

CBSE Test Paper 01
Chapter 7 Coordinate Geometry

1. The distance between the points $A(p \sin 25^\circ, 0)$ and $B(0, p \sin 65^\circ)$ is **(1)**
 - a. 0 units
 - b. p units
 - c. p^2 units
 - d. 1 units
2. If the points (x, y) , $(1, 2)$ and $(7, 0)$ are collinear, then the relation between 'x' and 'y' is given by **(1)**
 - a. $3x - y - 7 = 0$
 - b. $3x + y + 7 = 0$
 - c. $x + 3y - 7 = 0$
 - d. $x - 3y + 7 = 0$
3. If the distance between the points $(p, -5)$ and $(2, 7)$ is 13 units, then the value of 'p' is **(1)**
 - a. -3, -7
 - b. 3, -7
 - c. 3, 7
 - d. -3, 7
4. If the vertices of a triangle are $(1, 1)$, $(-2, 7)$ and $(3, -3)$, then its area is **(1)**
 - a. 0 sq. units
 - b. 2 sq. units
 - c. 24 sq. units
 - d. 12 sq. units
5. The distance between the points (x_1, y_1) and (x_2, y_2) is given by **(1)**
 - a. $\sqrt{(x_2 + x_1)^2 + (y_2 + y_1)^2}$ units
 - b. $\sqrt{(x_2 + x_1)^2 - (y_2 + y_1)^2}$ units
 - c. $\sqrt{(x_2 - x_1)^2 - (y_2 - y_1)^2}$ units
 - d. $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ units
6. If the points $A(x, 2)$, $B(-3, -4)$, $C(7, -5)$ are collinear, then find the value of x. **(1)**
7. Find the distance between the points A and B in the following : $A(a, 0)$, $B(0, a)$ **(1)**

8. Find the perpendicular distance of A(5,12) from the y-axis. **(1)**
9. Find the distance of the point (- 4, - 7) from the y-axis. **(1)**
10. Find the coordinates of the centroid of a triangle whose vertices are (0,6), (8,12) and (8,0). **(1)**
11. Find the distance between the points: A(-6, -4) and B(9, -12) **(2)**
12. Find the condition that the point (x, y) may lie on the line joining (3, 4) and (-5, - 6). **(2)**
13. If P (x, y) is any point on the line joining the points A(a,0) and B(0, b), then show that $\frac{x}{a} + \frac{y}{b} = 1$. **(2)**
14. The area of triangle formed by the points (p, 2 - 2p), (1, p, 2 p) and (-4 -p, 6 - 2p) is 70 sq. units. How many integral values of p are possible. **(3)**
15. Point A is on x-axis, point B is on y-axis and the point P lies on line segment AB, such that P (4, - 5) and AP : PB = 5 : 3. Find the coordinates of point A and B. **(3)**
16. Show that four points (0, -1), (6, 7), (-2, 3) and (8, 3) are the vertices of a rectangle. Also, find its area. **(3)**
17. Find the co-ordinates of the points of trisection of the line segment joining the points A(1, - 2) and B(- 3,4). **(3)**
18. Show that the points A(3, 5), B(6, 0), C(1, -3) and D (-2, 2) are the vertices of a square ABCD. **(4)**
19. A (4, 2), B (6, 5) and C (1, 4) are the vertices of $\triangle ABC$.
- The median from A meets BC in D. Find the coordinates of the point D.
 - Find the coordinates of point P on AD such that AP : PD = 2:1.
 - Find the coordinates of the points Q and R on medians BE and CP respectively such that BQ : QE = 2 :1 and CR: RF =2: 1.
 - What do you observe? **(4)**
20. Find the lengths of the medians of a $\triangle ABC$ whose vertices are A(0, -1) B(2, 1) and C(0, 3). **(4)**

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Chapter 07 Coordinate Geometry

