

Lesson #2

Finding the Distance Between Two Points

What Is The Distance Between Two Points? And How Do We Find It?

The distance between 2 points in the coordinate plane is a measure of how far apart they are. Or, the length of the segment connecting the 2 points.

In order to find distance, we need 2 points in the form (x_1, y_1) and (x_2, y_2) .

Distance can be either a number or it can be expressed as “d” units.

The Distance Formula:

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

Using the Distance Formula

Sample Question: Find the distance between the points $(-1, 4)$ and $(3, 7)$.

Solution: Use the distance formula with $x_1 = -1$, $y_1 = 4$, $x_2 = 3$, and $y_2 = 7$

$$\begin{aligned} d &= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \\ &= \sqrt{(-1 - 3)^2 + (4 - 7)^2} \\ &= \sqrt{(-4)^2 + (-3)^2} \\ &= \sqrt{16 + 9} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$$

The distance between the 2 points is 5 units

Sample Question: What is the distance between (2, -4) and (-7, 9)?

Solution: Use the distance formula with $x_1 = 2$, $y_1 = -4$, $x_2 = -7$, and $y_2 = 9$

$$\begin{aligned}d &= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \\&= \sqrt{(2 - (-7))^2 + (-4 - 9)^2} \\&= \sqrt{(9)^2 + (-13)^2} \\&= \sqrt{81 + 169} \\&= \sqrt{250} \\&= \sqrt{25}\sqrt{10} = 5\sqrt{10} \approx 15.81\end{aligned}$$

The distance between the 2 points is $5\sqrt{10}$ or 15.81 units

A Quick Note About Radicals...

The ACT varies in how they display their answers. If a radical does not simplify nicely (such as when $\sqrt{81} = 9$), it will sometimes be displayed in exact radical form and sometimes as a decimal approximation

For example, $\sqrt{60}$ could be expressed as either $2\sqrt{15}$ or 7.75

Always look at the answer choices to find out which format a question expects!!!