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Publication-Grade Practice Worksheets

CBSE · CLASS 9

MATHEMATICS

NCERT Ganita Manjari

Chapters 1 – 8

Worksheet E-book · Foundation | Application | Expert
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CHAPTER

1

Orienting Yourself: The Use of Coordinates

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CBSE Class 9 — Mathematics

NCERT Ganita Manjari, Part I — Chapter 1

Orienting Yourself: The Use of Coordinates

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Contents

Worksheet 1: Foundation

Name: ________________________ **Max Marks: 30** **Time: 60 minutes**

Section A — Multiple Choice Questions (8 × 1 = 8 Marks)

Choose the correct option.

1. The point of intersection of the x-axis and the y-axis is called the:

(a) Quadrant (b) Origin (c) Abscissa (d) Ordinate

2. The coordinates of a point lying on the x-axis are always of the form:

(a) (0, y) (b) (x, 0) (c) (x, x) (d) (y, y)

3. In which quadrant does the point (−3, 5) lie?

(a) Quadrant I (b) Quadrant II (c) Quadrant III (d) Quadrant IV

4. The distance of the point (4, −7) from the x-axis is:

(a) 4 units (b) 7 units (c) −7 units (d) 11 units

5. A point in which both coordinates are negative lies in:

(a) Quadrant I (b) Quadrant II (c) Quadrant III (d) Quadrant IV

6. Which theorem is used to find the distance between two points that do not lie on a line parallel to either axis?

(a) Thales' Theorem (b) Baudhāyana–Pythagoras Theorem (c) Midpoint Theorem (d) Basic Proportionality Theorem

7. The coordinates of the origin are:

(a) (1, 1) (b) (0, 0) (c) (0, 1) (d) (1, 0)

8. The point (0, −6) lies on the:

(a) x-axis (b) y-axis (c) Quadrant III (d) Quadrant IV

Section B — Fill in the Blanks (6 × 1 = 6 Marks)

9. The horizontal line in the Cartesian plane is called the _______.

10. The vertical line in the Cartesian plane is called the _______.

11. A point of the form (x, 0) always lies on the _______.

12. In Quadrant III, both the x-coordinate and the y-coordinate are _______.

13. The distance between the points (x_1, y) and (x_2, y) is _______.

14. The distance between the points (x_1, y_1) and (x_2, y_2) is given by the formula _______.

Section C — True or False (5 × 1 = 5 Marks)

15. The coordinates of a point on the y-axis are of the form (x, 0).

16. Points in Quadrant II have a negative x-coordinate and a positive y-coordinate.

17. If x = y, then the point (x, y) is the same as the point (y, x).

18. Reflecting a point in the y-axis changes the sign of its y-coordinate.

19. The distance between two points can be a negative number.

Section D — Match the Following (5 × 1 = 5 Marks)

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Match each point in Column A with its correct description in Column B.

Column A (Point)	Column B (Description)
1. (0, 0)	(a) Lies in Quadrant III
2. (−2, −3)	(b) Lies on the x-axis
3. (3, −4)	(c) Is the origin
4. (0, 5)	(d) Lies in Quadrant IV
5. (−6, 0)	(e) Lies on the y-axis

Section E — One-Word Answer (3 × 1 = 3 Marks)

20. What is the name given to the four parts into which the coordinate axes divide the plane?

21. What is the perpendicular distance of a point from the y-axis called?

22. What is the perpendicular distance of a point from the x-axis called?

Section F — Very Short Answer Questions (3 × 1 = 3 Marks)

23. Write the coordinates of the only point that lies on both the x-axis and the y-axis.

24. In which quadrant does the point (7, −2) lie?

25. If a point P(x, y) is such that x = y, what can you say about the points P(x, y) and P(y, x)?

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Worksheet 2: Application

Name: ________________________ **Max Marks: 38** **Time: 75 minutes**

Section A — Case-Based Multiple Choice Questions (4 × 1 = 4 Marks)

Meera set up a coordinate grid on the floor of her new bedroom to help her younger brother, who is visually impaired, become familiar with the positions of furniture. She placed the origin at one corner of the room. The four corners of the bed are at (2, 3), (2, 9), (7, 9) and (7, 3). The four corners of the study table are at (9, 1), (9, 4), (11, 4) and (11, 1). All measurements are in feet.