Solution

1. b. p units

Explanation: The distance between point A and point B =

$$\begin{aligned}
 AB &= \sqrt{(0 - p \sin 25^\circ)^2 + (p \sin 65^\circ - 0)^2} \\
 &= \sqrt{p^2 \sin^2 25^\circ + p^2 \sin^2 65^\circ} \\
 &= p \sqrt{\sin^2 25^\circ + \sin^2 (90^\circ - 25^\circ)} \\
 &= p \sqrt{\sin^2 25^\circ + \cos^2 25^\circ} [\because \sin(90^\circ - \theta) = \cos \theta] \\
 &= p \text{ units} \\
 &[\because \cos^2 \theta + \sin^2 \theta = 1]
 \end{aligned}$$

2. c. $x + 3y - 7 = 0$

$$\begin{aligned}
 \text{Explanation: } &\therefore \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)| = 0 \\
 \Rightarrow &\frac{1}{2} |x(2 - 0) + 1(0 - y) + 7(y - 2)| = 0 \\
 \Rightarrow &\frac{1}{2} |2x - y + 7y - 14| = 0 \\
 \Rightarrow &2x + 6y - 14 = 0 \Rightarrow x + 3y - 7 = 0
 \end{aligned}$$

3. d. -3, 7

Explanation: Let point A be (p, -5) and point B (2, 7) and distance between A and B = 13 units

$$\begin{aligned}
 \therefore 13 &= \sqrt{(2 - p)^2 + (7 + 5)^2} \\
 \Rightarrow 13 &= \sqrt{4 + p^2 - 4p + 144} \\
 \Rightarrow 13 &= \sqrt{p^2 - 4p + 148} \\
 \Rightarrow 169 &= p^2 - 4p + 148 \\
 \Rightarrow p^2 - 4p - 21 &= 0 \\
 &= p^2 - 7p + 3p - 21 = 0 \\
 &= p(p - 7) + 3(p - 7) = 0 \\
 \Rightarrow (p - 7)(p + 3) &= 0 \\
 \Rightarrow p = 7, p = -3
 \end{aligned}$$

4. a. 0 sq. units

Explanation: Given: $(x_1, y_1) = (1, 1)$, $(x_2, y_2) = (-2, 7)$ and $(x_3, y_3) = (3, -3)$, then the Area of triangle

$$\begin{aligned} &\therefore \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)| \\ &= \frac{1}{2} |1(7 + 3) + (-2)(-3 - 1) + 3(1 - 7)| \\ &= \frac{1}{2} |10 + 8 - 18| \\ &= \frac{1}{2} |0| = 0 \text{ sq. units} \end{aligned}$$

Also therefore the three given points(vertices) are collinear.

5. d. $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ units

Explanation: The distance between the points (x_1, y_1) and (x_2, y_2) is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ units. This is known as distance formula.

6. Since the points are collinear, then,

Area of triangle = 0

$$\frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)] = 0$$

$$\frac{1}{2} [x(-4 + 5) + (-3)(-5 - 2) + 7(2 + 4)] = 0$$

$$x + 21 + 42 = 0$$

$$x = -63$$

7. A(a, 0), B(0, a)

$$\begin{aligned} AB &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(0 - a)^2 + (a - 0)^2} \\ &= \sqrt{(a^2 + a^2)} = \sqrt{2a^2} = \sqrt{2}a \text{ units} \end{aligned}$$

8. The point on the y-axis is (0,12)

\therefore Distance between (5,12) and (0,12)

$$d = \sqrt{(0 - 5)^2 + (12 - 12)^2}$$

$$= \sqrt{25 + 0}$$

$$= 5 \text{ units}$$

9. Points are (- 4, - 7) and (0, - 7)

$$\text{Distance} = \sqrt{(0 + 4)^2 + (-7 + 7)^2}$$

$$= \sqrt{4^2 + 0} = \sqrt{16} = 4 \text{ units}$$

10. Coordinates of the centroid of a triangle whose vertices are (x_1, y_1) , (x_2, y_2) , (x_3, y_3) are

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

$$= \left(\frac{0+8+8}{3}, \frac{6+12+0}{3} \right) = \left(\frac{16}{3}, \frac{18}{3} \right) = \left(\frac{16}{3}, 6 \right).$$

