x_2 = -1$, $y_2 = -5$ Distance, AB = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{(-1+6)^2+(-5-7)^2} = \sqrt{5^2+(-12)^2} = 13$ 2AB = 2 × 13 = 26
81	If the mid-point of the line segment joining the points P(6, b – 2) and Q(– 2, 4) is (2, – 3), find the value of *b*.
	ANS: P(6, b - 2) R(2, -3) Q(-2, 4) According to question PR = RQ or R is mid-point of PQ. $x=\frac{x_1+x_2}{2}, y=\frac{y_1+y_2}{2}$ Using mid-point formula $\frac{b-2+4}{2}=-3 \Rightarrow b+2=-6 \quad \Rightarrow b=-8$
82	If A(1, 2), B(4, 3) and C(6, 6) are the three vertices of a parallelogram ABCD, find the coordinates of the fourth vertex D.
	ANS: Let coordinates of D be (α,β) P is mid-point of AC and BD.  $\left(\frac{\alpha+4}{2},\frac{\beta+3}{2}\right)=\left(\frac{1+6}{2},\frac{2+6}{2}\right) = \frac{\alpha+4}{2}=\frac{7}{2} \quad ; \quad \frac{\beta+3}{2}=\frac{8}{2} \qquad \alpha=3 \quad \beta=5$ ∴ Coordinates of D are (3,5)
83	The three vertices of a parallelogram ABCD are A (3, –4), B (–1, –3) and C (–6, 2). Find the coordinates of vertex D.
	Let coordinates of vertex D are (*x*, *y*). Mid-point of AC = $\left(\frac{-6+3}{2},\frac{2+(-4)}{2}\right) = \left(\frac{-3}{2},-1\right)$ Mid-point of BD = $\left(\frac{-1+x}{2},\frac{-3+y}{2}\right)$ Diagonals of a ||gm bisect each other 

	Midpoint of AC = Midpoint of BD $\left(\frac{-3}{2}, -1\right) = \left(\frac{-1+x}{2}, \frac{-3+y}{2}\right)$ $\frac{-3}{2} = \frac{-1+x}{2}$ and $-1 = \frac{-3+y}{2}$ $-3 = -1 + x$ and $-2 = -3 + y \Rightarrow y = 1$ $x = -2$ and $y = 1$ Coordinates of D are (–2, 1)	
84	Find the coordinates of the centroid of a triangle whose vertices are (0, 6), (8, 12) and (8, 0).	
	ANS: Coordinates of the centroid of a triangle whose vertices are (x_1, y_1), (x_2, y_2), (x_3, y_3) are $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$ $= \left(\frac{0+8+8}{3}, \frac{6+12+0}{3}\right) = \left(\frac{16}{3}, \frac{18}{3}\right) = \left(\frac{16}{3}, 6\right)$	
85	Check whether (5, – 2), (6, 4) and (7, – 2) are the vertices of an isosceles triangle	
	Let A (5, – 2), B(6, 4) and C(7, – 2) be the vertices of triangle. Finding $AB = \sqrt{37},\ BC = \sqrt{37}\ adn\ AC = 2$ Hence triangle is isosceles triangle.	
86	Find the coordinates of the point which divides the line segment joining the points (4, – 3) and (8, 5) in the ratio 3 : 1 internally	
	ANS: Let coordinates of the required point be R(x, y) this means R divides the join of P(4, –3) and Q(8, 5) in the ratio 3 : 1 internally.  Using the formula for internal division. $x = \frac{3(8)+1(4)}{3+1} = \frac{24+4}{4} = \frac{28}{4} = 7$ $y = \frac{3(5)+1(-3)}{4} = \frac{15-3}{4} = 3$ Thus, the coordinates of R (7, 3) divides PQ in the ratio 3 : 1.	
87	Two vertices of a triangle are (3, –5) and (–7, 4). If its centroid is (2, – 1), find the third vertex.	
	ANS: Let the third vertex of the triangle be (x, y). $\therefore \quad 2 = \frac{x+3+-7}{3}$, $-1 = \frac{y-5+4}{3}$ $\Rightarrow 6 = x - 4, -3 = y - 1 \Rightarrow x = 10, y = -2$ Thus coordinates of the vertex are (10, –2).	
88	The coordinates of one end point of a diameter of a circle are (4, –1) and the coordinates of the centre are (1, –3). Find the coordinates of the other end of the diameter.	
	ANS: Given that coordinates of one end point of the diameter is (4, –1) and centre of the circle is (1, – 3).  Let coordinates of the other end of the diameter be (x, y). We know that the centre of the circle (1, –3) is the mid-point of diameter.	

