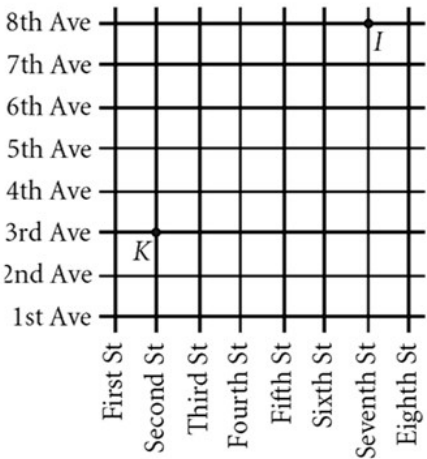


Warm-Up

Distance in Coordinate Geometry

What is the shortest distance from Kayleigh to Isabella? Describe how you would identify and find the value of this distance.



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Coordinate Geometry 9: Distance in Coordinat

10.1b Distance in Coordinate Geometry

- a. I can calculate the distance between two points using the distance formula or the Pythagorean Theorem.

b. I can find the perimeter of a polygon on the coordinate plane.

10.1b The Distance Formula

Find the distance between the points. Give an exact answer (*hint: use Pythagorean Thm.).

1. $2 - (-4) = 6$
 $3 - (-5) = 8$

$6^2 + 8^2 = c^2$
 $100 = c^2$
 $10 = c$

2. $\sqrt{8} = 2\sqrt{2}$
 $\sqrt{20} = 2\sqrt{5}$
 $\sqrt{24} = 2\sqrt{6}$

$4^2 + 2^2 = c^2$
 $20 = c^2$
 $\sqrt{20} = c$
 $2\sqrt{5} = c$

How about when two points are too far? It is unrealistic to plot them.

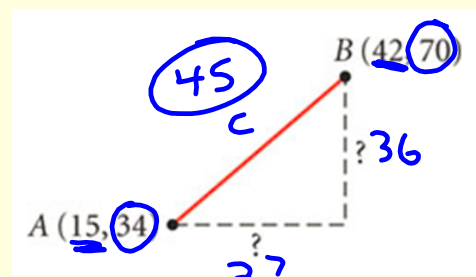
3. Given the points (15, 34) and (42, 70)

- a. Find the horizontal distance between these points.

$$42 - 15 = 27$$

- b. Find the vertical distance between these points.

$$70 - 34 = 36$$



- c. Use Pythagorean Thm. to find the distance between point A and B.

$$27^2 + 36^2 = c^2$$

$$729 + 1296 = c^2$$

$$2025 = c^2$$

$$\sqrt{2025} = c$$

$$45 = c$$

Exploring the distance formula.

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is:

- a. Write an expression to represent the horizontal distance between the two points.

$$x_2 - x_1$$

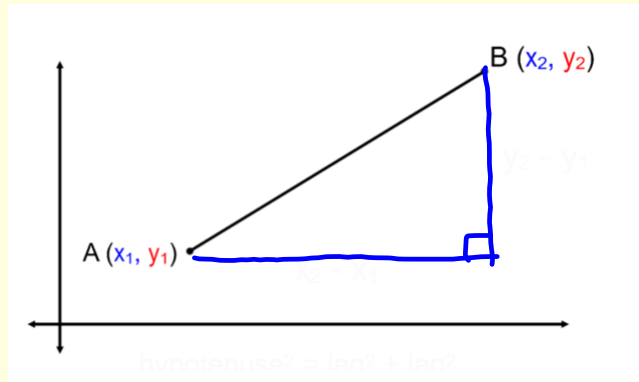
- b. Write an expression to represent the vertical distance between the two points.

$$y_2 - y_1$$

- c. Use your expressions from a, b, and plug into the Pythagorean Thm.

$$(AB)^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$a^2 + b^2$$



- d. Solve for AB.

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

Pythagorean Theorem

The Distance formula:

$$c = \sqrt{a^2 + b^2}$$

Examples: Find the distance between the following sets of points. Give an exact answer (no decimals).

4. $(5, 0)$ and $(3, 8)$

$$d = \sqrt{2^2 + 8^2}$$

$$d = \sqrt{4 + 64}$$

$$d = \sqrt{68}$$

$$d = 2\sqrt{17}$$

5. $(-4, 6)$ and $(8, -1)$

$$d = \sqrt{12^2 + (-7)^2}$$

$$8 - (-4) \quad -1 - 6$$

$$d = \sqrt{144 + 49}$$

$$d = \sqrt{193}$$

6. Use the distance formula to determine the most specific name for the following quadrilateral.

$$A(-4,0), B(-7,-1), C(-8,2), D(-4,5)$$

$$AB = \sqrt{1^2 + 3^2} = \sqrt{10}$$

$$BC = \sqrt{1 + 3^2} = \sqrt{10}$$

$$CD = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$$

