PRACTICE PAPER 03 (2026-27)
CHAPTER 01
Orienting Yourself: The Use of Coordinates
(ANSWERS)

SUBJECT: MATHEMATICS **MAX. MARKS : 40**
CLASS : IX **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. A point is equidistant from the lines $x = 0$and $y = 0$and lies in second quadrant. Which is possible?
(a) (-5,5) (b) (-3,-3) (c) (4,4) (d) (3,-3)
Ans: (a) (-5,5)
$|x| = |y|,\ x < 0, y > 0 \implies (-5,5)$

2. The number of points on x-axis equidistant from $(2,3)$and $(6,3)$is:
(a) 0 (b) 1 (c) 2 (d) Infinite
Ans: (b) 1
$(x-2)^2 + 9 = (x-6)^2 + 9 \implies (x-2)^2 = (x-6)^2$
$\implies x = 4$
∴Only one point

3. Which point has **maximum distance from origin**?
(a) (5,0) (b) (3,4) (c) (2,6) (d) (1,7)
Ans: (d) (1,7)
$(5,0) \to 5,\ (3,4) \to 5,\ (2,6) \to \sqrt{40},\ (1,7) \to \sqrt{50}$
$\sqrt{50}$ largest

4. Midpoint of segment joining $(a, b)$and $(-a, -b)$is:
(a) (a, b) (b) (0, 0) (c) (a, 0) (d) (0, b)
Ans: (b) (0, 0)
$M = \left(\frac{a-a}{2}, \frac{b-b}{2}\right) = (0,0)$

5. Distance between $(x, 0)$and $(0, y)$is 5 and $x = y$. Then $x$equals:
(a) 5 (b) 3 (c) $\frac{5}{\sqrt{2}}$ (d) 4
Ans: (c) $\frac{5}{\sqrt{2}}$
$\sqrt{x^2 + x^2} = 5 \implies \sqrt{2x^2} = 5$
$\implies x^2 = \frac{25}{2} \implies x = \frac{5}{\sqrt{2}}$

6. Which of the following points are collinear?

(a) (1,1), (2,3), (3,5)
(b) (0,0), (1,1), (2,4)
(c) (2,3), (4,7), (6,10)
(d) (1,2), (2,4), (3,7)
Ans:
Check (a):
$Slope\ consistency \implies y = 2x - 1$
Points satisfy ⇒ collinear

7. If midpoint is $(2,3)$ and one endpoint is $(6,7)$, the other endpoint is:
(a) (-2,-1) (b) (4,5) (c) (-2,-2) (d) (0,-1)
Ans: (a) (-2,-1)
$\frac{6+x}{2} = 2 \implies x = -2, \frac{7+y}{2} = 3 \implies y = -1$

8. Distance between two points is zero if:
(a) Points lie on axis
(b) Points are same
(c) Points lie in same quadrant
(d) Coordinates are opposite
Ans: (b) Points are same
Distance $= 0 \implies$ same point

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

9. **Assertion (A):** The distance between the points $A(a,b)$and $B(-a,-b)$is $AB = 2\sqrt{a^2+b^2}$.
Reason (R): The distance between two points $(x_1, y_1)$and $(x_2, y_2)$is given by
$$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}.$$
Ans. (a) Both A and R are true and R is the correct explanation of A.

10. **Assertion (A):** If the midpoint of the line segment joining the points $A(x_1, y_1)$and $B(x_2, y_2)$is the same as the midpoint of the line segment joining the points $B(x_2, y_2)$and $C(x_3, y_3)$, then the points A, B, and $C$are collinear.
Reason (R): The midpoint of a line segment joining the points (x_1, y_1) and (x_2, y_2) is given by
$$M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right).$$
Ans: (a) Both A and R are true and R is the correct explanation of A.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Find a point on x-axis equidistant from $(2,5)$ and $(6,5)$.
Ans. Let the required point on the x-axis be $P(x,0)$
Distance of $P$from $(2,5)$: $PA = \sqrt{(x-2)^2 + (0-5)^2}$
Distance of $P$from $(6,5)$: $PB = \sqrt{(x-6)^2 + (0-5)^2}$
Since the point is equidistant from the two given points,
$PA = PB$
$\Rightarrow (x-2)^2 + 25 = (x-6)^2 + 25$
$\Rightarrow (x-2)^2 = (x-6)^2$
$\Rightarrow x^2 - 4x + 4 = x^2 - 12x + 36$
$\Rightarrow 8x = 32$
$\Rightarrow x = 4$

Therefore, the required point is (4, 0)

12. Find value of k if distance between $(k, 2)$ and $(2, k)$ is zero.
Ans. Distance zero implies both points are identical.
Distance between the two points is $\sqrt{(2-k)^2 + (k-2)^2}$
Given that the distance is zero, So $\sqrt{(2-k)^2 + (k-2)^2} = 0$
Squaring both sides, $(2-k)^2 + (k-2)^2 = 0$
Since, $(2-k)^2 = (k-2)^2$, we get
$\Rightarrow 2(k-2)^2 = 0$
$\Rightarrow (k-2)^2 = 0$
$\Rightarrow k = 2$
Therefore, $\boxed{k = 2}$