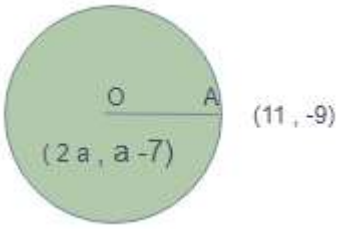
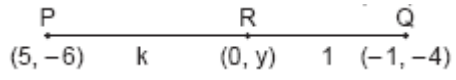
	$\Rightarrow \frac{4+x}{2} = 1$ and $\frac{-1+y}{2} = -3$ $\Rightarrow 4 + x = 2$ and $-1 + y = -6 \Rightarrow x = -2$ and $y = -6 + 1 = -5$ Thus, coordinates of the other end of the diameter are (–2, –5).
89	Point P divides the line segment joining the points A(2, –5) and B(5, 2) in the ratio 2 : 3. Name the quadrant in which P lies.
	$x = \frac{2\times5+3\times2}{2+3} = \frac{16}{5} = 3.2$ $y = \frac{2\times2+3\times(-5)}{2+3} = -\frac{11}{5} = -2.2$ Point P(3.2, – 2.2) lies in IV quadrant 
90	In figure, P(5, –3) and Q(3, y) are the points of trisection of the line segment joining A(7, – 2) and B(1, – 5). Find y.
	ANS: AP = PQ = BQ  $\Rightarrow$ Q is mid-point of PB $\Rightarrow y = \frac{-3+(-5)}{2} = -4$
91	If P $\left(\frac{a}{3}, 4\right)$ is the mid-point of the line segment joining the points Q (– 6, 5) and R (–2, 3), then the value of a is _____
	ANS: (b) Mid-point of QR = $\frac{-6-2}{2}, \frac{5+3}{2}$ = (– 4, 4) P = $\left(\frac{a}{3}, 4\right)$ So, $\frac{a}{3} = -4 \Rightarrow$ a = – 12
92	Find the distance between the points P(–6, 7) and Q(–1, –5).
	PQ = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ PQ = $\sqrt{((-1)-(-6))^2 + (7-(-5))^2}$ = $\sqrt{25+144} = \sqrt{169} = 13$
93	If the distances of P(*x*, *y*) from the points A(3, 6) and B(–3, 4) are equal prove that $3x + y = 5$
	ANS: Distance between P(*x*, *y*) and A(3, 6) is equal to the distance between P(*x*, *y*) and B (– 3, 4). $\Rightarrow$ PA = PB $\Rightarrow \sqrt{(x-3)^2 + (y-6)^2} = \sqrt{(x-(-3))^2 + (y-4)^2}$ $\Rightarrow \sqrt{x^2+9-6x+y^2+36-12y} = \sqrt{x^2+9+6x+y^2+16-8y}$ Squaring both sides, we get $x^2 + 9 - 6x + y^2 + 36 - 12y = x^2 + 9 + 6x + y^2 + 16 - 8y$ $\Rightarrow 6x + 6x - 8y - 36 + 16 + 12y = 0 \Rightarrow 12x + 4y - 20 = 0 \Rightarrow 3x + y = 5$
94	Find the point on *y*-axis which is equidistant from the points (5, – 2) and (–3, 2).

