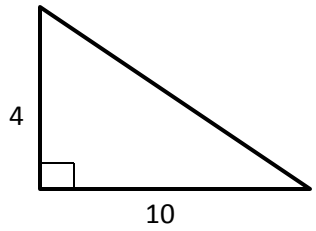
IC27

Distance & Midpoint – Coordinate Plane

Finding Distances: Solve for the missing side of the triangles below.



Pythagorean Thm.

$$a^2 + b^2 = c^2$$

$$4^2 + 10^2 = c^2$$

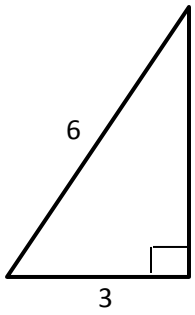
$$16 + 100 = c^2$$

$$116 = c^2$$

$$\sqrt{116} = \sqrt{c^2}$$

$$\sqrt{116} = c$$

Finding Distances: Solve for the missing side of the triangles below.



Pythagorean Thm.

$$a^2 + b^2 = c^2$$

$$3^2 + b^2 = 6^2$$

$$9 + b^2 = 36$$

$$b^2 = 27$$

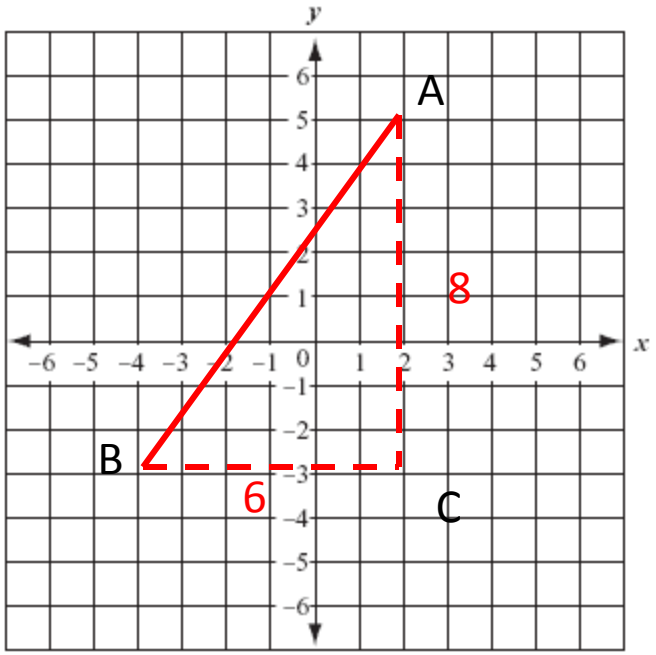
$$\sqrt{b^2} = \sqrt{27}$$

$$b = \sqrt{27}$$

A. Plot the points A (2, 5) and B (-4, -3)

B. Draw AB

C. Draw a horizontal line through B and a vertical line through A, label their intersection C.



D. AC = 8 BC = 6

E. By Pythagorean Thm.

$AB^2 = 8^2 + 6^2$

$AB^2 = 64 + 36$

$AB^2 = 100$

AB = 10

1a. Explain how you solved for AB in Step E?

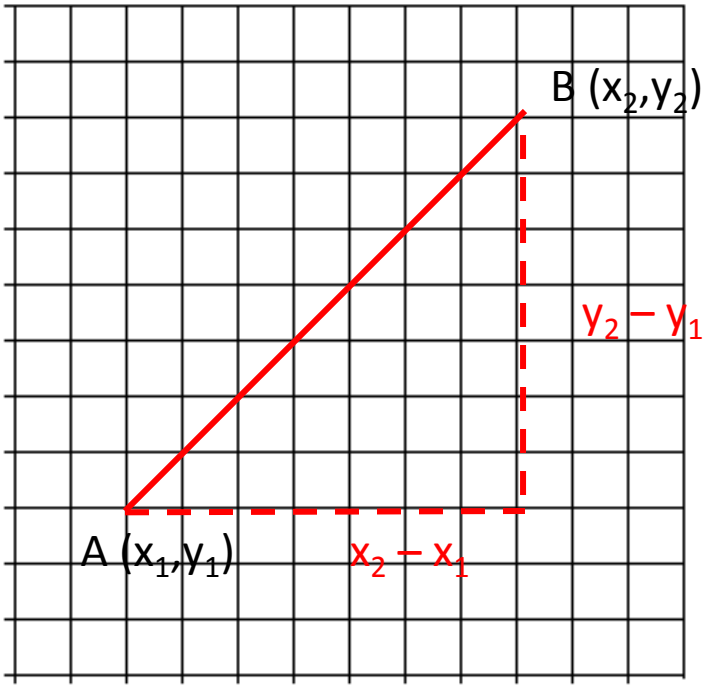
Solved using the Pythagorean Thm.

1b. Can you use the above method to find the distance between any two points in the coordinate plane? Explain.

Yes→ you can always draw a vertical and horizontal lines to make a right triangle.

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

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



Distance formula:

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

Find the distance between (8, -4) and (2, 2)

$$d = \sqrt{(2-8)^2 + (2+4)^2}$$

$$d = \sqrt{36+36}$$

$$d = \sqrt{72} = \sqrt{6 * 6 * 2} = 6\sqrt{2} \approx 8.5$$

Find the distance between (-1, 2) and (-4, 6)

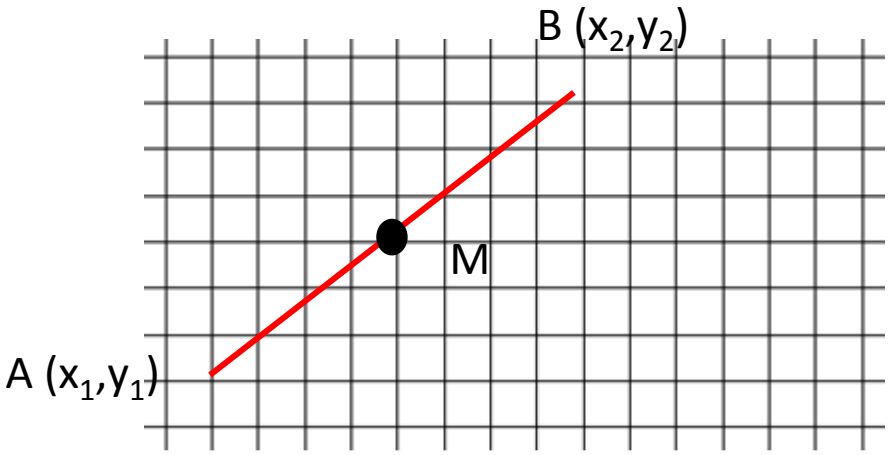
$$d = \sqrt{(-4+1)^2 + (6-2)^2}$$

$$d = \sqrt{9+16}$$

$$d = \sqrt{25} = 5$$

Finding Midpoints: Given A(x_1, y_1), B(x_2, y_2)
Find: The midpoint of $\overline{AB}$.

*Needs to be halfway between A and B → averages are halfway Between.



$$M_{x-coor} = \frac{x_1 + x_2}{2}$$

$$M_{y-coor} = \frac{y_1 + y_2}{2}$$

Midpoint Formula:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Note: The result of this formula is **NOT** a distance or length – it is a **POINT**. *Needs both x and y parts