1. What is the length of the bed measured along the x-direction?

(a) 5 units (b) 6 units (c) 7 units (d) 9 units

2. What is the width of the bed measured along the y-direction?

(a) 5 units (b) 6 units (c) 7 units (d) 3 units

3. Which point is diagonally opposite to (2, 3) on the bed?

(a) (7, 3) (b) (2, 9) (c) (7, 9) (d) (9, 4)

4. What is the distance between the two corners (9, 1) and (11, 1) of the study table?

(a) 1 unit (b) 2 units (c) 3 units (d) 4 units

Section B — Short Answer Questions (5 × 2 = 10 Marks)

5. Find the distance between the points A(3, 8) and B(3, −2).

6. Find the distance between the points P(−5, 4) and Q(9, 4).

7. Plot the point R(−4, −6) mentally. State the quadrant in which it lies and find its distance from the origin.

8. Write the coordinates of the reflection of the point (6, −9) (i) in the x-axis, and (ii) in the y-axis.

9. If the coordinates of a point are (a, −a), where a > 0, state the quadrant in which the point lies. Justify your answer.

Section C — Numerical Problems (4 × 3 = 12 Marks)

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Show your complete working using the Baudhāyana–Pythagoras Theorem.

10. Find the distance between the points A(2, 3) and B(6, 6).

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11. Find the distance between the points M(−3, 7) and N(5, −8).

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12. Show that the points A(1, 2), B(4, 2) and C(4, 6) form a right-angled triangle. Find the length of the hypotenuse.

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13. Rohan walks from the point (0, 0) to the point (8, 0), and then to the point (8, 6). Find (i) the total distance he walked, and (ii) the straight-line (shortest) distance from his starting point to his final point.

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Section D — Explain with Reasons (3 × 2 = 6 Marks)

14. Explain why the point (0, 0) does not lie in any of the four quadrants.

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15. Explain, giving a reason, why the distance between two points can never be negative.

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16. A student claims that the point (−4, 0) lies in Quadrant III because its x-coordinate is negative. Explain why the student's reasoning is incorrect.

Section E — Competency-Based Questions (2 × 3 = 6 Marks)

17. A rectangular garden has its corners at (1, 1), (1, 5), (6, 5) and (6, 1), with distances measured in metres. Find its length, breadth and area.

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18. Two friends start from the origin. One walks to (12, 0) and then to (12, 9); the other walks directly to (12, 9). Find how much extra distance the first friend walked compared to the second.

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CBSE Class 9 | Mathematics | Ch.1: The Use of Coordinates

Worksheet 3: Expert

Name: ________________________ **Max Marks: 42** **Time: 90 minutes**

Section A — Assertion–Reason Questions (5 × 1 = 5 Marks)

Each question has an Assertion (A) and a Reason (R). Choose the correct option: (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.

1. Assertion (A): The point (0, −5) lies on the y-axis.
Reason (R): Any point of the form (0, y) lies on the y-axis.

2. Assertion (A): The distance between (2, 3) and (2, 9) is 6 units.
Reason (R): When two points have the same x-coordinate, the distance between them equals the absolute difference of their y-coordinates.

3. Assertion (A): If x = y, the point (x, y) coincides with the point (y, x).
Reason (R): (x, y) and (y, x) represent the same point only when x = y.

4. Assertion (A): The point (−7, 2) lies in Quadrant IV.
Reason (R): In Quadrant IV, the x-coordinate is positive and the y-coordinate is negative.

5. Assertion (A): The distance formula $\sqrt{[(x_2-x_1)^2 + (y_2-y_1)^2]}$ can give a negative value if $x_2 < x_1$.
Reason (R): Squaring the differences before taking the square root always makes the value under the root non-negative.

Section B — HOTS Questions (4 × 2 = 8 Marks)

6. P(x, 0) is a point on the x-axis that is equidistant from A(3, 4) and the origin O(0, 0). Find the coordinates of P.

7. Without plotting, determine whether the points A(1, 2), B(3, 6) and C(5, 10) are collinear. (Hint: check whether AB + BC = AC.)