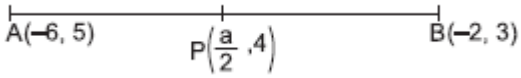
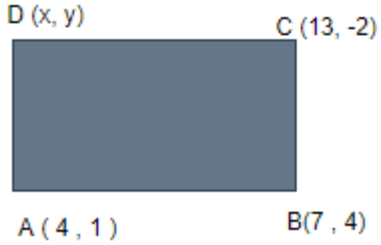
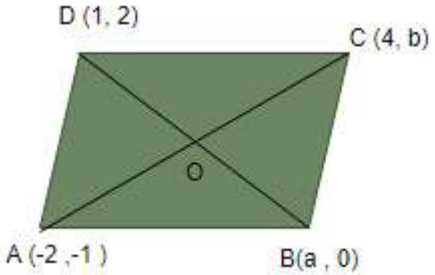
	ANS: Let point on y-axis be $(0, a)$ Now distance of this point from $(5, -2)$ is equal to distance from point $(-3, 2)$ i.e., $\sqrt{5^2 + (-2-a)^2} = \sqrt{3^2 + (a-2)^2}$ Squaring and simplifying, we get $25 + 4 + a^2 + 4a = 9 + a^2 + 4 - 4a \Rightarrow 8a = -16 \Rightarrow a = -2$
95	What point on the x-axis is equidistant from $(7, 6)$ and $(-3, 4)$?
	ANS: Let A$(7, 6)$, B$(-3, 4)$ be the given points and P$(x, 0)$ be the required point. Since P is equidistant from A and B, therefore, AP = BP $\Rightarrow$ $AP^2 = BP^2$ $\Rightarrow (x-7)^2 + (0-6)^2 = (x+3)^2 + (0-4)^2 \Rightarrow x^2 + 49 - 14x + 36 = x^2 + 9 + 6x + 16$ $\Rightarrow -14x - 6x = 25 - 85 \Rightarrow -20x = -60$ $\Rightarrow x = -\frac{60}{-20} = 3.$ Required point on x-axis is $(3, 0)$.
96	If the points A$(4, 3)$ and B$(x, 5)$ are on the circle with the centre O$(2, 3)$, find the value of x.
	ANS: The points A and B are on circle with centre O. $AB = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ AO = BO $\Rightarrow \sqrt{(4-2)^2 + (3-3)^2} = \sqrt{(x-2)^2 + (5-3)^2}$ $\Rightarrow \sqrt{4} = \sqrt{(x-2)^2 + 4}$ Squaring both sides, we get $4 = (x-2)^2 + 4 \Rightarrow (x-2)^2 = 0$ $\Rightarrow x = 2$
97	The centre of a circle is $(2\alpha - 1, 7)$ and it passes through the point $(-3, -1)$. If the diameter of the circle is 20 units, then find the value of α .
	OA = 10 units $OA = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ $\Rightarrow$ OA = $\sqrt{\left((2\alpha - 1) + 3\right)^2 + (7+1)^2}$ $\Rightarrow 10 = \sqrt{4\alpha^2 + 44 + 8\alpha + 64}$ Squaring $100 = 4\alpha^2 + 8\alpha + 68$ $\Rightarrow 4\alpha^2 + 8\alpha - 32 = 0$ $\Rightarrow \alpha^2 + 2\alpha - 8 = 0$ $\Rightarrow \alpha^2 + 4\alpha - 2\alpha - 8 = 0 \ \alpha(\alpha + 4) - 2(\alpha + 4) = 0$ $\Rightarrow (\alpha + 4)(\alpha - 2) = 0$ $\Rightarrow \alpha = -4, \alpha = 2$ 
98	Find the coordinates of the point of trisection of the line segment joining $(1, -2)$ and $(-3, 4)$.
	
	Let the points P and Q trisect AB.

