

1-6: Midpoint and Distance Formula

“I WILL...

...apply and solve using the Midpoint and Distance Formula.”

I. Definitions

- A. Coordinate Plane: a plane divided into four regions by a horizontal line ( $x$ -axis) and a vertical line ( $y$ -axis).
- B. Ordered Pair: Coordinates of a point  $(x, y)$ .
- C. Midpoint Formula: To find the midpoint, average the  $x$  and  $y$  values from each endpoint.
- D. The Distance Formula: used to calculate the distance between two points in a coordinate plane. The Ruler Postulate can be used to find the distance between two points on a number line.

II. Formulas:

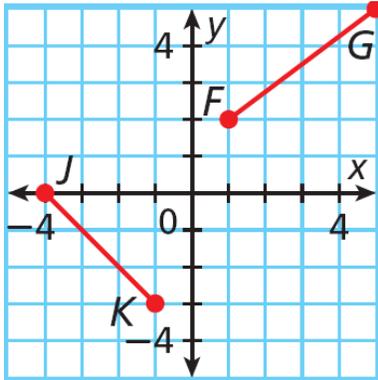
A. Midpoint Formula: \_\_\_\_\_

B. Distance Formula: \_\_\_\_\_

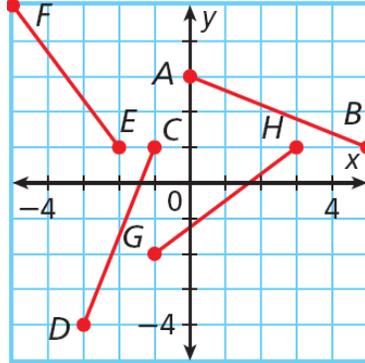
<p>Ex 1: Find the coordinates of the midpoint of <math>PQ</math> with endpoints <math>P (-8, 3)</math> and <math>Q (-2, 7)</math>.</p>	<p>Your Turn: Find the coordinates of the midpoint of <math>PQ</math> with endpoints <math>E (-2, 3)</math> and <math>F (5, -3)</math>.</p>	
<p>Ex 2: <math>B</math> is the midpoint of segment <math>\overline{AC}</math>. <math>A</math> has coordinates <math>(2, 7)</math> and <math>B</math> has coordinates <math>(6, 1)</math>. Find the coordinates of <math>C</math>. Your Turn: Solve, <math>4x^2 - 10x + 15 = 10x - 10</math></p>	<p>Ex 3: <math>S</math> is the midpoint of segment, <math>\overline{RT}</math>. <math>R</math> has an <math>x</math>-coordinate of <math>-6</math>. and <math>T</math> has a <math>y</math>-coordinate of <math>3</math>. The midpoint coordinate of <math>S</math> is <math>(-1, 1)</math>. What is the <math>y</math>-coordinate of <math>R</math> and <math>x</math>-coordinate of <math>T</math>?</p>	<p>Your Turn: <math>J</math> is the midpoint of segment <math>\overline{HL}</math>. <math>H</math> has coordinates <math>(1, -7)</math> and <math>J</math> has coordinates <math>(9, 3)</math>. Find the coordinates of <math>L</math>.</p>

Ex 4: Determine the distance of points  $(-1, -2)$  and  $(-3, 5)$

Ex 5: Using the graph, solve for  $\overline{FG}$  and  $\overline{JK}$ . Then, determine if  $\overline{FG} \cong \overline{JK}$



Your Turn: Using the graph, solve for  $\overline{EF}$  and  $\overline{GH}$ . Then, determine if  $\overline{EF} = \overline{GH}$

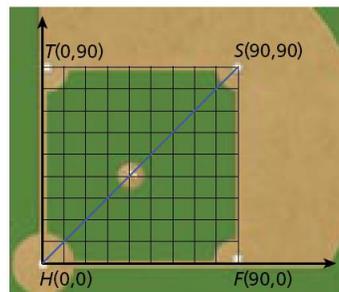


Ex 6: Use the Distance Formula to find the distance, in radical form, from  $D(3, 4)$  to  $E(-2, -5)$ .

Ex 7: Use the Pythagorean Theorem to find the distance, in radical form, from  $D(3, 4)$  to  $E(-2, -5)$ .

Your Turn: Use the Pythagorean Theorem to find the distance, in radical form, from  $R(3, 2)$  to  $E(-3, 1)$ .

Ex 8: A player throws the ball from first base to a point located between third base and home plate and 10 feet from third base. What is the distance of the throw?



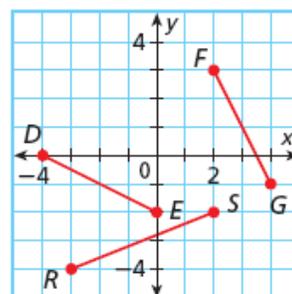
## PRACTICE AND PROBLEM SOLVING

Find the coordinates of the midpoint of each segment.

12.  $\overline{XY}$  with endpoints  $X(-3, -7)$  and  $Y(-1, 1)$
13.  $\overline{MN}$  with endpoints  $M(12, -7)$  and  $N(-5, -2)$
14.  $M$  is the midpoint of  $\overline{QR}$ .  $Q$  has coordinates  $(-3, 5)$ , and  $M$  has coordinates  $(7, -9)$ . Find the coordinates of  $R$ .
15.  $D$  is the midpoint of  $\overline{CE}$ .  $E$  has coordinates  $(-3, -2)$ , and  $D$  has coordinates  $(2\frac{1}{2}, 1)$ . Find the coordinates of  $C$ .

**Multi-Step** Find the length of the given segments and determine if they are congruent.

16.  $\overline{DE}$  and  $\overline{FG}$
17.  $\overline{DE}$  and  $\overline{RS}$

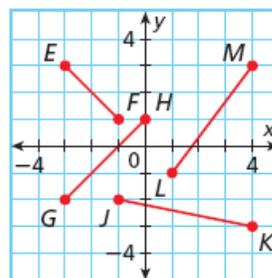


Use the Distance Formula and the Pythagorean Theorem to find the distance, to the nearest tenth, between each pair of points.

18.  $U(0, 1)$  and  $V(-3, -9)$
19.  $M(10, -1)$  and  $N(2, -5)$
20.  $P(-10, 1)$  and  $Q(5, 5)$
34. Which segment has a length closest to 4 units?  

<input type="radio"/> A $\overline{EF}$	<input type="radio"/> C $\overline{JK}$
<input type="radio"/> B $\overline{GH}$	<input type="radio"/> D $\overline{LM}$
35. Find the distance, to the nearest tenth, between the midpoints of  $\overline{LM}$  and  $\overline{JK}$ .  

<input type="radio"/> F 1.8	<input type="radio"/> H 4.0
<input type="radio"/> G 3.6	<input type="radio"/> J 5.3



36. What are the coordinates of the midpoint of a line segment that connects the points  $(7, -3)$  and  $(-5, 6)$ ?  

<input type="radio"/> A $(6, -4\frac{1}{2})$	<input type="radio"/> C $(2, \frac{1}{2})$
<input type="radio"/> B $(2, 3)$	<input type="radio"/> D $(1, 1\frac{1}{2})$
37. A coordinate plane is placed over the map of a town. A library is located at  $(-5, 1)$ , and a museum is located at  $(3, 5)$ . What is the distance, to the nearest tenth, from the library to the museum?  

<input type="radio"/> F 4.5	<input type="radio"/> G 5.7	<input type="radio"/> H 6.3	<input type="radio"/> J 8.9
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