

9/16/19 - Warm Up Problem

1. Name an angle adjacent to $\angle EGF$.

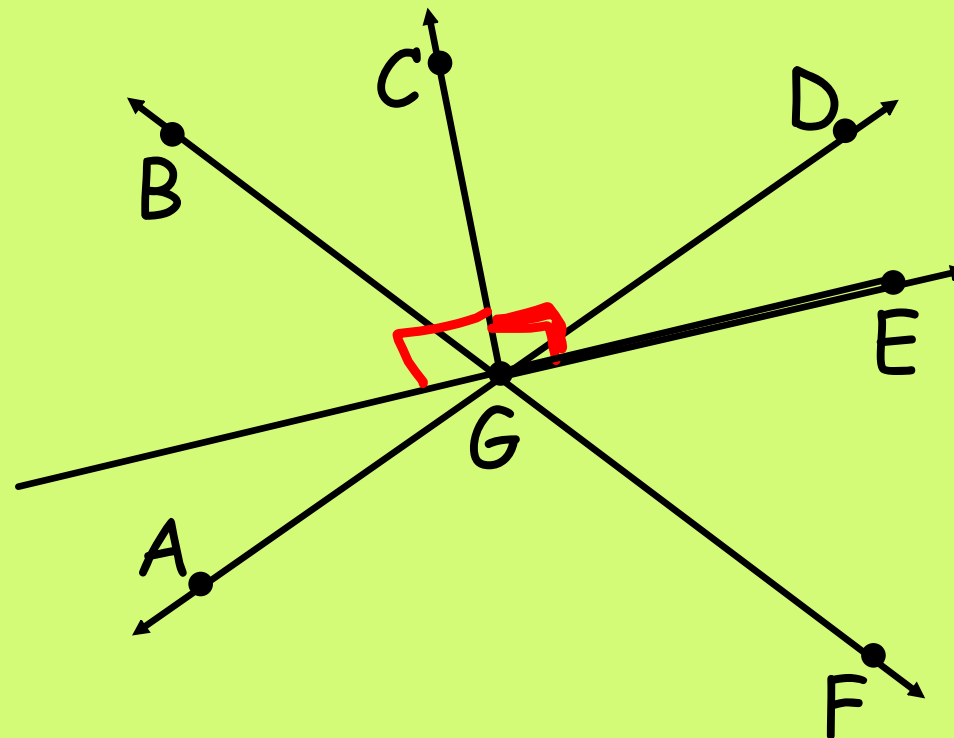
$\angle AGF$

2. Name an angle vertical to $\angle BGA$.

$\angle DGF$

3. Name an angle that makes a linear pair with $\angle DGF$.

$\angle AGF$ or $\angle BGD$

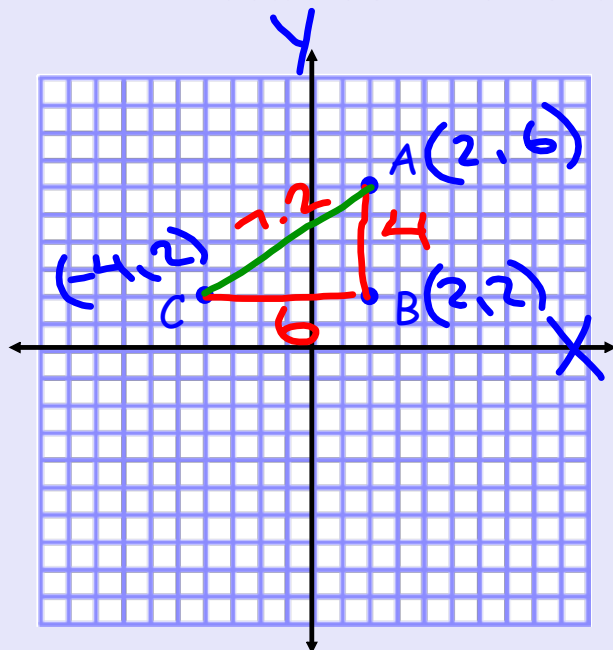


Concept 4 - Use Midpoint and Distance Formulas

Goal

- find the distance between two points in the coordinate plane
- find the coordinates of the midpoint of a segment in the coordinate plane

Distance in the Coordinate Plane



On a horizontal line or a vertical line, the distance between two points can be counted.

