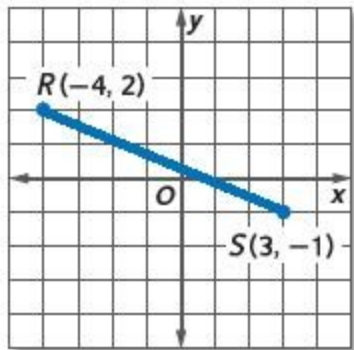


1-3 Locating Points and Midpoints

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



26.

SOLUTION:

Use the Midpoint Formula.

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

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

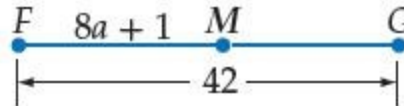
ANSWER:

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

Suppose M is the midpoint of \overline{FG} . Find the missing measure.

36. $FM = 8a + 1$, $FG = 42$, $a = ?$

SOLUTION:



If M is the midpoint, then $FM = \frac{FG}{2}$

Substitute.

$$FM = \frac{42}{2}$$

$$= 21$$

So, $FM = 21$.

$$FM = FM \quad \text{Given.}$$

$$8a + 1 = 21 \quad \text{Substitution.}$$

$$8a + 1 - 1 = 21 - 1 \quad -1 \text{ from each side.}$$

$$8a = 20 \quad \text{Simplify.}$$

$$\frac{8a}{8} = \frac{20}{8} \quad \div \text{ each side by } 8.$$

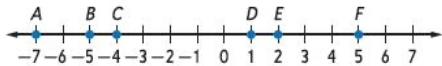
$$a = 2.5 \quad \text{Simplify.}$$

ANSWER:

2.5

1-3 Locating Points and Midpoints

ANALYZE RELATIONSHIPS Refer to the number line.



40. Find the point X on \overline{AE} that is $\frac{1}{6}$ of the distance from A to E .

SOLUTION:

$$\begin{aligned} AE &= |x_2 - x_1| && \text{Distance Formula} \\ &= |2 - (-7)| && \text{Replace } x_2 \text{ with } 2 \text{ and } x_1 \text{ with } -7. \\ &= |9| && \text{Simplify.} \\ &= 9 && \text{Simplify.} \end{aligned}$$

The distance from A to E is 6 unit.

To find the point $\frac{1}{6}$ of the distance from A to E , find $\frac{1}{6}AE$.

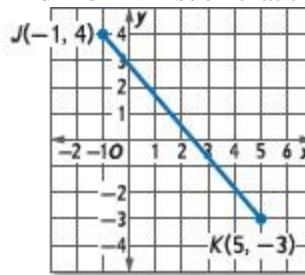
$$\frac{1}{6}AE = \frac{1}{6}(9) = 1.5$$

To find the coordinate of point X add 1.5 to the coordinate of A so X is at -5.5 on the number line.

ANSWER:

-5.5

44. Find X on \overline{JK} such that the ratio of JX to XK is 1:2.



SOLUTION:

Since the ratio of the measure is 1:2, $2JX = XK$.

So, $JK = JX + XK = JX + 2JX$ or $3JX$. Thus, JX is $\frac{1}{3}$ of JK .

Find the distance between the x -coordinates of J and K .

$$\begin{aligned} |x_2 - x_1| &= |5 - (-1)| && \text{Substitution.} \\ &= 6 && \text{Subtraction.} \end{aligned}$$

Multiply the distances by the fractional distance.

$$6\left(\frac{1}{3}\right) = 2$$

Add this to the x -coordinate of J to determine the x -coordinate of X .

$$-1 + 2 = 1.$$

The x -coordinate of X is 1.

Then, find the distance between the y -coordinates of J and K .

$$\begin{aligned} |y_2 - y_1| &= |(-3) - 4| && \text{Substitution.} \\ &= 7 && \text{Subtraction.} \end{aligned}$$

Multiply the distances by the fractional distance.

$$7\left(\frac{1}{3}\right) = \frac{7}{3}$$

Add this to the y -coordinate of J to determine the y -coordinate of X .

$$4 - \frac{7}{3} = 1\frac{2}{3}. \text{ The } y\text{-coordinate of } X \text{ is } 1\frac{2}{3}.$$

Thus, point X is located at $\left(1, 1\frac{2}{3}\right)$

ANSWER:

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

1-3 Locating Points and Midpoints

50. **GEOMETRY** One endpoint of \overline{AB} has coordinates $(-3, 5)$. If the coordinates of the midpoint of \overline{AB} are $(2, -6)$, what is the length of \overline{AB} ?

SOLUTION:

First find the length of \overline{AB} .

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

$$D = \sqrt{(2 - (-3))^2 + (-6 - 5)^2} \quad \text{Substitution.}$$

$$D = \sqrt{(5)^2 + (11)^2} \quad \text{Simplify.}$$

$$D = \sqrt{25 + 121} \quad \text{Square each term.}$$

$$D = \sqrt{146} \quad \text{Addition.}$$

$$D = 12.1 \quad \text{Simplify.}$$

The distance from A to the midpoint is 12.1, thus the distance of the whole segment is $2 \cdot 12.1 = 24.2$.

ANSWER:

24.2