Common Core Standards
8. G. 7 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8. EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation \( y = mx \) for a line through the origin and the equation \( y = mx + b \) for a line intercepting the vertical axis at \( b \).
8. F. 4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two \( (x, y) \) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
WARM-UP (1)

1) Use the Pythagorean Theorem to find the distance between A and B.

2) Use the Pythagorean Theorem to find the distance between A and C.
The Distance Formula

Can we use the Pythagorean Theorem to find distances in the coordinate plane?

\[ \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
We can use the Pythagorean Theorem to find diagonal distances by using the horizontal and vertical distances between the points as the legs.

Concept Check
Find the horizontal and vertical distances between the two points.

Use the Pythagorean Theorem to find the diagonal distance.
EXAMPLES (3)

Use the Pythagorean Theorem to find the diagonal distance.
Find the distance between (7,9) and (-1,-6).
The Pythagorean Theorem can be rewritten with the hypotenuse by itself and the vertical and horizontal distances included.

**Concept Check**
Rewrite the Pythagorean Theorem with the hypotenuse by itself.

\[
hyp^2 = \text{leg}_1^2 + \text{leg}_2^2
\]

Include the horizontal and vertical distances in the Theorem.
To find diagonal distances between points without the benefit of a graph use the distance formula.

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

**Example**

Find the distance between the points (6,2) and (3,-2).
Find the distance between the points (4,10) and (-8,1).

\[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
EXAMPLES (8)

Find the distance between the points (-2,3) and (5,-4) and round the answer to the nearest tenth.
Find the distance between the points (9,-3) and (-6,5).

Find the distance between the points (-4,-5) and (-1,2) and round the answer to the nearest tenth.
Find the distance between the points (-14, -1) and (10, -8).