Distance Between Two Points

To find the distance between two points when the coordinates of the two points are given, we use the following formula:

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

Example 1

Find the length of the line segment joining C(2, -3) to D(2, 1).

Solution

$$D_{CD} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(2 - 2)^2 + (1 - {-3})^2}$$
$$= \sqrt{(0)^2 + (4)^2}$$
$$= \sqrt{0 + 16}$$
$$= \sqrt{16}$$
$$= 4$$

Example 2

Calculate the distance between the points $B(2, -3)$ and $C(9, 4)$.

Solution

$$D_{BC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(9 - 2)^2 + (4 - {-3})^2}$$
$$= \sqrt{(7)^2 + (7)^2}$$
$$= \sqrt{49 + 49}$$
$$= \sqrt{98}$$

Can you think of another way to express $\sqrt{98}$???

$$\Rightarrow \sqrt{98}$$
$$\Rightarrow \sqrt{49 \times 2}$$
$$\Rightarrow 7\sqrt{2} \text{ units}$$

Example 3

A triangle has vertices at A(1, 5), B(1, 2), and C(5, 2). Find the perimeter.

Solution

$$D_{AB} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(1 - 1)^2 + (2 - 5)^2}$$
$$= \sqrt{(0)^2 + (-3)^2}$$
$$= \sqrt{0 + 9}$$
$$= \sqrt{9}$$
$$= 3$$

$$D_{BC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(5 - 1)^2 + (2 - 2)^2}$$
$$= \sqrt{(4)^2 + (0)^2}$$
$$= \sqrt{16 + 0}$$
$$= \sqrt{16}$$
$$= 4$$

$$D_{AC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(5 - 1)^2 + (2 - 5)^2}$$
$$= \sqrt{(4)^2 + (-3)^2}$$
$$= \sqrt{16 + 9}$$
$$= \sqrt{25}$$
$$= 5$$

Perimeter = 3 + 4 + 5
$$= 12 \text{ units}$$