

Tarun Classes of Mathematics

IIT-JEE Mains | CBSE | PU-CET | NDA

CLASS 9 – CBSE | MATHEMATICS

Orienting Yourself: The Use of Coordinates

SECTION -A (Multiple choice questions)

- Which of the following points is the midpoint of $(-3,5)$ and $(1,1)$?
(a) $(-1,3)$ (b) $(-2,2)$ (c) $(1,3)$ (d) $(0,2)$
- Abscissa of all the points on the x-axis is
(a) 0 (b) 1 (c) 2 (d) any number
- If the perpendicular distance of a point P from the x-axis is 5 units and the foot of the perpendicular lies on the negative direction of x-axis, then the point P has
(a) x coordinate = -5 (b) y coordinate = 5 only
(c) y coordinate = -5 only (d) y coordinate = 5 or -5
- If the coordinates of the two points are P $(-2, 3)$ and Q $(-3, 5)$, then (abscissa of P) – (abscissa of Q) is
(a) -5 (b) 1 (c) -1 (d) -2
- The point which lies on y-axis at a distance of 5 units in the negative direction of y-axis is
(a) $(0, 5)$ (b) $(5, 0)$ (c) $(0, -5)$ (d) $(-5, 0)$
- The perpendicular distance of the point P $(5, -12)$ from the y-axis is
(a) 5 (b) 13 (c) 12 (d) -12
- The point $(5, -7)$ lies in:
(a) First quadrant (b) Second quadrant (c) Third quadrant (d) Fourth quadrant
- Consider an isosceles triangle ABC with $AC = BC$ with two of its vertices as A $(4, 4)$ and B $(-4, 4)$ then which of the following cannot be the coordinates of C ?
(a) $(0, 0)$ (b) $(0, 4)$ (c) $(0, 10)$ (d) $(0, -3)$

SECTION - B

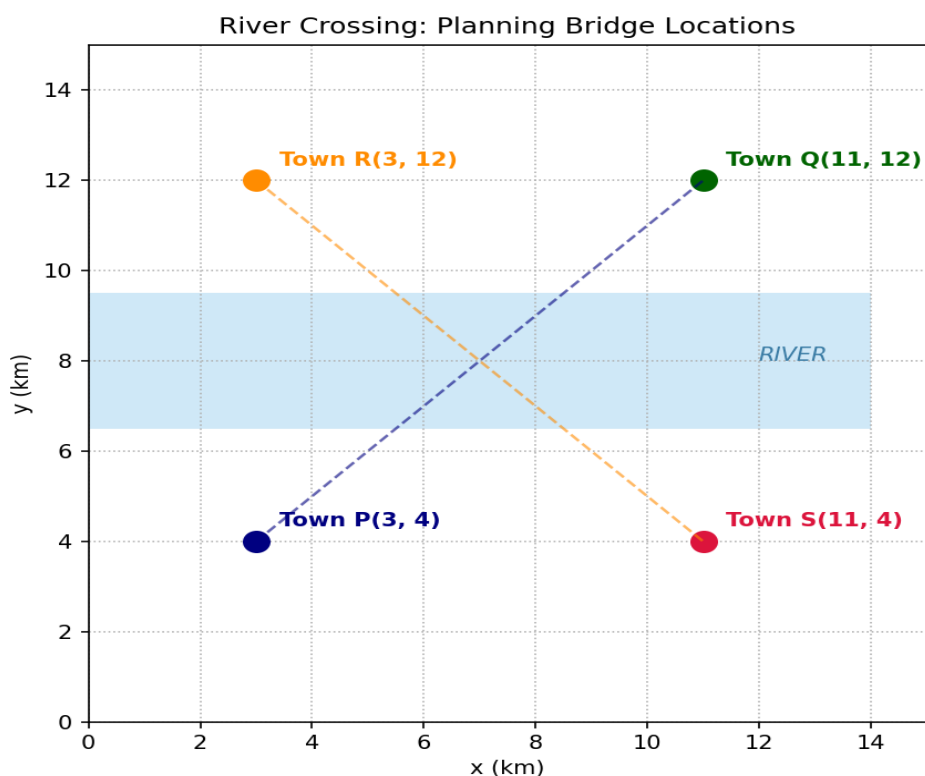
- The base of an equilateral triangle with side $4a$ lies along the y-axis such that the mid-point of the base is at the origin. Find the coordinates of the vertices of the triangle.
- Find the coordinates of point which lies at distance 7 units from y-axis .
- A and B have co-ordinates $(4, 3)$ and $(0, 1)$ respectively. Find