	⇒ AP : PB = 1 : 2 and AQ : QB = 2 : 1 Using section formula coordinates of P are $$x = \frac{1 \times (-3) + 2 \times 1}{1 + 2} = \frac{-3 + 2}{3} = -\frac{1}{3}$$ $$y = \frac{1 \times (4) + 2 \times (-2)}{1 + 2} = 4 - 4 = 0$$ Thus, P is $\left(-\frac{1}{3}, 0\right)$, Coordinates of Q are $$x = \frac{2 \times (-3) + 1 \times 1}{1 + 2} = \frac{-6 + 1}{3} = -\frac{5}{3}$$ $$y = \frac{2 \times (4) + 1 \times (-2)}{1 + 2} = \frac{8 - 2}{3} = \frac{6}{3} = 2$$ Thus, Q is $\left(-\frac{5}{3}, 2\right)$
99	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*.
	ANS: Let C divides AB in the ratio *k* : 1 *x* coordinate of C $$2 = \frac{3k + 1 \times (-2)}{k + 1}$$ $2 = \frac{3k-2}{k+1}$ $\Rightarrow 2k + 2 = 3k - 2$  ⇒ $k = 4$ C divides AB in the ratio 4 : 1 Now *y* coordinate of C = $$\frac{4 \times 7 + 1 \times (2)}{4 + 1}$$ $\frac{4 \times 7 + 1 \times 2}{4 + 1}$ [$k = 4$] ⇒ $y = \frac{28+2}{5}$ $y = 6$
100	If C is a point lying on the line segment AB joining A(1, 1) and B(2, – 3) such that 3AC = CB, then find the coordinates of C.
	

	ANS: $\frac{AC}{CB} = \frac{1}{3}$ Coordinates of C (x, y) $\quad x = \frac{mx_2 + nx_1}{m+n}, y = \frac{my_2 + ny_1}{m+n}$ $x = \frac{2+3}{4} = \frac{5}{4}$ $\quad y = \frac{-3+3}{1+3} = 0$ $(x, y) = \left(\frac{5}{4}, 0\right)$ 
101	The coordinates of the mid-point of the line joining the points $(3p, 4)$ and $(-2, 2q)$ are $(5, p)$. Find the values of p and q.
	
	R(5, p) is the mid-point of the line segment joining the points A ($3p$, 4) and B (-2, $2q$). $\left(\frac{3p-2}{2}, \frac{4+2q}{2}\right) = (5, p)$ $\frac{3p-2}{2} = 5 \Rightarrow 3p = 10 + 2$, $3p = 12 \Rightarrow p = 4$ ...(i) $p = 4$, and $\frac{4+2q}{2} = 4$ $\quad 4 + 2q = 2p$ ...(ii) Substituting $p = 4$ from (i) in (ii), we get $4 + 2q = 8 \Rightarrow 2q = 4 \Rightarrow q = 2$ $p = 4$ and $q = 2$
102	Find the ratio in which the line segment joining (2, – 3) and (5, 6) is divided by x-axis.
	ANS: Let the required ratio be k : 1. Then the coordinates of the point of division are $\left(\frac{5k+2}{k+1}, \frac{6k-3}{k+1}\right)$. This point lies on the x-axis whose equation is $y = 0$. $\frac{6k-3}{k+1} = 0$ $\quad 6k = 3$, or $k = ½$. Line segment joining the two points is divided in the ratio 1 : 2 internally by x-axis.
103	If two vertices of a parallelogram are (3, 2), (– 1, 0) and the diagonals cut at (2, – 5), find the other vertices of the parallelogram.
	
	Let coordinates of C be (x_1, y_1) and D be (x_2, y_2). $\frac{x_1+3}{2} = 2, -----(i)$ $\quad \frac{y_1+2}{2} = -5$ ----(ii) [Mid-point theorem] $\frac{x_2-1}{2} = 2 -------(iii)$, $\frac{y_2+0}{2} = -5 -----(iv)$ [Mid-point theorem] From equation (i), we get