11. The given points are A(-6, -4) and B(9, -12)

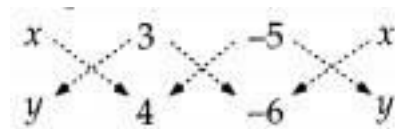
Then, $(x_1 = -6, y_1 = -4)$ and $(x_2 = 9, y_2 = -12)$

$$\therefore AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(6+9)^2 + (-12+4)^2} = \sqrt{(15)^2 + (-8)^2}$$

$$= \sqrt{225 + 64} = \sqrt{289} = 17 \text{ units}$$

12. Since the point P (x, y) lies on the line joining A (3, 4) and B (-5, -6). Therefore, P, A and B are collinear points.



$$\therefore \{4x + 3 \times -6 + (-5) \times y\} - \{3y + (-5) \times 4 + x \times (-6)\} = 0$$

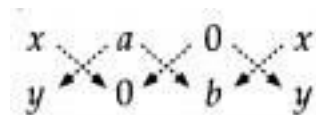
$$\Rightarrow \{4x - 18 - 5y\} - \{3y - 20 - 6x\} = 0$$

$$\Rightarrow 10x - 8y + 2 = 0 \Rightarrow 5x - 4y + 1 = 0$$

Hence, the point (x, y) lies on the line joining (3,4) and (-5, -6), if $5x - 4y + 1 = 0$

13. It is given that the point P (x, y) lies on the line segment joining points A (a, 0) and B (0, b).

Therefore, points P (x, y), A (a, 0) and B (0, b) are collinear points.



$$\therefore (x \times 0 + a \times b + 0 \times y) - (a \times y + 0 \times 0 + x \times b) = 0$$

$$\Rightarrow ab - (ay + bx) = 0$$

$$\Rightarrow ab = ay + bx$$

$$\Rightarrow \frac{ab}{ab} = \frac{ay}{ab} + \frac{bx}{ab} \text{ [Dividing throughout by ab]}$$

$$\Rightarrow 1 = \frac{y}{b} + \frac{x}{a} \text{ or } \frac{x}{a} + \frac{y}{b} = 1$$

14. Area = $\frac{1}{2} [p(2p - 6 + 2p) + (1 - p)(6 - 2p - 2 + 2p) + (-4 - p)(2 - 2p - 2p)]$
- $$\Rightarrow \frac{1}{2} [p(4p - 6) + (1 - p)4 + (-4 - p)(2 - 4p)] = 70$$
- $$\Rightarrow 4p^2 - 6p + 4 - 4p - 8 + 16p - 2p + 4p^2 = 140$$
- $$\Rightarrow \frac{1}{2} [-13k - 9] = 15$$

$$\Rightarrow [-13k - 9] = 30 - 13k - 9 = 30 \text{ or } -13k - 9 = -30$$

$$k = -3 \text{ or } k = \frac{21}{13}$$

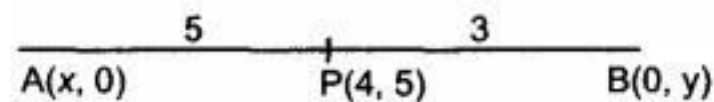
When $k = -3$, coordinates = 15 sq. units

$$\Rightarrow \frac{1}{2} \times AB \times \text{Altitude} = 15$$

$$\Rightarrow \frac{1}{2} \times 3 \times \text{Altitude} = 15$$

$$\Rightarrow \text{Altitude} = 10 \text{ units}$$

15. Let coordinates of A are $(x, 0)$ and coordinates of B are $(0, y)$



Using section formula, we get

$$4 = \frac{5 \times 0 + 3 \times x}{5 + 3}$$

$$\Rightarrow 32 = 3x$$

$$\Rightarrow x = \frac{32}{3}$$

$$\text{Similarly, } 5 = \frac{5 \times y + 3 \times 0}{5 + 3}$$

$$\Rightarrow 40 = 5y$$

$$\Rightarrow y = 8$$

\therefore Coordinate of A are $\left(\frac{32}{3}, 0\right)$ and coordinates of B are $(0, 8)$.