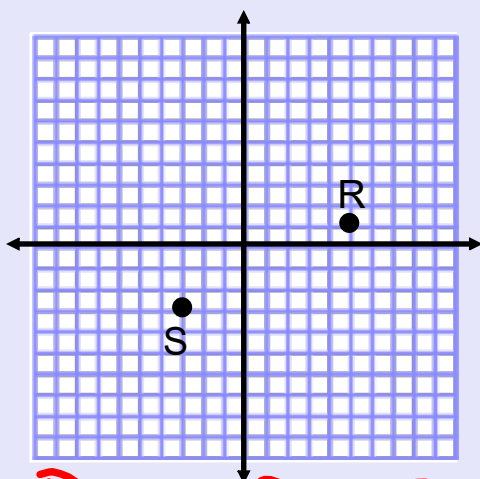
How can we find the distance between two points that are not horizontal or vertical from each other?

$$\begin{aligned}
 9^2 + 6^2 &= c^2 \\
 6^2 + 4^2 &= c^2 \\
 36 + 16 &= c^2 \\
 \sqrt{52} &= \sqrt{c^2} \\
 7.2 &= c
 \end{aligned}$$

The Distance Formula

The distance between two points with coordinates (x_1, y_1) and (x_2, y_2) is given by

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



PENDAS

Find the distance between the two points.

x_1, y_1
R (5, 1) and x_2, y_2
S (-3, -3)

$$\sqrt{(-3-5)^2 + (-3-1)^2}$$

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

$$\sqrt{64 + 16}$$

$$\sqrt{80}$$

$$\boxed{8.9 \text{ units}}$$

Find the distance between the points.

x_1, y_1 x_2, y_2
A (-1, 3) and B (8, -6) $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$\sqrt{(8 - 1)^2 + (-6 - 3)^2}$$

$$\sqrt{(9)^2 + (-9)^2}$$

$$\sqrt{81 + 81}$$

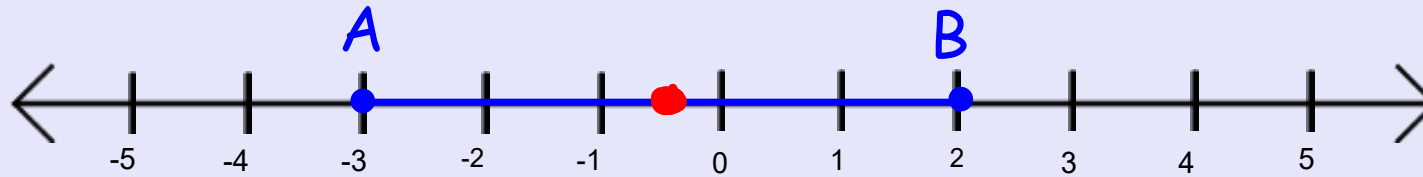
$$\sqrt{162}$$

$$12.7$$

$$-9^2 = -81$$

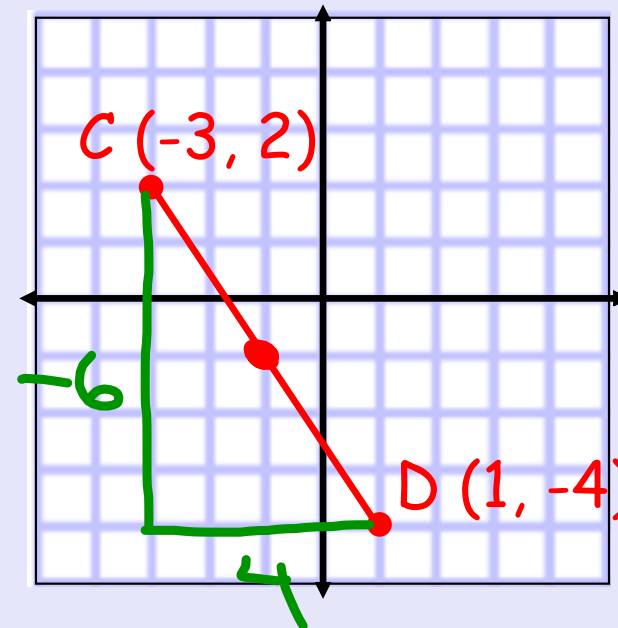
$$(-9)^2 = 81$$

Midpoints in the Coordinate Plane



What is the midpoint of \overline{AB} ?

What is the midpoint of \overline{CD} ?



The Midpoint Formula

The coordinates of the midpoint of a segment whose endpoints have coordinates (x_1, y_1) and (x_2, y_2) are

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

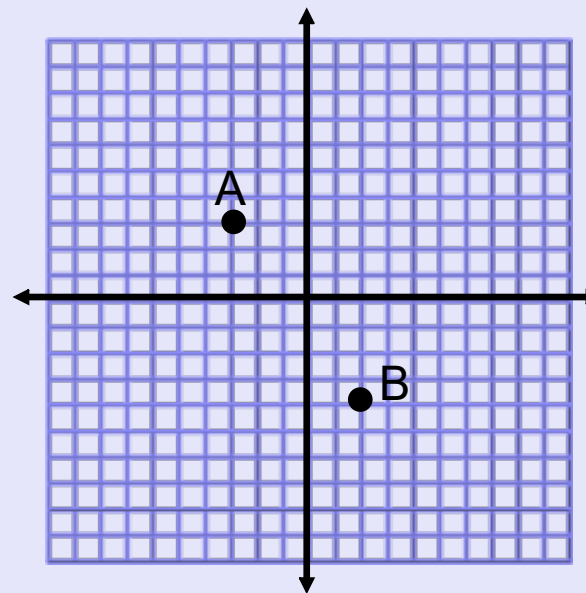
Find the coordinates of the midpoint.