- (i) the image A' of A under reflection in the y -axis.
- (ii) find the image B' of B under reflection in the line AA' , the length of $A'B'$.
12. Find the distance between the points $P(-3, 6)$ and $Q(5, -2)$.
13. Find the mid-point of the line segment joining the points $(-6, 7)$ and $(2, -3)$.
14. Find the point on the x -axis which is equidistant from $(2, -5)$ and $(-2, 9)$.
15. Point W has x -coordinate equal to -5 . Can you predict the coordinates of point H which is on the line through W parallel to the y -axis? Which quadrants can H lie in?
16. Find the coordinates of B given that $M(-7, 1)$ is the midpoint of $A(3, -4)$ and $B(x, y)$.
17. A triangular park ABC is to be developed in a colony. The midpoints of its three sides are already marked by lamp posts at points $D(4, 3)$, $E(7, 6)$ and $F(2, 8)$, where D is the midpoint of AB , E is the midpoint of BC , and F is the midpoint of AC .
- (i) Find the coordinates of vertex A of triangle ABC .
- (ii) Find the coordinates of vertex B of triangle ABC .
- (iii) Find the coordinates of vertex C of triangle ABC .

SECTION - C

Case Study Based Questions

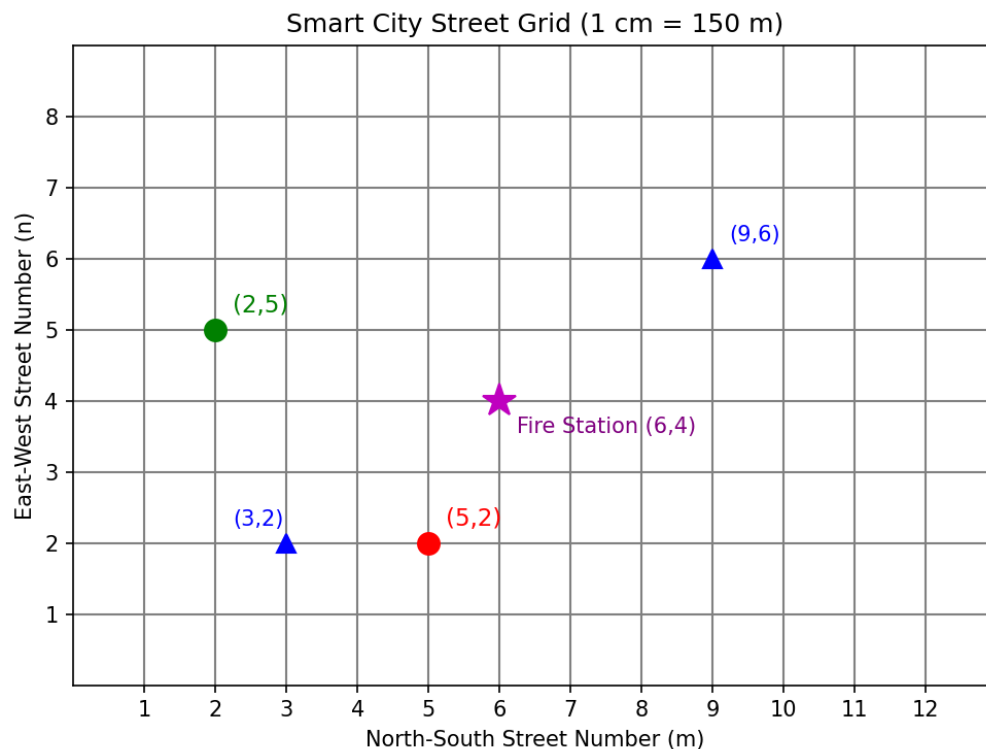
18. A river flows between two banks, and the local authority wants to build a bridge connecting Town P , located at $(3, 4)$, to Town Q , located at $(11, 12)$, on the opposite bank. A second possible bridge route would connect Town $R(3, 12)$ to Town $S(11, 4)$.



