

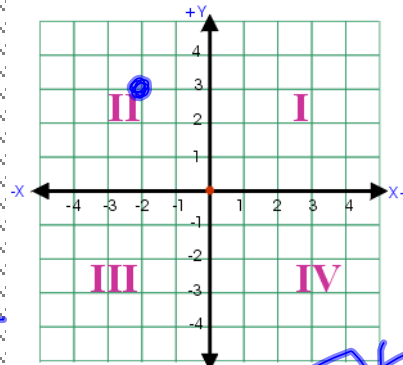
$\sqrt{4 \cdot 12}$ \swarrow $4 \cdot 3$ **Warmup**

1) Simplify $\sqrt{48}$

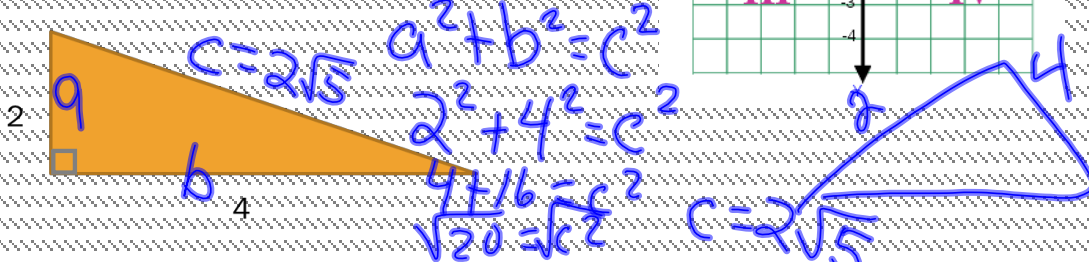
$\sqrt{16 \cdot 3} \rightarrow \sqrt{16} \cdot \sqrt{3} \rightarrow 4\sqrt{3}$

2) What quadrant is $(-2, 3)$

II



3) Find the missing side.



3) How many cats are eaten in Asia each year?

4 million kitties

40,000

Unit 1 - Lesson 5

MIDPOINT & DISTANCE FORMULA

ESSENTIAL QUESTIONS

HOW DO YOU FIND THE DISTANCE BETWEEN TWO POINTS AND THE HALFWAY POINT? WHY IS IT USEFUL TO HAVE A FORMULA?