8. Find a point on the y-axis that is equidistant from the points (5, −2) and (−3, 2).

9. The vertices of a triangle are A(0, 0), B(6, 0) and C(3, 4). Find the length of the median from A to the midpoint of BC.

Section C — Long Answer Questions (4 × 4 = 16 Marks)

10. Plot the points A(2, 1), B(6, 1), C(6, 5) and D(2, 5). Name the figure ABCD, and find its perimeter and area, showing all working.

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11. Using the Baudhāyana–Pythagoras Theorem, prove that the points A(4, 4), B(3, 5) and C(−1, −1) are the vertices of a right-angled triangle. Identify the vertex at which the right angle lies.

12. A(a, b) is a point whose distance from the origin O(0, 0) is 13 units. The point lies in Quadrant III, and a = −5. Find the value of b and write the coordinates of A. Verify your answer using the distance formula.

13. Three vertices of a rectangle are A(1, 1), B(1, 6) and C(8, 6). Find the coordinates of the fourth vertex D, and calculate the area of the rectangle. Show your reasoning.

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Worksheet 3: Expert (contd.)

Name: ________________________ **Max Marks: 42** **Time: 90 minutes**

Section D — Case Study (5 Marks)

An architect is designing a rectangular park on a coordinate grid drawn on a city map, where 1 unit represents 10 metres. The park's corners are to be placed at A(0, 0), B(0, 40), C(60, 40) and D(60, 0). A circular fountain of radius 10 units is to be built with its centre at the exact centre of the park.

14. Find the coordinates of the centre of the park. *[1 mark]*

15. Find the actual length and breadth of the park in metres. *[1 mark]*

16. A gate is to be built at the point (0, 20). Find the actual distance, in metres, from the gate to the centre of the park. *[2 marks]*

17. Will the fountain (radius 10 units) at the centre stay entirely within the boundary of the park? Justify your answer with a calculation. *[1 mark]*

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Section E — Board-Style Questions (2 × 4 = 8 Marks)

18. The point P(2, −3) is first reflected in the x-axis to get P′, and then P′ is reflected in the y-axis to get P″. Find the coordinates of P″, and identify the single transformation that maps P directly to P″.

19. Find the value of k such that the point (k, 3) is at a distance of 5 units from the point (1, −1).

COMPLETE ANSWER KEY

Worksheet 1 — Foundation: Answers

Section A — MCQ

1. (b) Origin

2. (b) (x, 0)

3. (b) Quadrant II — x is negative, y is positive.

4. (b) 7 units — distance from the x-axis equals $|y| = |-7| = 7$.

5. (c) Quadrant III

6. (b) Baudhāyana–Pythagoras Theorem

7. (b) (0, 0)

8. (b) y-axis — it is of the form (0, y).

Section B — Fill in the Blanks

9. x-axis

10. y-axis

11. x-axis

12. negative

13. $|x_2 - x_1|$

14. $\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$

Section C — True or False

15. False — a point on the y-axis is of the form (0, y), not (x, 0).

16. True

17. True — when x = y, (x, y) and (y, x) are identical.

18. False — reflection in the y-axis changes the sign of the x-coordinate.

19. False — distance, being a length, is always non-negative.

Section D — Match the Following

—. 1 → (c); 2 → (a); 3 → (d); 4 → (e); 5 → (b)

Section E — One-Word Answer

20. Quadrants

21. x-coordinate (abscissa)

22. y-coordinate (ordinate)

Section F — Very Short Answer

23. The origin, (0, 0).

24. Quadrant IV, since $x = 7 > 0$ and $y = -2 < 0$.

25. If x = y, then P(x, y) and P(y, x) represent exactly the same point, since swapping equal coordinates does not change anything.

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Worksheet 2 — Application: Answers

Section A — Case-Based MCQ

1. (a) 5 units — length along $x = 7 - 2 = 5$.

2. (b) 6 units — width along $y = 9 - 3 = 6$.

3. (c) (7, 9) — diagonally opposite corner of the rectangle.

4. (b) 2 units — distance $= |11 - 9| = 2$.

