

**Exercise 9.1****1. Find the distance between the following pairs of points.**(a)  $A(9, 2), B(7, 2)$ 

$$\begin{aligned}
 |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(7 - 9)^2 + (2 - 2)^2} \\
 &= \sqrt{(-2)^2 + (0)^2} \\
 &= \sqrt{4 + 0} \\
 &= \sqrt{4} \\
 &= 2
 \end{aligned}$$

(b)  $A(2, -6), B(3, -6)$ 

$$\begin{aligned}
 |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(3 - 2)^2 + (-6 + 6)^2} \\
 &= \sqrt{(1)^2 + (0)^2} \\
 &= \sqrt{1 + 0} \\
 &= \sqrt{1} \\
 &= 1
 \end{aligned}$$

(c)  $A(-8, 1), B(6, 1)$ 

$$\begin{aligned}
 |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(6 + 8)^2 + (1 - 1)^2} \\
 &= \sqrt{(14)^2 + (0)^2} \\
 &= \sqrt{196 + 0} \\
 &= \sqrt{196} \\
 &= 14
 \end{aligned}$$

(d)  $A(-4, \sqrt{2}), B(-4, -3)$ 

$$\begin{aligned}
 |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(-4 + 4)^2 + (-3 - \sqrt{2})^2} \\
 &= \sqrt{(0)^2 + (3 + \sqrt{2})^2} \\
 &= \sqrt{(3 + \sqrt{2})^2} \\
 &= 3 + \sqrt{2}
 \end{aligned}$$

(e)  $A(3, -11), B(3, -4)$ 

$$\begin{aligned}
 |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(3 - 3)^2 + (-4 + 11)^2} \\
 &= \sqrt{(0)^2 + (7)^2} \\
 &= \sqrt{(7)^2} \\
 &= 7
 \end{aligned}$$



(f)  $A(0, 0), B(0, -5)$

$$\begin{aligned} |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(0 - 0)^2 + (-5 - 0)^2} \\ &= \sqrt{(0)^2 + (5)^2} \\ &= \sqrt{(5)^2} \\ &= 5 \end{aligned}$$

2. Let P be the point on x-axis with x-coordinate a and Q be the point on y-axis with y-coordinate b as given below. Find the distance between P and Q.

(i)  $a = 9, b = 7$

$P(9, 0), Q(0, 7)$

$$\begin{aligned} |PQ| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(0 - 9)^2 + (7 - 0)^2} \\ &= \sqrt{(-9)^2 + (7)^2} \\ &= \sqrt{81 + 49} \\ &= \sqrt{130} \end{aligned}$$

(ii)  $a = 2, b = 3$

$P(2, 0), Q(0, 3)$

$$\begin{aligned} |PQ| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(0 - 2)^2 + (3 - 0)^2} \\ &= \sqrt{(-2)^2 + (3)^2} \\ &= \sqrt{4 + 9} \\ &= \sqrt{13} \end{aligned}$$

(iii)  $a = -8, b = 6$

$P(-8, 0), Q(0, 6)$

$$\begin{aligned} |PQ| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(0 + 8)^2 + (6 - 0)^2} \\ &= \sqrt{(8)^2 + (6)^2} \\ &= \sqrt{64 + 36} \\ &= \sqrt{100} \\ &= 10 \end{aligned}$$

(iv)  $a = -2, b = -3$

$P(-2, 0), Q(0, -3)$

$$\begin{aligned} |PQ| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(0 - 2)^2 + (-3 - 0)^2} \\ &= \sqrt{(-2)^2 + (-3)^2} \\ &= \sqrt{4 + 9} \\ &= \sqrt{13} \end{aligned}$$

(v)  $a = \sqrt{2}, b = 1$

$P(\sqrt{2}, 0), Q(0, 1)$

$$\begin{aligned}|PQ| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\&= \sqrt{(0 - \sqrt{2})^2 + (1 - 0)^2} \\&= \sqrt{(\sqrt{2})^2 + (1)^2} \\&= \sqrt{2 + 1} \\&= \sqrt{3}\end{aligned}$$

(vi)  $a = -9, b = -4$

$P(-9, 0), Q(0, -4)$

$$\begin{aligned}|PQ| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\&= \sqrt{(0 + 9)^2 + (-4 - 0)^2} \\&= \sqrt{(9)^2 + (-4)^2} \\&= \sqrt{81 + 16} \\&= \sqrt{97}\end{aligned}$$