Example 1 In Fig 11.3, if P is (2,4,5), find the coordinates of F.

Solution For the point F, the distance measured along OY is zero. Therefore, the coordinates of F are (2,0,5).

Example 2 Find the octant in which the points (–3,1,2) and (–3,1,– 2) lie.

Solution From the Table 11.1, the point (–3,1, 2) lies in second octant and the point (–3, 1, – 2) lies in octant VI.

EXERCISE 11.1

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

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

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).

4. Fill in the blanks:

(i) The x-axis and y-axis taken together determine a plane known as_____.

(ii) The coordinates of points in the XY-plane are of the form_____.

(iii) Coordinate planes divide the space into_____octants.

11.4 Distance between Two Points

We have studied about the distance between two points in two-dimensional coordinate system. Let us now extend this study to three-dimensional system.

Let P(x_1, y_1, z_1) and Q (x_2, y_2, z_2) be two points referred to a system of rectangular axes OX, OY and OZ. Through the points P and Q draw planes parallel to the coordinate planes so as to form a rectangular parallelopiped with one diagonal PQ (Fig 11.4).

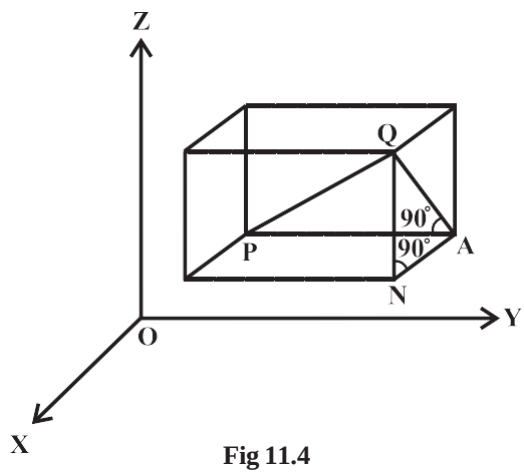

Fig 11.4

Now, since ∠PAQ is a right angle, it follows that, in triangle PAQ,

$$PQ^2 = PA^2 + AQ^2 \quad \ldots (1)$$

Also, triangle ANQ is right angle triangle with ∠ANQ a right angle.