Section B — Short Answer

5. A(3, 8), B(3, −2) have the same x-coordinate, so distance $= |8 - (-2)| = 10$ units.

6. P(−5, 4), Q(9, 4) have the same y-coordinate, so distance $= |9 - (-5)| = 14$ units.

7. R(−4, −6): since $x < 0$ and $y < 0$, R lies in Quadrant III. Distance from origin $= \sqrt{[(-4)^2 + (-6)^2]} = \sqrt{(16 + 36)} = \sqrt{52} = 2\sqrt{13}$ units.

8. Reflection in the x-axis: (6, 9). Reflection in the y-axis: (−6, −9).

9. Since $a > 0$, the x-coordinate a is positive and the y-coordinate $-a$ is negative. A point with (+, −) coordinates lies in Quadrant IV.

Section C — Numerical Problems

10. A(2, 3), B(6, 6): $\Delta x = 6 - 2 = 4$, $\Delta y = 6 - 3 = 3$. Distance $= \sqrt{(4^2 + 3^2)} = \sqrt{25} = 5$ units.

11. M(−3, 7), N(5, −8): $\Delta x = 5 - (-3) = 8$, $\Delta y = -8 - 7 = -15$. Distance $= \sqrt{(8^2 + 15^2)} = \sqrt{(64 + 225)} = \sqrt{289} = 17$ units.

12. AB (horizontal) $= |4 - 1| = 3$; BC (vertical) $= |6 - 2| = 4$. Since AB ⊥ BC, the right angle is at B. Hypotenuse AC $= \sqrt{(3^2 + 4^2)} = \sqrt{25} = 5$ units.

13. Total distance walked $= 8 + 6 = 14$ units. Straight-line distance $= \sqrt{(8^2 + 6^2)} = \sqrt{(64 + 36)} = \sqrt{100} = 10$ units.

Section D — Explain with Reasons

14. The origin (0, 0) lies exactly on both the x-axis and the y-axis, which form the boundaries of the four quadrants. A point must have a strictly positive or negative x- and y-coordinate to lie inside a quadrant, so the origin, lying on the axes themselves, is not considered part of any quadrant.

15. Distance is a physical length, and the distance formula involves squaring the coordinate differences before taking the (positive) square root, so the result is always zero or positive, never negative.

16. The point (−4, 0) lies on the x-axis itself (since its y-coordinate is 0), not inside any quadrant. Quadrant III requires both coordinates to be strictly negative, but here the y-coordinate is 0, not negative — so the student's reasoning is incorrect.

Section E — Competency-Based Questions

17. Length (along x) $= 6 - 1 = 5$ m; breadth (along y) $= 5 - 1 = 4$ m. Area $= 5 \times 4 = 20$ m^2.

18. First friend's distance $= 12 + 9 = 21$ units. Second friend's distance $= \sqrt{(12^2 + 9^2)} = \sqrt{(144 + 81)} = \sqrt{225} = 15$ units. Extra distance walked $= 21 - 15 = 6$ units.

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Worksheet 3 — Expert: Answers

Section A — Assertion–Reason

1. (a) — Both A and R are true; R correctly explains A.

2. (a) — Both A and R are true; R correctly explains A.

3. (a) — Both A and R are true; R correctly explains A.

4. (d) — A is false: $(-7, 2)$ has $x < 0$, $y > 0$, so it lies in Quadrant II, not IV. R is true.

5. (d) — A is false: the square root symbol denotes the non-negative root, so the formula never gives a negative value. R is true.

Section B — HOTS

6. Let $P = (x, 0)$. Distance $PA^2 = (x - 3)^2 + 4^2$; distance $PO^2 = x^2$. Equating: $(x - 3)^2 + 16 = x^2 \Longrightarrow x^2 - 6x + 9 + 16 = x^2 \Longrightarrow -6x + 25 = 0 \Longrightarrow x = 25/6$. So $P = (25/6, 0)$.

7. $AB = \sqrt{[(3-1)^2 + (6-2)^2]} = \sqrt{(4+16)} = \sqrt{20} = 2\sqrt{5}$. $BC = \sqrt{[(5-3)^2 + (10-6)^2]} = \sqrt{(4+16)} = 2\sqrt{5}$. $AC = \sqrt{[(5-1)^2 + (10-2)^2]} = \sqrt{(16+64)} = \sqrt{80} = 4\sqrt{5}$. Since $AB + BC = 2\sqrt{5} + 2\sqrt{5} = 4\sqrt{5} = AC$, the points A, B, C are collinear.