16. Let A $(0, -1)$, B $(6, 7)$, C $(-2, 3)$ and D $(8, 3)$ be the given points. Then,

$$AD = \sqrt{(8 - 0)^2 + (3 + 1)^2} = \sqrt{64 + 16} = 4\sqrt{5}$$

$$BC = \sqrt{(6 + 2)^2 + (7 - 3)^2} = \sqrt{64 + 16} = 4\sqrt{5}$$

$$AC = \sqrt{(-2 - 0)^2 + (3 + 1)^2} = \sqrt{4 + 16} = 2\sqrt{5}$$

$$\text{and, } BD = \sqrt{(8 - 6)^2 + (3 - 7)^2} = \sqrt{4 + 16} = 2\sqrt{5}$$

Therefore, $AD = BC$ and $AC = BD$

So, ADBC is a parallelogram

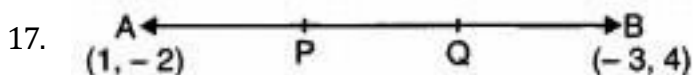
$$\text{Now, } AB = \sqrt{(6 - 0)^2 + (7 + 1)^2} = \sqrt{36 + 64} = 10$$

$$\text{and, } CD = \sqrt{(8 + 2)^2 + (3 - 3)^2} = 10$$

$$\text{Clearly, } AB^2 = AD^2 + DB^2 \text{ and } CD^2 = CB^2 + BD^2$$

Hence, ADBC is a rectangle.

$$\text{Area of rectangle ADBC} = AD \times DB = (4\sqrt{5} \times 2\sqrt{5}) \text{ sq. units} = 40 \text{ sq. units.}$$



Let $P(x_1, y_1)$, $Q(x_2, y_2)$ divides AB into 3 equal parts.

$\therefore P$ divides AB in the ratio of 1: 2

$$\therefore x_1 = \frac{1 \times -3 + 2 \times 1}{1+2} \text{ and } y_1 = \frac{1 \times 4 + 2 \times -2}{1+2}$$

$$\Rightarrow x_1 = \frac{2-3}{3} = \frac{-1}{3} \quad y_1 = \frac{-4+4}{3} = 0$$

\therefore Co-ordinates of $P\left(-\frac{1}{3}, 0\right)$.

Q is the mid-point of PB .

$$\therefore x_2 = \frac{\frac{-1}{3} + (-3)}{2}$$

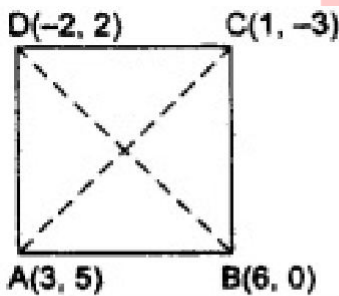
$$= \frac{-10}{6} = \frac{-5}{3}$$

$$y_2 = \frac{0+4}{2} = 2$$

\therefore Co-ordinates of $Q\left(-\frac{5}{3}, 2\right)$.

18. Let $A(3, 5)$, $B(6, 0)$, $C(1, -3)$ and $D(-2, 2)$ be the angular points of a quadrilateral $ABCD$.

Join AC and BD



$$\text{Now } AB = \sqrt{(6-3)^2 + (0-5)^2}$$

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

$$= \sqrt{9 + 25} = \sqrt{34} \text{ units,}$$

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

$$= \sqrt{25 + 9} = \sqrt{34} \text{ units,}$$

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

$$= \sqrt{9 + 25} = \sqrt{34} \text{ units,}$$

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

$$= \sqrt{25 + 9} = \sqrt{34} \text{ units,}$$

Thus, $AB = BC = CD = DA$.

$$\text{Diagonal } AC = \sqrt{(1-3)^2 + (-3-5)^2} = \sqrt{(-2)^2 + (-8)^2}$$

$$= \sqrt{4 + 64} = \sqrt{68} = 2\sqrt{17} \text{ units}$$

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

$$= \sqrt{(-8)^2 + 2^2} = \sqrt{64 + 4}$$

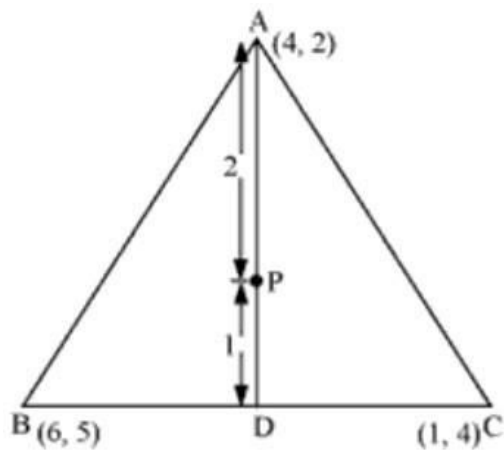
$$= \sqrt{68} = 2\sqrt{17} \text{ units}$$

$$\therefore \text{diag. } AC = \text{diag. } BD$$

Thus, ABCD is a quadrilateral in which all sides are equal and the diagonals are equal.