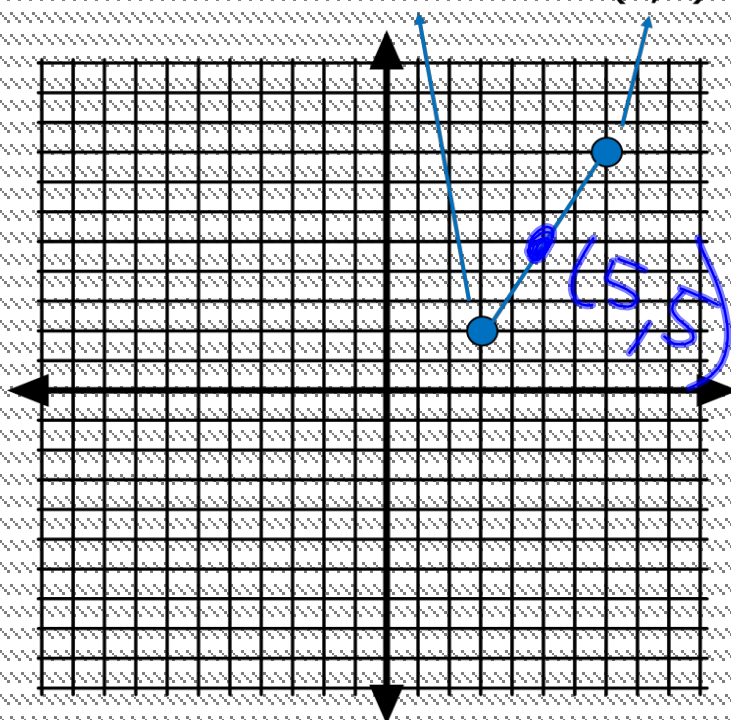
Midpoint Formula

$$\begin{matrix} x_1 & y_1 & & x_2 & y_2 \\ (3, 2) & & & (7, 8) \end{matrix}$$

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

$$\left(\frac{3+7}{2}, \frac{2+8}{2} \right)$$

$$(5, 5)$$



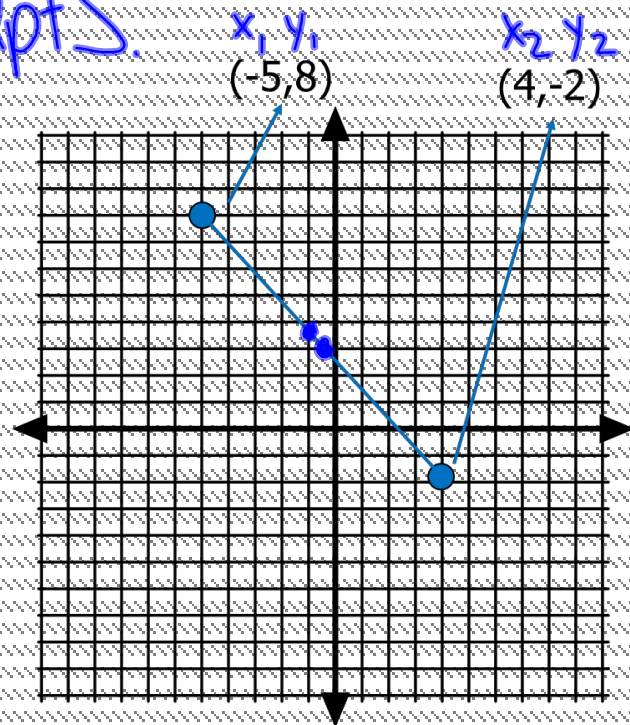
Midpoint Formula

Coordinates of endpoints

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

$$\left(\frac{-5 + 4}{2}, \frac{8 + (-2)}{2} \right)$$

$$\left(-\frac{1}{2}, 3 \right)$$

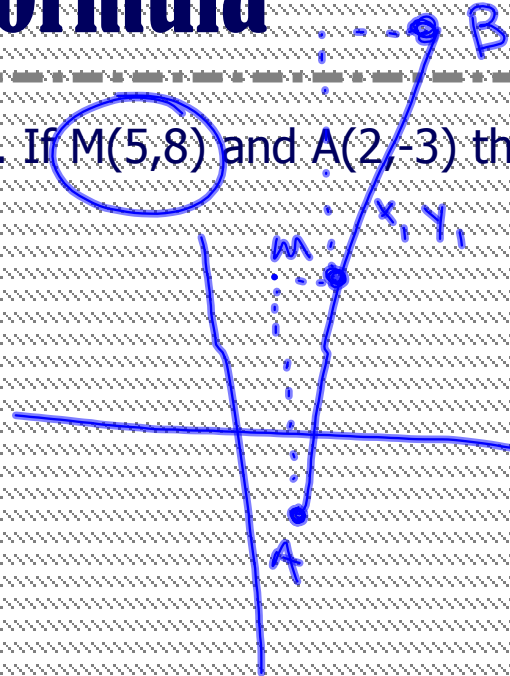


Midpoint Formula

M is the midpoint of segment AB. If $M(5,8)$ and $A(2,-3)$ then find the coordinates of B.

$$M\left(\frac{2+x_2}{2}, \frac{-3+y_2}{2}\right)$$

$$M(5, 8)$$



$$\frac{2+x_2}{2} = 5 \quad \frac{-3+y_2}{2} = 8$$

$$\begin{array}{r} 2+x_2=10 \\ -2 \quad -2 \\ \hline x_2=8 \end{array} \quad \begin{array}{r} -3+y_2=16 \\ +3 \quad +3 \\ \hline y_2=19 \end{array}$$

$$B(8, 19)$$

Distance

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

Find the distance between (2,3) and (7,10).