8. Let the point be $(0, y)$. Distance^2 from $(5, -2) = 25 + (y+2)^2$. Distance^2 from $(-3, 2) = 9 + (y-2)^2$. Equating: $25 + y^2 + 4y + 4 = 9 + y^2 - 4y + 4 \Longrightarrow 29 + 4y = 13 - 4y \Longrightarrow 8y = -16 \Longrightarrow y = -2$. The required point is $(0, -2)$.

9. Midpoint of B(6,0) and C(3,4) $= ((6+3)/2, (0+4)/2) = (4.5, 2)$. Median length from A(0,0) $= \sqrt{(4.5^2 + 2^2)} = \sqrt{(20.25 + 4)} = \sqrt{24.25} = \sqrt{97}/2 \approx 4.92$ units.

Section C — Long Answer

10. $AB = |6-2| = 4$; $BC = |5-1| = 4$; $CD = |6-2| = 4$; $DA = |5-1| = 4$. All sides equal and adjacent sides are perpendicular (horizontal/vertical), so ABCD is a square. Perimeter $= 4 \times 4 = 16$ units. Area $= 4^2 = 16$ sq. units.

11. $AB = \sqrt{[(4-3)^2 + (4-5)^2]} = \sqrt{(1+1)} = \sqrt{2}$. $BC = \sqrt{[(3-(-1))^2 + (5-(-1))^2]} = \sqrt{(16+36)} = \sqrt{52} = 2\sqrt{13}$. $AC = \sqrt{[(4-(-1))^2 + (4-(-1))^2]} = \sqrt{(25+25)} = \sqrt{50} = 5\sqrt{2}$. Check: $AB^2 + AC^2 = 2 + 50 = 52 = BC^2$. Since the sum of squares of the two shorter sides equals the square of the longest side, the triangle is right-angled, with the right angle at vertex A.

12. Distance from O = 13 $\Longrightarrow a^2 + b^2 = 169$. With $a = -5$: $25 + b^2 = 169 \Longrightarrow b^2 = 144 \Longrightarrow b = \pm 12$. Since A lies in Quadrant III, both coordinates are negative, so $b = -12$. $A = (-5, -12)$. Verification: $\sqrt{[(-5)^2 + (-12)^2]} = \sqrt{(25+144)} = \sqrt{169} = 13$. ✓

13. AB is vertical (same $x = 1$): length $= |6-1| = 5$. BC is horizontal (same $y = 6$): length $= |8-1| = 7$. Since ABCD is a rectangle, D must have the x-coordinate of C and the y-coordinate of A: $D = (8, 1)$. Area = length × breadth $= 7 \times 5 = 35$ sq. units.

Section D — Case Study

14. Centre = midpoint of A(0,0) and C(60,40) = (30, 20).

15. Length (along x) = 60 units = 600 m. Breadth (along y) = 40 units = 400 m.

16. Gate (0, 20) and centre (30, 20) share the same y-coordinate, so distance $= |30 - 0| = 30$ units = 300 m.

17. Distance from centre (30, 20) to the nearer vertical boundary ($x = 0$ or $x = 60$) = 30 units; to the nearer horizontal boundary ($y = 0$ or $y = 40$) = 20 units. Both distances (30 and 20 units) are greater than the fountain's radius of 10 units, so the fountain stays entirely within the park.

Section E — Board-Style Questions

18. Reflecting $P(2, -3)$ in the x-axis gives $P' = (2, 3)$. Reflecting $P'(2, 3)$ in the y-axis gives $P'' = (-2, 3)$. The single transformation mapping $P(2, -3)$ directly to $P''(-2, 3)$ is reflection through the origin, i.e., $(x, y) \to (-x, -y)$.

19. Distance$^2 = (k-1)^2 + (3-(-1))^2 = 25 \Longrightarrow (k-1)^2 + 16 = 25 \Longrightarrow (k-1)^2 = 9 \Longrightarrow k - 1 = \pm 3 \Longrightarrow k = 4$ or $k = -2$.

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