Answer the following questions:

- i) Find the coordinates of the midpoint of PQ. This point will be used to place the central pillar of the bridge.
- ii) Two additional support pillars are to be placed exactly midway between P and the central pillar, and midway between the central pillar and Q. Find the coordinates of these two support pillars.
- iii) Find the coordinates of the midpoint of RS, the second possible bridge route.
- iv) Compare your answers to Questions 1 and 3. What do you notice about the two midpoints?
Based on this, what can you say about the diagonals PQ and RS of the quadrilateral PRQS?

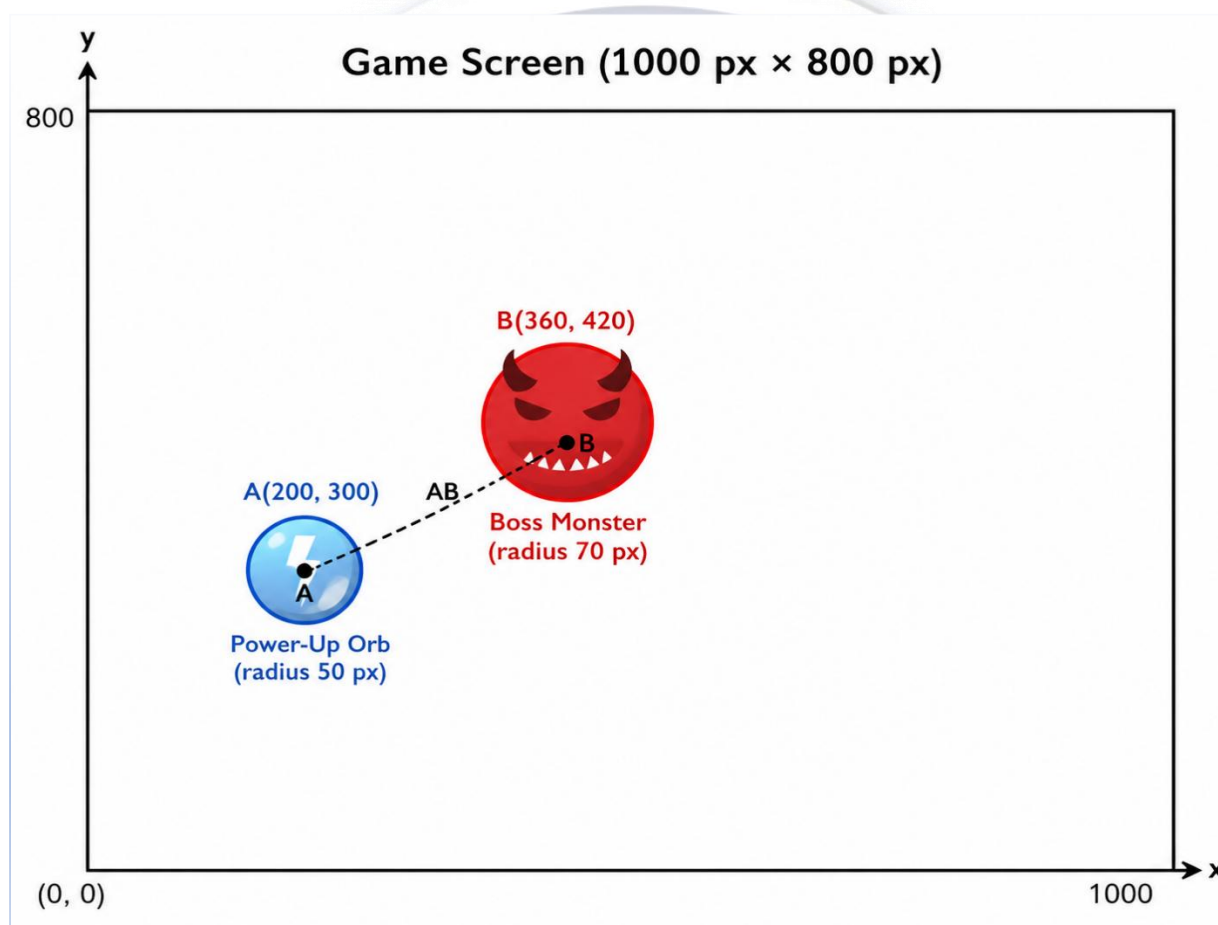
19. A planned smart city has its roads arranged in a perfect grid. The two main roads cross at the centre of the city and run in the North–South and East–West directions. All other streets run parallel to these main roads and are 150 m apart. There are 12 streets running North–South and 8 streets running East–West. A street intersection is named (m, n) if the m-th North–South street meets the n-th East–West street.



