Exercise 12.1

Question 1:

A point is on the *x*-axis. What are its *y*-coordinates and *z*-coordinates?

Answer

If a point is on the *x*-axis, then its *y*-coordinates and *z*-coordinates are zero.

Question 2:

A point is in the XZ-plane. What can you say about its *y*-coordinate?

Answer

If a point is in the XZ plane, then its *y*-coordinate is zero.

Question 3:

Name the octants in which the following points lie:

(1, 2, 3), (4, −2, 3), (4, −2, −5), (4, 2, −5), (−4, 2, −5), (−4, 2, 5),

(−3, −1, 6), (2, −4, −7)

Answer

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (1, 2, 3) are all positive. Therefore, this point lies in octant **I**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (4, −2, 3) are positive, negative, and positive respectively. Therefore, this point lies in octant **IV**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (4, −2, −5) are positive, negative, and negative respectively. Therefore, this point lies in octant **VIII**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (4, 2, −5) are positive, positive, and negative respectively. Therefore, this point lies in octant **V**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (−4, 2, −5) are negative, positive, and negative respectively. Therefore, this point lies in octant **VI**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (−4, 2, 5) are negative, positive, and positive respectively. Therefore, this point lies in octant **II**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (−3, −1, 6) are negative, negative, and positive respectively. Therefore, this point lies in octant **III**.

The *x*-coordinate, *y*-coordinate, and *z*-coordinate of point (2, −4, −7) are positive, negative, and negative respectively. Therefore, this point lies in octant **VIII**.

Question 4:

Fill in the blanks:

Answer

(i) The *x*-axis and *y*-axis taken together determine a plane known as $XY-plane$.

(ii) The coordinates of points in the XY-plane are of the form $(x, y, 0)$.

(iii) Coordinate planes divide the space into $eight$ octants.