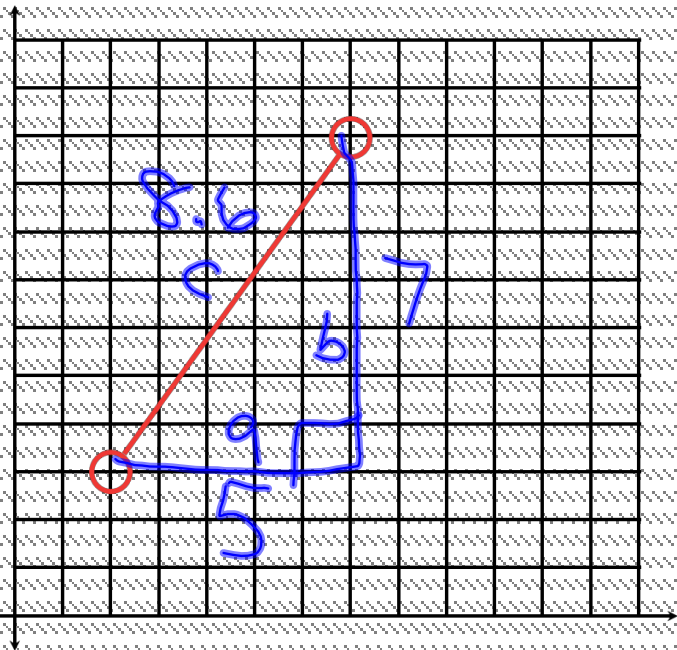
$$5^2 + 7^2 = c^2$$

$$25 + 49 = c^2$$

$$\sqrt{74} = \sqrt{c^2}$$

$$c = \sqrt{74}$$

$$c \approx 8.6 \text{ units}$$



Distance

Find the distance between $(-4, -7)$ and $(6, 5)$.

$$10^2 + 12^2 = c^2$$

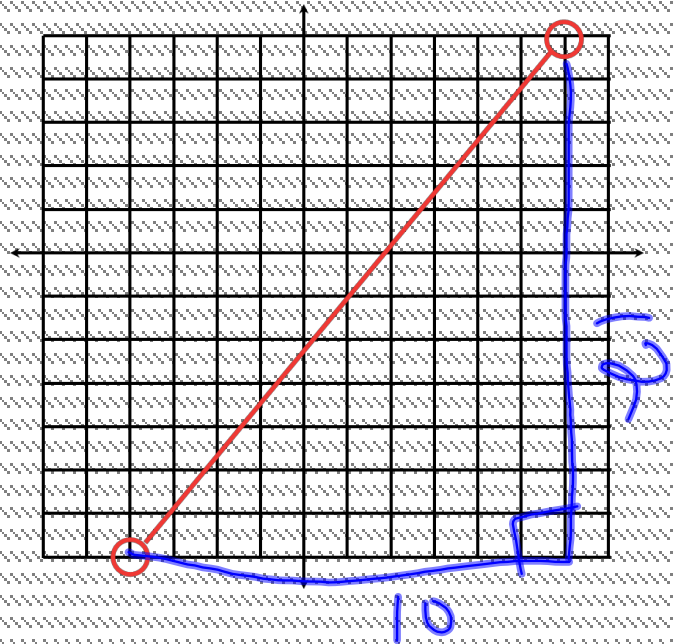
$$100 + 144 = c^2$$

$$\sqrt{244} = \sqrt{c^2}$$

$$c = \sqrt{4 \cdot 61}$$

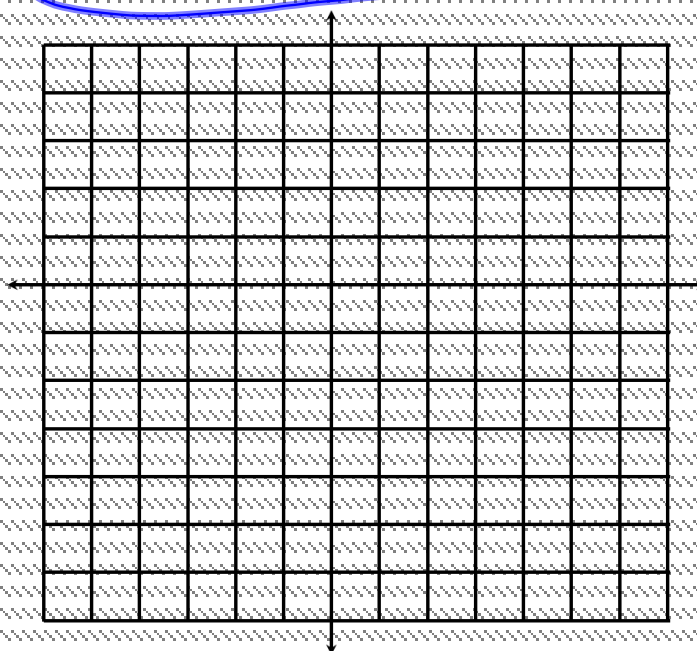
$$c = 2\sqrt{61}$$

$$c \approx 15.6$$



Distance

Find the distance between $(50, 23)$ and $(74, 30)$.



Distance Formula

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

Find the distance between (x_1, y_1) and (x_2, y_2) .

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

