HOTS Questions on Chapter 1 'Orienting Yourself – The Use of Coordinates' for Class 9

Question 1: What is the abscissa of the origin?
Solution:
The origin has coordinates (0, 0). The abscissa is the x-coordinate, so the abscissa of the origin is 0.

Question 2: What is the sign of the y-coordinate of a point that lies below the x-axis?
Solution:
Any point below the x-axis has a negative y-coordinate. This is because we move downward from the origin along the y-axis, which is the negative direction.

Question 3: What are the coordinates of a point lying on the y-axis at −3 units from the origin?
Solution:
A point on the y-axis always has its x-coordinate = 0. If it is 3 units below the origin (i.e., in the negative direction), its coordinates are (0, −3).

Question 4: Two points are A(−3, 7) and B(−7, 5). Find the value of (Abscissa of A) − (Abscissa of B).
Solution:
Abscissa of A = x-coordinate of A = −3
Abscissa of B = x-coordinate of B = −7
Difference = (−3) − (−7) = −3 + 7 = 4

Question 5: A point is such that its abscissa (which is non-zero) equals its ordinate. In which quadrant(s) can this point lie?
Solution:
If abscissa = ordinate, i.e., x = y (and x ≠ 0), then:
If both x and y are positive ⇒ the point lies in Quadrant I (e.g., (3, 3))
If both x and y are negative ⇒ the point lies in Quadrant III (e.g., (−2, −2))
So the point can lie in Quadrant I or Quadrant III.

Question 6: Can a point lie in more than one quadrant at the same time? Give a reason. What about lying on the axes?

Solution:

No, a point cannot lie in more than one quadrant simultaneously. The four quadrants are mutually exclusive, non-overlapping regions of the Cartesian plane. A point has a unique pair of coordinates (x, y) and can belong to exactly one of the four quadrants or to one of the axes but never two simultaneously.

A point that lies on the x-axis or y-axis does not belong to any quadrant. The axes form the boundaries between quadrants, not part of them.

Question 7: A point P lies in the third quadrant. Its distance from the x-axis is 4 units and its distance from the y-axis is 3 units. What are the coordinates of P? Also write the coordinates of its mirror images with respect to (i) the x-axis, (ii) the y-axis, and (iii) the origin.

Solution:

Since P is in Quadrant III, both coordinates are negative.

Distance from x-axis = |y-coordinate| = 4 $\Rightarrow$ y = −4

Distance from y-axis = |x-coordinate| = 3 $\Rightarrow$ x = −3

So P = (−3, −4)

(i) Mirror image with respect to the x-axis:

Reflecting over the x-axis changes the sign of the y-coordinate.

$\Rightarrow$ Mirror image = (−3, 4) [Quadrant II]

(ii) Mirror image with respect to the y-axis:

Reflecting over the y-axis changes the sign of the x-coordinate.

$\Rightarrow$ Mirror image = (3, −4) [Quadrant IV]

(iii) Mirror image with respect to the origin:

Reflecting through the origin changes the sign of both coordinates.

$\Rightarrow$ Mirror image = (3, 4) [Quadrant I]

Question 8: A city has two main roads crossing at the centre of the city. These roads are along the North-South and East-West directions. All the other streets of the city run parallel to these two roads and are 200 m apart. There are five streets in each direction. Using the Cartesian system, set up a coordinate system to represent this city. Name the main roads as the x and y-axes, and plot the intersection of the 2nd street (East) and 3rd street (North).

Solution:

Let's set up our coordinate system:

The intersection of the two main roads = Origin (0, 0)

East direction = positive x-axis; West = negative x-axis

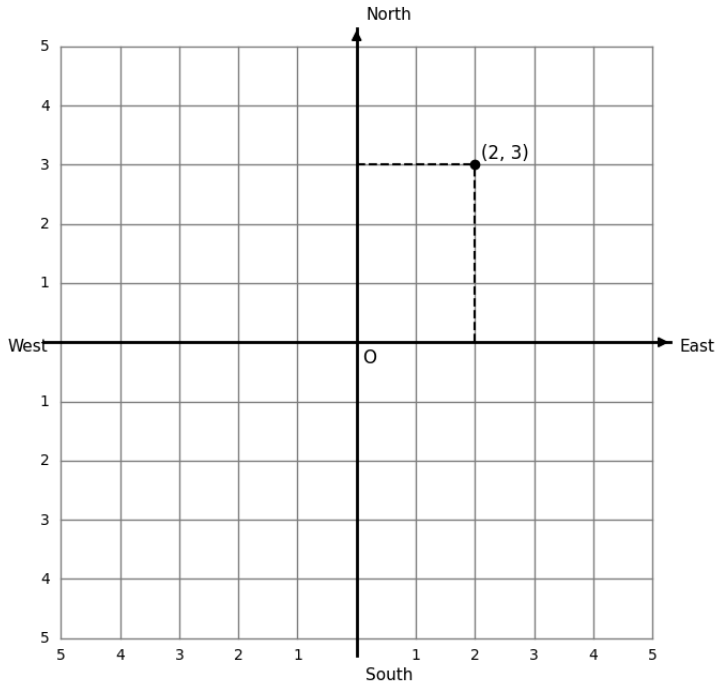
North direction = positive y-axis; South = negative y-axis

Each unit = 200 m

Streets are numbered by their distance from the main roads:

1st street East = x = 1, 2nd street East = x = 2, etc.

1st street North = y = 1, 2nd street North = y = 2, etc.



The intersection of the 2nd street East and 3rd street North = (2, 3)

This is a Quadrant I point (both coordinates positive), 400 m East and 600 m North of the city centre.

Question 9: State whether the following are True or False, and explain why:

(a) The point (−2, 3) and the point (3, −2) represent the same location on the Cartesian plane.

False. In an ordered pair (x, y), the first value is always the x-coordinate and the second is always the y-coordinate. (−2, 3) lies in Quadrant II, while (3, −2) lies in Quadrant IV. They are entirely different points.

(b) A point can lie on both the x-axis and y-axis simultaneously.
True, but only at the Origin. The point (0, 0) lies on both axes. No other point satisfies y = 0 and x = 0 at the same time.