	$\frac{x_1+3}{2} = 2$ = 2 ⇒ $x_1 + 3 = 4$ ⇒ $x_1 = 4 – 3 = 1$ Solving equation (ii), we get $y_1 + 2 = –10$ ⇒ $y_1 = – 10 – 2$ ⇒ $y_1 = – 12$ Solving equation (iii), we get $D(x_2, y_2)$ $x_2 – 1 = 4$ $x_2 = 4 + 1 = 5$ Solving equation (iv), we get $y_2 + 0 = –10$ ⇒ $y_2 = –10$ Coordinates of C are (1, –12) and D are (5, –10).
104	Find the coordinates of a point P which divides the line segment joining the points A(– 2, 3) and B(4, 7) internally in the ratio $\frac{4}{7}$.
	Let P be a point which divides the line segment A(–2, 3) and B(4, 7) in the ratio 4 : 7 internally. Let coordinates of P be (x , y) $x = \frac{4\times4+7\times(-2)}{4+7} = \frac{16-14}{11} = \frac{2}{11}$ $y = \frac{4\times7+7\times(3)}{4+7} = \frac{28+21}{11} = \frac{49}{11}$ Required point is $\left(\frac{2}{11}, \frac{49}{11}\right)$ 
105	If x is a positive integer such that the distance between the points P(x, 2) and Q(3, –6) is 10 units, then x = ?
	ANS: Distance between the points P(x, 2) and Q(3, –6) is 10. Using distance formula PQ = 10 ⇒ $\sqrt{(x-3)^2 + (2-(-6))^2} =$ 10 ⇒ $\sqrt{x^2 + 9 - 6x + 8^2} =$ = 10 ⇒ $\sqrt{x^2 - 6x + 73} =$ = 10 Squaring both sides, we get ⇒ $x^2 – 6x + 73 = 100$ ⇒ $x^2 – 6x + 73 – 100 = 0$ ⇒ $x^2 – 6x – 27 = 0$ ⇒ $x^2 – 9x + 3x – 27 = 0$ ⇒ $x(x – 9) + 3(x – 9) = 0$ ⇒ $(x – 9)(x + 3) = 0$ ⇒ either $x – 9 = 0$ or $x + 3 = 0$ ⇒ $x = 9$ or $x = – 3$ Ignoring $x = –3$ as it is given that x is a positive integer. Thus, only solution is x = 9
106	Point A is on the y-axis at a distance of 4 units from the origin. If coordinates of point B are (–3, 0) then find the length of AB.
	ANS: Coordinates of A are (0, 4) ⇒ $AB = \sqrt{(0-(-3))^2 + (4-0)^2} = \sqrt{9+16}$ AB = 5 units

107	Find the point on *x*-axis which is equidistant from the points (2, – 5) and (–2, 9).
	ANS: Let point on *x*-axis be P(a, 0) and given that A(2, –5) and B(–2, 9) are equidistant. PA = PB $\Rightarrow \sqrt{(a-2)^2+25} = \sqrt{(a+2)^2+81}$ Squaring both sides, we get $a^2 + 4 - 4a + 25 = a^2 + 4 + 4a + 81$ $\Rightarrow -8a = 56 \Rightarrow a = -7$
108	The centre of a circle is ($2a$, a – 7). Find the values of a if the circle passes through the point (11, –9) and has diameter $10\sqrt{2}$ units.
	
	A.T.Q. Diameter = $10\sqrt{2}$ $\Rightarrow$ Radius = $5\sqrt{2}$ So OA = $5\sqrt{2}$ $OA^2 = 50$ $\Rightarrow (2a - 11)^2 + (a - 7 + 9)^2 = 50$ $\Rightarrow 4a^2 + 121 - 44a + (a + 2)^2 = 50$ $\Rightarrow 4a^2 - 44a + 121 + a^2 + 4 + 4a - 50 = 0$ $\Rightarrow 5a^2 - 40a + 75 = 0$, $a^2 - 8a + 15 = 0$ $(a - 5)(a - 3) = 0 \Rightarrow a = 5, 3$
109	Find the perimeter of the triangle with vertices (0, 4), (0, 0) and (3, 0).
	ANS: Let A(0, 4), B(0, 0) and C(3, 0) are the vertices of Δ ABC $AB = \sqrt{(0-0)^2+(0-4)^2} = 4$ $BC = \sqrt{(0-3)^2+(0-0)^2} = 3$ $AC = \sqrt{(3-0)^2+(0-4)^2} = 5$ Perimeter of Δ ABC = AB + BC + CA = 4 + 3 + 5 = 12 units.
110	Find the ratio in which the *y*-axis divides the line segment joining the points (5, – 6) and (–1, –4).
	ANS: Let *y*-axis divides the line segment joining the points (5, – 6) and (– 1, – 4) in the ratio k : 1 and the coordinates of the required point be (0, y).  Then, $0 = \frac{5\times1 + k\times(-1)}{k+1}$