x_1, y_1
A $(-3, 3)$ and x_2, y_2
B $(2, -4)$

$$\left(\frac{-3+2}{2}, \frac{3+(-4)}{2} \right)$$

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

$$(-.5, -.5)$$



Find the coordinates of the midpoint of \overline{GH} for

G x_1, y_1 $(8, -6)$ and H x_2, y_2 $(-14, 12)$

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

$$\left(\frac{8 + -14}{2}, \frac{-6 + 12}{2} \right)$$

$$\left(\frac{-6}{2}, \frac{6}{2} \right)$$

$$(-3, 3)$$

Finding an Endpoint

The midpoint of \overline{AB} is $M(3,4)$. One endpoint is $A(-3,-2)$. Find the coordinates of the other endpoint B.

*Use the midpoint formula

*Fill in the variables x and y for the coordinates of point B.

$$\frac{-3+x}{2} = 3 \cdot 2$$

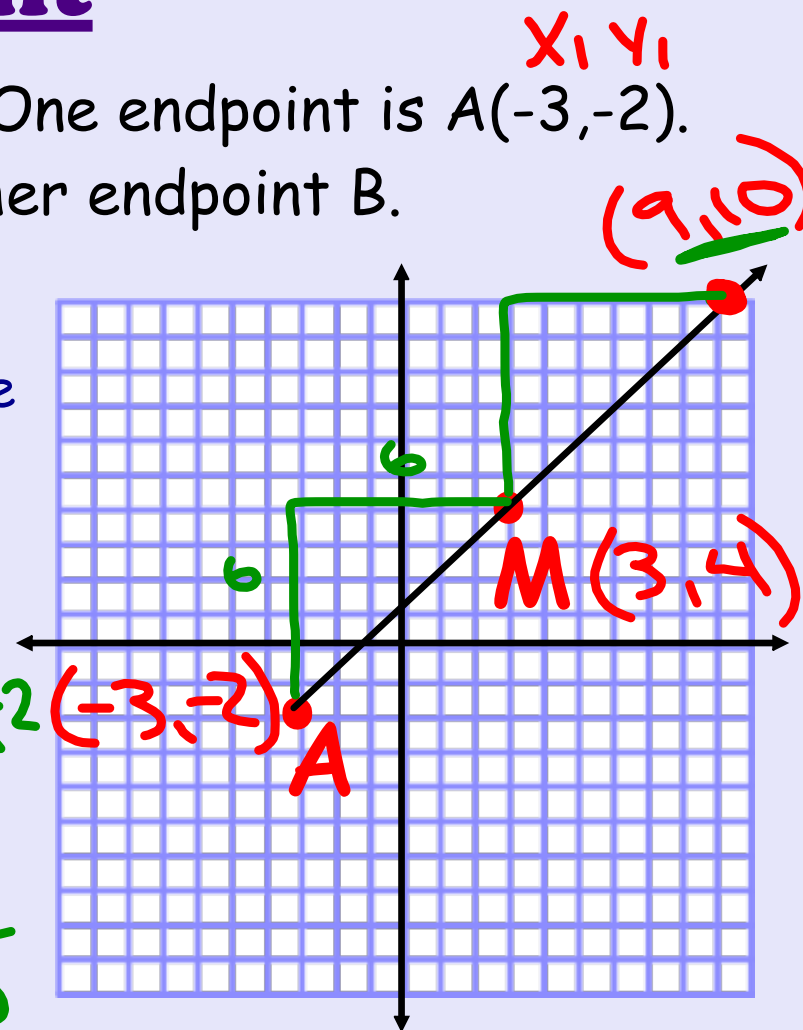
$$\frac{-3+x}{2} = 6$$

$$\begin{array}{r} -3+x = 6 \\ +3 \quad +3 \\ \hline x = 9 \end{array}$$

$$\frac{-2+y}{2} = 4 \cdot 2$$

$$\frac{-2+y}{2} = 8$$

$$\begin{array}{r} -2+y = 8 \\ +2 \quad +2 \\ \hline y = 10 \end{array}$$



Assignment:

Concept 4 Worksheet
(front)

- due by Monday 9/23

SHOW YOUR WORK!

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

⑧ $T(x_1, y_1)$ Midpoint $(\underline{5}, \underline{-8})$

$$\left(\frac{0+x}{2}, \frac{4+y}{2} \right)$$

$$(10, -20)$$

$$\frac{0+x}{2} = 5 \cdot 2 \quad \frac{4+y}{2} = -8 \cdot 2$$

$$0+x=10$$

$$4+y=-16$$

$$x=10$$

$$y=-20$$