

**Distance between Two Points**

To determine the distance between two points,  $P(x_1, y_1, z_1)$  and  $Q(x_2, y_2, z_2)$  in three-dimensional space.

Observing the diagram provided above, it is evident that

$$\angle PAN = 90^\circ.$$

By applying the Pythagoras theorem,

$$PN^2 = PA^2 + AN^2$$

$$\angle PNQ = 90^\circ$$

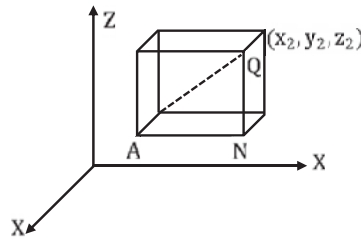
$$PQ^2 = PN^2 + NQ^2$$

$$PQ^2 = PA^2 + AN^2 + NQ^2$$

$$PA = (x_2 - x_1)$$

$$AN = (y_2 - y_1)$$

$$NQ = (z_2 - z_1)$$



$$PQ^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2$$

$$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$