	$5 - k = 0 \Rightarrow \ k = 5$ Thus, y-axis divides the line segment joining the points (5, –6) and (–1, –4) in the ratio 5 : 1.
111	If $\left(\frac{a}{2},\ 4\right)$, is the mid-point of the line segment joining the points A(–6, 5) and B(–2, 3) then find the value of a.
	ANS: Since P is mid-point of line segment AB, then $\frac{-6+-2}{2} = \frac{a}{2}$, $\frac{a}{2} = -4 \quad \Rightarrow a = -8$  $\Rightarrow \ a = -8$
112	Find the fourth vertex of a rectangle whose three vertices taken in order are (4, 1), (7, 4) and (13, –2).
	ANS: Mid-points of diagonals of a rectangle coincide  $\left(\frac{13+4}{2}, \frac{1-2}{2}\right) = \left(\frac{x+7}{2}, \frac{y+4}{2}\right)$ $x = 10$ and $y = -5$. Hence, fourth vertex is D(10, –5).
113	If origin is the mid-point of the line segment joined by the points (2, 3) and (x, y) then find the value of (x, y).
	ANS: $\frac{x+2}{2} = 0 \quad \Rightarrow x = -2$ $\frac{y+3}{2} = 0 \quad \Rightarrow y = -3$
114	If (–2, –1); (a, 0); (4, b) and (1, 2) are the vertices of a parallelogram, find the values of a and b.
	ANS: A(–2, –1), B(a, 0), C(4, b) and D(1, 2) are the vertices of a parallelogram. We know that diagonals of a parallelogram bisect each other.  Coordinates of mid-point of AC = coordinate of mid-point of BD $\left(\frac{-2+4}{2}, \frac{-1+b}{2}\right) = \left(\frac{1+a}{2}, \frac{2+0}{2}\right)$

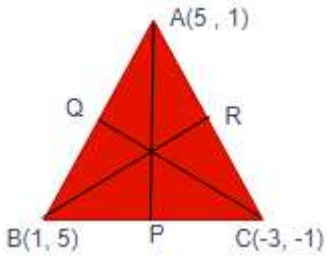
	$\frac{-2+4}{2} = \frac{1+a}{2} \Rightarrow 2 = 1 + a \quad \Rightarrow a = 1$ $\frac{-1+b}{2} = \frac{2+0}{2} \Rightarrow -1 + b = 2 \quad \Rightarrow b = 3$ $\Rightarrow a = 1; b = 3$
115	In what ratio does the line $x - y - 2 = 0$ divide the line segment joining (3, –1) and (8, 9)?
	ANS: Let the line $x - y - 2 = 0$, divides the line segment joining (3, – 1) and (8, 9) in the ratio k : 1 and let the coordinates of the required point be (x_1, y_1). Then $x_1 = \frac{8k+3}{k+1}$ $y_1 = \frac{9k+1(-1)}{k+1} = \frac{9k-1}{k+1}$ This point (x_1, y_1) lies on the line whose equation is $x - y - 2 = 0$. It must satisfy the equation of the given line $\frac{8k+3}{k+1} - \frac{9k-1}{k+1} - 2 = 0$. $\Rightarrow 8k + 3 - (9k - 1) - 2(k + 1) = 0$ $\Rightarrow 8k + 3 - 9k + 1 - 2k - 2 = 0$ $\Rightarrow -3k + 2 = 0$, $k = \frac{2}{3}$ Therefore, the required ratio is $k : 1 = \frac{2}{3} : 1$ or 2 : 3.
116	Find the ratio in which the point $(x, 2)$ divides the line segment joining the points (–3, –4) and (3, 5). Also find the value of x.
	ANS: Let C divides AB in the ratio k : 1 k 1 A(–3, –4) C(x, 2) B(3, 5) y coordinate of C = $\frac{5k+1(-4)}{k+1}$ $2 = \frac{5k-4}{k+1} \Rightarrow 2k + 2 = 5k - 4$ $k = 2$ C divides AB in the ratio 2 : 1 x coordinates of C = $\frac{2 \times 3 + 1 \times (-3)}{2+1}$ $\Rightarrow x = 1$
117	Find the ratio in which the line segment joining the points (6, 4) and (1, –7) is divided by x-axis.
	ANS: Let x-axis divides the join of (6, 4) and (1, – 7) in the ratio k : 1 at the point $(a, 0)$. $a = \frac{1 \times k + 1 \times 6}{k+1}$, $0 = \frac{(-7) \times k + 1 \times 4}{k+1}$ $0 = -7k + 4 \Rightarrow 7k = 4 \Rightarrow k = \frac{4}{7}$ Thus, x-axis divides the join of the given points in the ratio 4 : 7.
118	Find the coordinates of a point which divides the join of (1, 3) and (2, – 1) in the ratio 3 : 2 internally
	ANS: (1, 3) P(x, y) (2, –1) 3 : 2 Let the point P(x, y) divides the join of (1, 3) and (2, –1) in the ratio 3 : 2 $x = \frac{3 \times 2 + 2 \times 1}{3+2} = \frac{8}{5}$

