

### 1-3 Distance and Midpoints

**Find the coordinates of the midpoint of a segment with the given endpoints.**

40.  $W(12, 2), X(7, 9)$

**SOLUTION:**

Use the Midpoint Formula

$$\begin{aligned} & \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) && \text{Midpoint Formula} \\ & = \left( \frac{12 + 7}{2}, \frac{2 + 9}{2} \right) && \text{Substitution.} \\ & = \left( \frac{19}{2}, \frac{11}{2} \right) && \text{Addition.} \\ & = (9.5, 5.5) && \text{Division.} \end{aligned}$$

The midpoint of  $\overline{WX}$  is  $(9.5, 5.5)$ .

42.  $V(-2, 5), Z(3, -17)$

**SOLUTION:**

Use the Midpoint Formula.

$$\begin{aligned} & \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) && \text{Midpoint Formula} \\ & = \left( \frac{-2 + 3}{2}, \frac{5 + (-17)}{2} \right) && \text{Substitution.} \\ & = \left( \frac{1}{2}, \frac{-12}{2} \right) && \text{Addition.} \\ & = (0.5, -6) && \text{Division.} \end{aligned}$$

The midpoint of  $\overline{VZ}$  is  $(0.5, -6)$ .

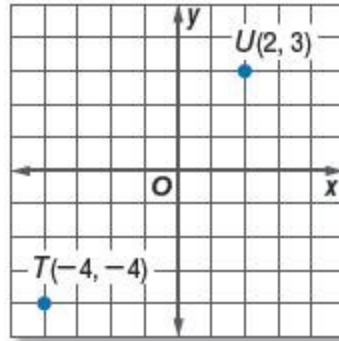
44.  $J(-11.2, -3.4), K(-5.6, -7.8)$

**SOLUTION:**

Use the Midpoint Formula.

$$\begin{aligned} & \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) && \text{Midpoint Formula} \\ & = \left( \frac{-11.2 + (-5.6)}{2}, \frac{-3.4 + (-7.8)}{2} \right) && \text{Substitution.} \\ & = \left( \frac{-16.8}{2}, \frac{-11.2}{2} \right) && \text{Addition.} \\ & = (-8.4, -5.6) && \text{Division.} \end{aligned}$$

The midpoint of  $\overline{JK}$  is  $(-8.4, -5.6)$ .



46.

**SOLUTION:**

Use the Midpoint Formula.

$$\begin{aligned} & \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) && \text{Midpoint Formula} \\ & = \left( \frac{-4 + 2}{2}, \frac{-4 + 3}{2} \right) && \text{Substitution.} \\ & = \left( \frac{-2}{2}, \frac{-1}{2} \right) && \text{Addition.} \\ & = \left( -1, -\frac{1}{2} \right) && \text{Simplify.} \end{aligned}$$

The midpoint of  $\overline{TU}$  is  $\left( -1, -\frac{1}{2} \right)$ .

### 1-3 Distance and Midpoints

Find the coordinates of the missing endpoint if  $B$  is the midpoint of  $\overline{AC}$ .

48.  $A(1, 7), B(-3, 1)$

**SOLUTION:**

Let the coordinates of  $C$  be  $(x, y)$ .

Then by the Midpoint Formula,

$$\left(\frac{1+x}{2}, \frac{7+y}{2}\right) = (-3, 1)$$

Write two equations to find the coordinates of  $C$ .

$$\frac{1+x}{2} = -3 \quad \text{Midpoint Formula}$$

$$2\left(\frac{1+x}{2}\right) = 2(-3) \quad \text{Multiply each side by 2.}$$

$$1+x = -6 \quad \text{Simplify.}$$

$$1-1+x = -6-1 \quad \text{Subtract 1 to each side.}$$

$$x = -7 \quad \text{Simplify.}$$

$$\frac{7+y}{2} = 1 \quad \text{Midpoint formula}$$

$$2\left(\frac{7+y}{2}\right) = 2(1) \quad \text{Multiply each side by 2.}$$

$$7+y = 2 \quad \text{Simplify.}$$

$$7-7+y = 2-7 \quad \text{Subtract 7 from each side.}$$

$$y = -5 \quad \text{Simplify.}$$

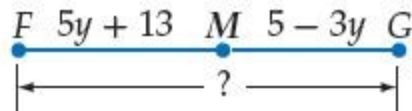
The coordinates of  $C$  are  $(-7, -5)$ .

**ALGEBRA** Suppose  $M$  is the midpoint of  $\overline{FG}$ . Use the given information to find the missing measure or value.

54.  $FM = 5y + 13, MG = 5 - 3y, FG = ?$

**SOLUTION:**

If  $M$  is the midpoint, then  $FM = MG$ .



$$FM = MG$$

$$5y + 13 = 5 - 3y$$

$$5y + 3y + 13 = 5 - 3y + 3y \quad \text{Add } 3y \text{ to each side.}$$

$$8y + 13 = 5$$

$$8y + 13 - 13 = 5 - 13$$

$$8y = -8$$

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

$$y = -1$$

Given.

Substitution.

Add  $3y$  to each side.

Simplify.

Subtract 13 from each side.

Simplify.

Divide each side by 8.

Simplify.

Then  $y = -1$ .

$$\begin{aligned} FM &= 5y + 13 \\ &= 5(-1) + 13 \\ &= 8 \end{aligned}$$

$$\begin{aligned} MG &= 5 - 3y \\ &= 5 - 3(-1) \\ &= 8 \end{aligned}$$

$$\begin{aligned} FG &= FM + MG \\ &= 8 + 8 \\ &= 16 \end{aligned}$$