Answer the following questions:

- i) Using a scale of 1 cm = 150 m, describe how you would draw a model of this grid in your notebook.

- ii) How many different street intersections in the city can be referred to as (5, 2)? Explain your reasoning.
 - iii) How many different street intersections can be referred to as (2, 5)? Is this the same intersection as (5, 2)? Justify your answer.
 - iv) If a fire station is to be built exactly midway between intersection (3, 2) and intersection (9, 6), find the coordinates (in the street-numbering system) of its nearest intersection.
20. A mobile game designer is creating a map on a rectangular screen of size 1000 pixels (width) by 800 pixels (height), with the origin at the bottom-left corner. A Power-Up Orb icon of radius 50 pixels is centred at point A(200, 300). A Boss Monster icon of radius 70 pixels is centred at point B(360, 420).



Answer the following questions:

- i) Check whether the Power-Up Orb icon (centre A, radius 50) lies completely within the screen boundaries.
- ii) Check whether the Boss Monster icon (centre B, radius 70) lies completely within the screen boundaries.
- iii) Find the distance AB between the centres of the two icons.
- iv) Using the distance AB and the two radii, determine whether the Power-Up Orb icon and the Boss Monster icon overlap (intersect) on the screen.

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The Use of Coordinates- Answer Key

Section A — Multiple Choice Questions

1. (a)
2. (d)
3. (d)
4. (b)
5. (c)
6. (a)
7. (d)
8. (b)

Section B — Short Answer Questions

9. Vertices of the equilateral triangle: $(0, 2a)$, $(0, -2a)$ and $(2\sqrt{3} a, 0)$.
10. Any point of the form $(7, y)$ or $(-7, y)$, e.g. $(7, 0)$.
11. (a) $A' = (-4, 3)$. (b) $B' = (0, 5)$; length $A'B' = 2\sqrt{5}$ units.
12. $PQ = 8\sqrt{2}$ units.
13. Midpoint = $(-2, 2)$.
14. $(-7, 0)$.
15. H has x-coordinate = -5 (any y-value); H can lie in Quadrant II ($y > 0$) or Quadrant III ($y < 0$), or on the negative x-axis if $y = 0$.
16. $B = (-17, 6)$.
17. $A(-1, 5)$, $B(9, 1)$, $C(5, 11)$.

Section C — Case Study Based Questions

18. Case Study 1: Bridge Across a River

- i) Midpoint of $PQ = (7, 8)$.

- ii) Support pillars: (5, 6) and (9, 10).
- iii) Midpoint of RS = (7, 8).
- iv) Both midpoints are the same point, (7, 8). This shows that PQ and RS bisect each other, confirming that PRQS is a parallelogram (in fact a rectangle).

19. Case Study 2: Smart City Street Grid

- i) Draw 12 vertical lines 1 cm apart (North–South streets, numbered 1–12) and 8 horizontal lines 1 cm apart (East–West streets, numbered 1–8), forming an 11 cm $\times$ 7 cm grid.
- ii) Only one — (5, 2) names a single, unique intersection.
- iii) Only one — (2, 5) is also a single, unique intersection, but it is not the same as (5, 2), since order matters.
- iv) Midpoint = (6, 4); nearest intersection is (6, 4).

20. Case Study 3: Mobile Game Map Design

- i) Yes — the Power-Up Orb icon lies completely within the screen.
- ii) Yes — the Boss Monster icon lies completely within the screen.
- iii) AB = 200 pixels.
- iv) Sum of radii = 120 px < AB = 200 px, so the two icons do NOT overlap.