Hence, quad. ABCD is a square.

19.



- i. Median AD of the triangle will divide the side BC in two equal parts. So D is the midpoint of side BC.

$$\text{Coordinates of } D = \left(\frac{6+1}{2}, \frac{5+4}{2} \right) = \left(\frac{7}{2}, \frac{9}{2} \right)$$

- ii. Point P divides the side AD in a ratio 2 : 1.

$$\begin{aligned} \text{Coordinates of } P &= \left(\frac{2 \times \frac{7}{2} + 1 \times 4}{2+1}, \frac{2 \times \frac{9}{2} + 1 \times 2}{2+1} \right) \\ &= \left(\frac{11}{3}, \frac{11}{3} \right) \end{aligned}$$

- iii. Median BE of the triangle will divide the side AC in two equal parts. So E is the midpoint of side AC.

$$\text{Coordinates of } E = \left(\frac{4+1}{2}, \frac{2+4}{2} \right) = \left(\frac{5}{2}, 3 \right)$$

Point Q divides the side BE in a ratio 2:1

$$\text{Coordinates of } Q = \left(\frac{2 \times \frac{5}{2} + 1 \times 6}{2+1}, \frac{2 \times 3 + 1 \times 5}{2+1} \right) = \left(\frac{11}{3}, \frac{11}{3} \right)$$

Median CF of the triangle will divide the side AB in two equal parts. So F is the midpoint of side AB.

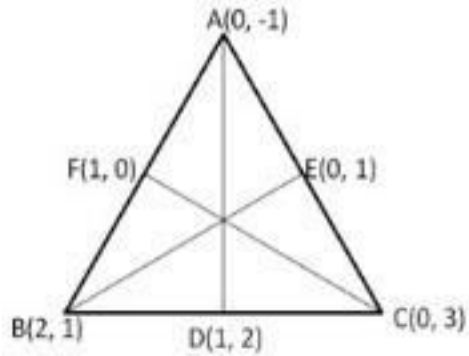
$$\text{Coordinates of } F = \left(\frac{4+6}{2}, \frac{2+5}{2} \right) = \left(5, \frac{7}{2} \right)$$

Point R divides the side CF in a ratio 2:1.

$$\text{Coordinates of } R = \left(\frac{2 \times 5 + 1 \times 1}{2+1}, \frac{2 \times \frac{7}{2} + 1 \times 4}{2+1} \right) = \left(\frac{11}{3}, \frac{11}{3} \right)$$

- iv. Now we may observe that coordinates of point P, Q are same. So, all these are representing same point on the plane i.e. centroid of the triangle.

20. Let D, E, F be the midpoint of the side BC, CA and AB respectively in $\triangle ABC$



Then, by the midpoint formula, we have

$$D \left(\frac{2+0}{2}, \frac{1+3}{2} \right), E \left(\frac{0+0}{2}, \frac{3-1}{2} \right), F \left(\frac{0+2}{2}, \frac{-1+1}{2} \right)$$

i.e., $D(1, 2), E(0, 1), F(1, 0)$

Hence the lengths of medians AD, BE and CF are given by

$$AD = \sqrt{(1-0)^2 + (2+1)^2} = \sqrt{1+9} = \sqrt{10} \text{ units}$$

$$BE = \sqrt{(0-2)^2 + (1-1)^2} = \sqrt{4+0} = \sqrt{4} = 2 \text{ units}$$

$$CF = \sqrt{(1-0)^2 + (0-3)^2} = \sqrt{1+9} = \sqrt{10} \text{ units}$$

Hence, $AD = \sqrt{10}, BE = 2, CF = \sqrt{10}$