13. Find a point on y-axis equidistant from $(2, 4)$ and $(-2, 4)$.
Ans. Let the required point on the y-axis be $P(0, y)$
Distance of P from $(2, 4)$: $PA = \sqrt{(0-2)^2 + (y-4)^2}$
$\Rightarrow PA = \sqrt{4 + (y-4)^2}$
Distance of P from $(-2,4)$: $PB = \sqrt{(0+2)^2 + (y-4)^2}$
$\Rightarrow PB = \sqrt{4 + (y-4)^2}$
Thus, $PA = PB$ for every real value of y.
Therefore, every point on the y-axis is equidistant from the two given points.
$\boxed{\text{All points of the form } (0, y)}$

14. Find coordinates of point whose distances from axes are 3 and 4 respectively.
Ans. Distance from the x-axis is equal to the absolute value of the y-coordinate.
$$|y| = 3$$
Therefore, $y = 3$ or $y = -3$
Distance from the y-axis is equal to the absolute value of the x-coordinate.
$$|x| = 4$$
Therefore, $x = 4$ or $x = -4$
Hence, the possible coordinates are $\boxed{(4,3),\ (4,-3),\ (-4,3),\ (-4,-3)}$

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Show that points $(1,2), (3,6), (5,10)$ are collinear using distance method.
Ans. Let $A(1,2), B(3,6), C(5,10)$
$AB = \sqrt{(3-1)^2 + (6-2)^2} = \sqrt{2^2 + 4^2} = \sqrt{4 + 16} = \sqrt{20}$
$BC = \sqrt{(5-3)^2 + (10-6)^2} = \sqrt{2^2 + 4^2} = \sqrt{4 + 16} = \sqrt{20}$
$AC = \sqrt{(5-1)^2 + (10-2)^2} = \sqrt{4^2 + 8^2} = \sqrt{16 + 64} = \sqrt{80} = 2\sqrt{20}$
Now, $AB + BC = \sqrt{20} + \sqrt{20} = 2\sqrt{20}$
$\Rightarrow AB + BC = AC$
Since, $AB + BC = AC$, therefore the three points are collinear.

16. Prove triangle $(0,0), (6,0), (0,8)$ is right-angled.
Ans. Let $A(0,0), B(6,0), C(0,8)$
$AB = \sqrt{(6-0)^2 + (0-0)^2} = \sqrt{36} = 6$
$AC = \sqrt{(0-0)^2 + (8-0)^2} = \sqrt{64} = 8$
$BC = \sqrt{(6-0)^2 + (0-8)^2} = \sqrt{36 + 64} = \sqrt{100} = 10$
Now, $AB^2 + AC^2 = 6^2 + 8^2 = 36 + 64 = 100$

Also, $BC^2 = 10^2 = 100$
Therefore, $AB^2 + AC^2 = BC^2$
By Pythagoras Theorem, the triangle is right-angled.

17. Find the midpoint of the line segment joining (a, b) and $(-a, b)$. State its position.
Ans. Let $A(a, b), B(-a, b)$
Using midpoint formula,
$M = \left(\frac{a + (-a)}{2}, \frac{b + b}{2}\right) = \left(\frac{0}{2}, \frac{2b}{2}\right) = (0, b)$
Since the x-coordinate of the midpoint is zero, therefore the midpoint lies on the y-axis
Hence, $M = (0, b)$

SECTION – D

Questions 18 carry 5 marks each.

18. Prove that points $(1,1), (5,1), (6,4), (2,4)$form a parallelogram using distance formula and midpoint formula.
Ans. Let $A(1,1), B(5,1), C(6,4), D(2,4)$
Using Distance Formula:
$AB = \sqrt{(5-1)^2 + (1-1)^2}$
$\Rightarrow AB = \sqrt{16}$
$\Rightarrow AB = 4$

Length of CD
$CD = \sqrt{(2-6)^2 + (4-4)^2}$
$\Rightarrow CD = \sqrt{16}$
$\Rightarrow CD = 4$
Thus, $AB = CD$
$BC = \sqrt{(6-5)^2 + (4-1)^2}$
$\Rightarrow BC = \sqrt{1+9}$
$\Rightarrow BC = \sqrt{10}$
$AD = \sqrt{(2-1)^2 + (4-1)^2}$
$\Rightarrow AD = \sqrt{1+9}$
$\Rightarrow AD = \sqrt{10}$
Thus, $BC = AD$
Since opposite sides of quadrilateral are equal, therefore, $\boxed{\text{ABCD is a parallelogram.}}$

