

Example 4: Find a relation between x and y such that the point (x, y) is equidistant from the points $(7, 1)$ and $(3, 5)$.

Solution: Let $P(x, y)$ be equidistant from the points $A(7, 1)$ and $B(3, 5)$.

We are given that $AP = BP$. So, $AP^2 = BP^2$

$$\begin{aligned}(x - 7)^2 + (y - 1)^2 &= (x - 3)^2 + (y - 5)^2 \\ x^2 - 14x + 49 + y^2 - 2y + 1 &= x^2 - 6x + 9 + y^2 - 10y + 25 \\ x - y &= 2\end{aligned}$$

which is the required relation.

Remark: Note that the graph of the equation $x - y = 2$ is a line. From your earlier studies, you know that a point which is equidistant from A and B lies on the perpendicular bisector of AB . Therefore, the graph of $x - y = 2$ is the perpendicular bisector of AB (see Fig. 7.7).

Example 5: Find a point on the y -axis which is equidistant from the points $A(6, 5)$ and $B(-4, 3)$.

Solution: We know that a point on the y -axis is of the form $(0, y)$. So, let the point $P(0, y)$ be equidistant from A and B . Then,

$$\begin{aligned}(6 - 0)^2 + (5 - y)^2 &= (-4 - 0)^2 + (3 - y)^2 \\ 36 + 25 + y^2 - 10y &= 16 + 9 + y^2 - 6y \\ 4y &= 36 \Rightarrow y = 9\end{aligned}$$

So, the required point is $(0, 9)$.

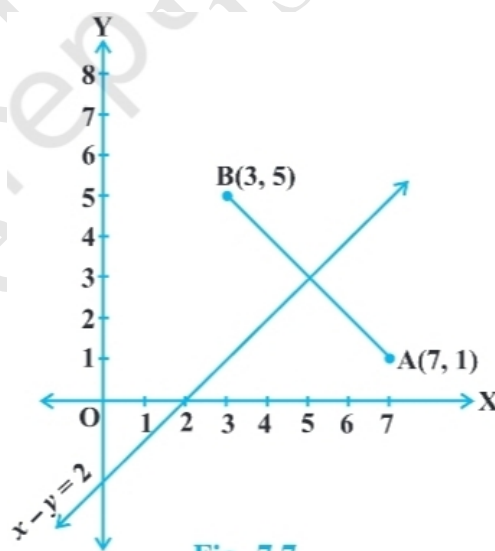


Fig. 7.7