and $y = \frac{3\times(-1)+2\times3}{3+2} = \frac{3}{5}$

Coordinates of P are $\left(\frac{8}{5}, \frac{3}{5}\right)$

119 Find the lengths of the medians of Δ ABC having vertices at A(5, 1), B(1, 5) and C(– 3, – 1).

Let P, Q and R be the mid-points of the sides BC, AB and AC respectively.



So, P = $\left(\frac{1-3}{2}, \frac{5-1}{2}\right)$ Q = $\left(\frac{1+5}{2}, \frac{5+1}{2}\right)$

and R = $\left(\frac{5-3}{2}, \frac{1-1}{2}\right)$

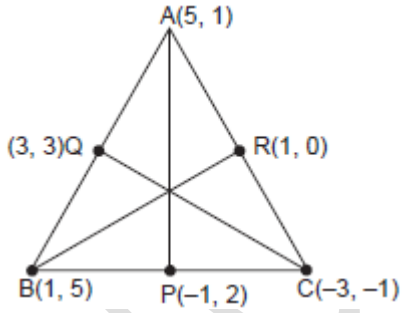
P (–1, 2), Q (3, 3) and R (1, 0).

AP, BR and CQ are the medians.

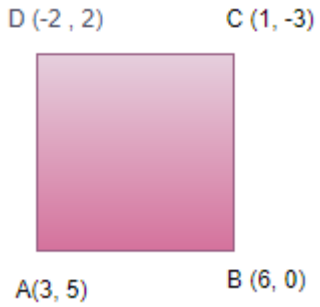
$AP = \sqrt{(5+1)^2 + (1-2)^2} = \sqrt{(6)^2 + (-1)^2} = \sqrt{37}$

$BR = \sqrt{(0)^2 + (5)^2} = 5$

$CQ = \sqrt{(6)^2 + (4)^2} = \sqrt{52}$



120 Show that the points A (3, 5), B (6, 0), C (1, – 3) and D (–2, 2) are the vertices of a square ABCD



AB = $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{(6-3)^2 + (0-5)^2} = \sqrt{3^2 + (-5)^2} = \sqrt{9+25} = \sqrt{34}$

$BC = \sqrt{(6-1)^2 + (0+3)^2} = \sqrt{5^2 + (3)^2} = \sqrt{25+9} = \sqrt{34}$

$CD = \sqrt{(1+2)^2 + (-3-2)^2} = \sqrt{3^2 + (-5)^2} = \sqrt{9+25} = \sqrt{34}$

$DA = \sqrt{(-2-3)^2 + (2-5)^2}$

$= \sqrt{(-5)^2 + 3^2} = \sqrt{25+9} = \sqrt{34}$

$AC = \sqrt{(1-3)^2 + (-3-5)^2} = \sqrt{68}$

$BD = \sqrt{(6+2)^2 + (0-2)^2} = \sqrt{68}$

AB = BC = CD = DA, Diagonal AC = diagonal BD = $\sqrt{68}$

Hence A, B, C and D are vertices of a square.