Using Midpoint Formular: Verify diagonals bisect each other
Midpoint of AC
$M_1 = \left(\frac{1+6}{2}, \frac{1+4}{2}\right)$
$M_1 = \left(\frac{7}{2}, \frac{5}{2}\right)$
Midpoint of BD
$M_2 = \left(\frac{5+2}{2}, \frac{1+4}{2}\right)$
$M_2 = \left(\frac{7}{2}, \frac{5}{2}\right)$
Since $M_1 = M_2$, therefore the diagonals bisect each other.
Therefore, $\boxed{\text{ABCD is a parallelogram.}}$

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Case Study 1 - Drone Delivery Network

A logistics company uses drones to deliver medicines. Three delivery stations are located at $A(2,2)$, $B(6,6)$, and $C(10,10)$. The company wants to check if drones can follow a straight-line path between all stations. If yes, it simplifies navigation. Otherwise, a control station is placed at the midpoint of the longest route. The company also wants to compute the maximum distance a drone must travel.

Using coordinate geometry concepts, answer the following questions.

(a) Using the distance formula, verify whether points A, B, C are collinear. (2)

(b) Identify the farthest stations. (1)

(c) Find midpoint of farthest stations. (1)

OR

(c) Find distance between farthest stations. (1)

Ans.

(a) $AB = \sqrt{(6-2)^2 + (6-2)^2} = \sqrt{16+16} = \sqrt{32}$

$BC = \sqrt{(10-6)^2 + (10-6)^2} = \sqrt{16+16} = \sqrt{32}$

$AC = \sqrt{(10-2)^2 + (10-2)^2} = \sqrt{64+64} = \sqrt{128}$

Now, $AB + BC = \sqrt{32} + \sqrt{32} = 2\sqrt{32} = \sqrt{128}$

$\Rightarrow AB + BC = AC$

Hence, the three points are collinear.

(b) $AB = \sqrt{32}$

$BC = \sqrt{32}$

$AC = \sqrt{128}$

Since, $\sqrt{128} > \sqrt{32}$

Hence, Stations A and C are farthest apart.

(c) Midpoint of AC,

$M = \left(\frac{2+10}{2}, \frac{2+10}{2}\right)$

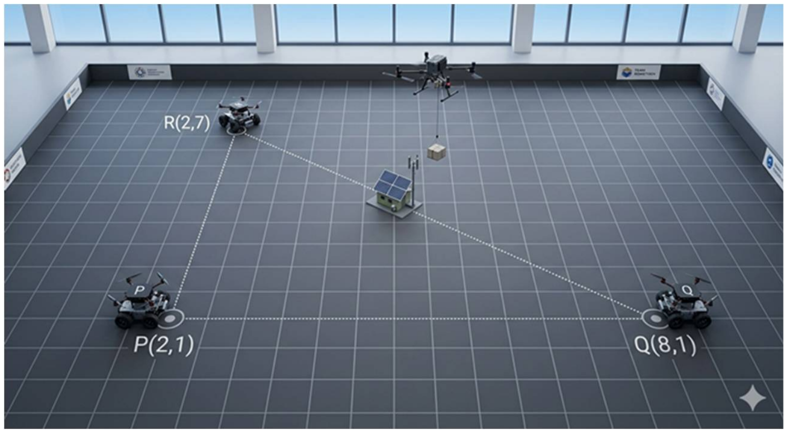
$M = (6,6)$

OR

(c) $AC = \sqrt{128} = 8\sqrt{2}$

20. Case Study 2 - Robotics Field Alignment

In a robotics competition, three robots start at positions $P(2,1)$, $Q(8,1)$, and $R(2,7)$. Engineers must verify whether the robots form a right-angled triangle for optimal sensor alignment. The longest side will be used as a communication axis, and a signal booster will be placed at its midpoint.



Using coordinate geometry concepts, answer the following questions.
(a) Verify whether triangle is right-angled. (2)
(b) Determine which side is the hypotenuse. (1)
(c) Find the midpoint of the hypotenuse. (1)

OR

(c) Find coordinates of booster location. (1)
Ans. (a) Given $P(2,1), Q(8,1), R(2,7)$
$PQ = 6$
$PR = 6$
$QR = \sqrt{(8-2)^2 + (1-7)^2} = \sqrt{36+36} = \sqrt{72}$
Now, $PQ^2 + PR^2 = 6^2 + 6^2 = 36 + 36 = 72$
Also, $QR^2 = 72$
Therefore, $PQ^2 + PR^2 = QR^2$
Hence, Triangle PQR is right-angled at P.
(b) The side opposite the right angle is the hypotenuse. Hence the hypotenuse is QR.
(c)
$M = \left(\frac{8+2}{2}, \frac{1+7}{2}\right) = (5,4)$

OR

(c) The booster is installed at the midpoint of the hypotenuse.
Therefore,
$M = \left(\frac{8+2}{2}, \frac{1+7}{2}\right) = (5,4)$