

# 1-3 Distance and Midpoints

## Bell Ringer #6: ← Due Today!! (Blue Bas

Find the distance between each set of points.  
Round to the nearest tenth if necessary.

$$\begin{matrix} x_1, y_1 & x_2, y_2 \\ (-5, 6) & (8, -4) \end{matrix}$$

$$\begin{matrix} x_1, y_1 & x_2, y_2 \\ (4, 3) & (-3, -7) \end{matrix}$$

$$\begin{matrix} x_1, y_1 & x_2, y_2 \\ (-3, 2) & (4, 5) \end{matrix}$$

$$\begin{aligned} & \sqrt{(-3-4)^2 + (-7-3)^2} \quad (\text{Rounded}) \\ & \sqrt{49 + 100} \\ & \sqrt{149} = 12.2 \end{aligned}$$

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

LESSON

## 1–3 Distance and Midpoints

### Homework Questions

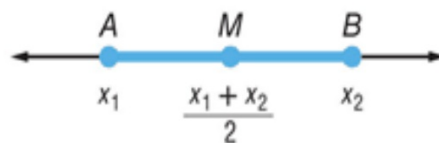
## LESSON 1–3 Distance and Midpoints

Midpoint - a point halfway between the endpoints on a segment.

### Key Concept Midpoint Formula (on Number Line)

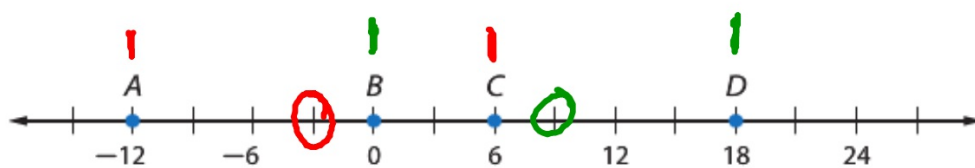
If  $\overline{AB}$  has endpoints at  $x_1$  and  $x_2$  on a number line, then the midpoint  $M$  of  $\overline{AB}$  has coordinate

$$\frac{x_1 + x_2}{2}.$$



## Example 1

Find the midpoint of each line segment on the number line.

 $\overline{AC}$ 

$$\frac{-12 + 6}{2} = \frac{-6}{2} = -3$$

 $\overline{BD}$ 

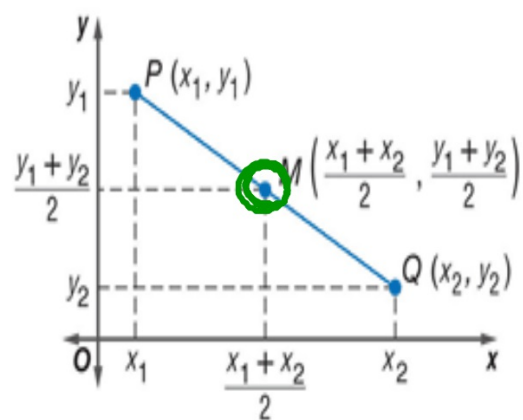
$$\frac{0 + 18}{2} = \frac{18}{2} = 9$$

## 1-3 Distance and Midpoints

**Key Concept** Midpoint Formula (in Coordinate Plane)

If  $\overline{PQ}$  has endpoints at  $P(x_1, y_1)$  and  $Q(x_2, y_2)$  in the coordinate plane, then the midpoint  $M$  of  $\overline{PQ}$  has coordinates

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



## 1-3 Distance and Midpoints

## EXAMPLE 2

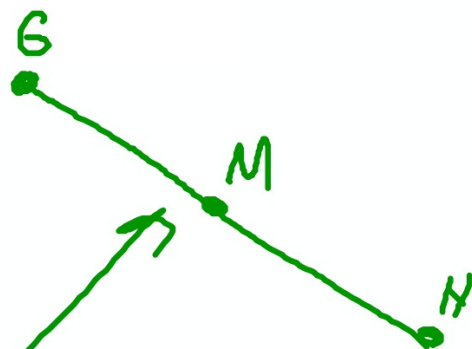
## Find Midpoint in Coordinate Plane

Find the coordinates of  $M$ , the midpoint of  $\overline{GH}$ ,  
for  $G(x_1, y_1)$  and  $H(x_2, y_2)$ .

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

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

$$(-3, 3)$$



## 1-3 Distance and Midpoints

**EXAMPLE 3**

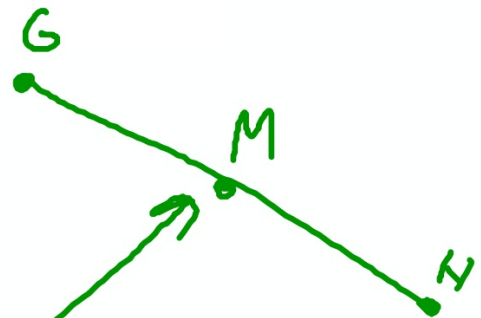
## Find Midpoint in Coordinate Plane

Find the coordinates of  $M$ , the midpoint of  $\overline{GH}$ ,  
for  $G(-6, 5)$  and  $H(9, -3)$

$$\left( \frac{-6+9}{2}, \frac{5-3}{2} \right)$$

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

$$(1.5, 1)$$



## 1-3 Distance and Midpoints

## EXAMPLE 4

Find the Coordinates of an Endpoint

Find the coordinates of  $D$  if  $E(-6, 4)$  is the midpoint of  $\overline{DF}$  and  $F$  has coordinates  $(-5, -3)$ .

$$\left( \frac{x_1 - 5}{2}, \frac{y_1 - 3}{2} \right) = (-6, 4)$$

$$2 \cdot \frac{x_1 - 5}{2} = -6 \cdot 2$$

$$x_1 - 5 = -12$$

$$+5 \quad +5$$

$$\boxed{x_1 = -7}$$

$$2 \cdot \frac{y_1 - 3}{2} = 4 \cdot 2$$

$$y_1 - 3 = 8$$

$$+3 \quad +3$$

$$\boxed{y_1 = 11}$$

$$D = (x_1, y_1) = (-7, 11)$$

D

E

F



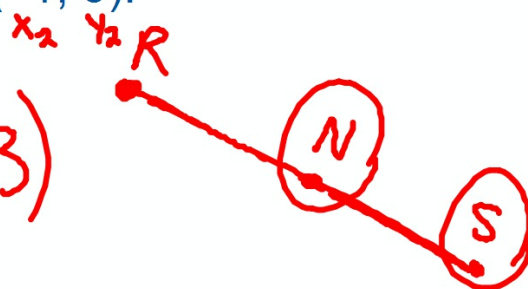
## 1-3 Distance and Midpoints

## EXAMPLE 5

$$R = (x_1, y_1) = (17, -11)$$

Find the coordinates of  $R$  if  $N(8, -3)$  is the midpoint of  $RS$  and  $S$  has coordinates  $(-1, 5)$ .

$$\left( \frac{x_1 - 1}{2}, \frac{y_1 + 5}{2} \right) = (8, -3)$$



$$2 \cdot \frac{x_1 - 1}{2} = 8 \cdot 2$$

$$2 \cdot \frac{y_1 + 5}{2} = -3 \cdot 2$$

$$x_1 - 1 = 16$$

$$y_1 + 5 = -6$$

$$+1 \quad +1$$

$$-5 \quad -5$$

$$(x_1 = 17)$$

$$(y_1 = -11)$$

Try these on your own.

Skills Practice 1-3 (from last class period)  
Problems # 13 - 21

15 minutes to complete.

Times Up!!!!

Questions!

## Assignment

Practice 1-3, problems # 11- 19 all.

