Name ______________________ Date ______________ Class ______________

LESSON 1-6

Reteach

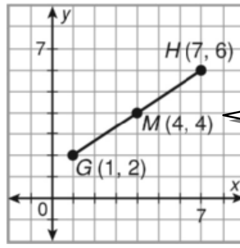
Midpoint and Distance in the Coordinate Plane

The **midpoint** of a line segment separates the segment into two halves. You can use the **Midpoint Formula** to find the midpoint of the segment with endpoints $G(1, 2)$ and $H(7, 6)$.

$$M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = M\left(\frac{1+7}{2}, \frac{2+6}{2}\right)$$

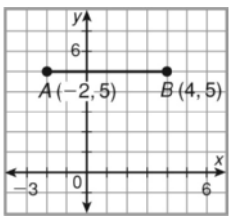
$$= M\left(\frac{8}{2}, \frac{8}{2}\right)$$

$$= M(4, 4)$$



M is the midpoint of $\overline{HG}$.

Find the coordinates of the midpoint of each segment.

1. 

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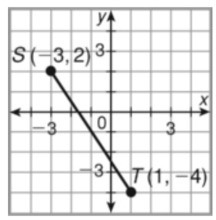
2. 

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3. $\overline{QR}$ with endpoints $Q(0, 5)$ and $R(6, 7)$ __________

4. $\overline{JK}$ with endpoints $J(1, –4)$ and $K(9, 3)$ __________

Suppose $M(3, –1)$ is the midpoint of $\overline{CD}$ and C has coordinates $(1, 4)$. You can use the Midpoint Formula to find the coordinates of D.

$$M(3, -1) = M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

<u>*x*-coordinate of *D*</u>		<u>*y*-coordinate of *D*</u>
$3 = \frac{x_1+x_2}{2}$	Set the coordinates equal.	$-1 = \frac{y_1+y_2}{2}$
$3 = \frac{1+x_2}{2}$	Replace (x_1, y_1) with $(1, 4)$.	$-1 = \frac{4+y_2}{2}$
$6 = 1 + x_2$	Multiply both sides by 2.	$-2 = 4 + y_2$
$5 = x_2$	Subtract to solve for x_2 and y_2.	$-6 = y_2$

The coordinates of D are $(5, –6)$.

5. $M(–3, 2)$ is the midpoint of $\overline{RS}$, and R has coordinates $(6, 0)$. What are the coordinates of S? __________

6. $M(7, 1)$ is the midpoint of $\overline{WX}$, and X has coordinates $(–1, 5)$. What are the coordinates of W? __________

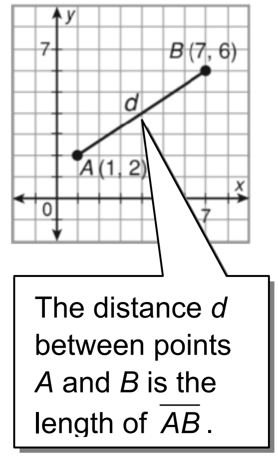
Name ______________________ Date ______________ Class______________

LESSON 1-6

Reteach

Midpoint and Distance in the Coordinate Plane continued

The **Distance Formula** can be used to find the distance *d* between points *A* and *B* in the coordinate plane.



$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
$= \sqrt{(7-1)^2 + (6-2)^2}$	$(x_1, y_1) = (1, 2); (x_2, y_2) = (7, 6)$
$= \sqrt{6^2 + 4^2}$	Subtract.
$= \sqrt{36 + 16}$	Square 6 and 4.
$= \sqrt{52}$	Add.
≈ 7.2	Use a calculator.

Use the Distance Formula to find the length of each segment or the distance between each pair of points. Round to the nearest tenth.

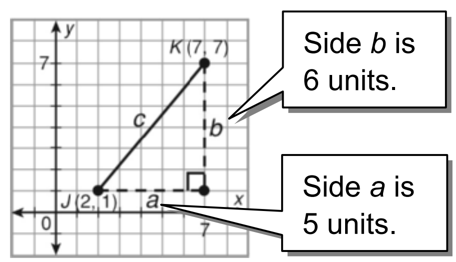
7. $\overline{QR}$ with endpoints $Q(2, 4)$ and $R(-3, 9)$ ______________

8. $\overline{EF}$ with endpoints $E(-8, 1)$ and $F(1, 1)$ ______________

9. $T(8, -3)$ and $U(5, 5)$ ______________

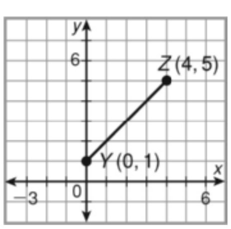
10. $N(4, -2)$ and $P(-7, 1)$ ______________

You can also use the Pythagorean Theorem to find distances in the coordinate plane. Find the distance between *J* and *K*.



$c^2 = a^2 + b^2$	Pythagorean Theorem
$= 5^2 + 6^2$	$a = 5$ units and $b = 6$ units
$= 25 + 36$	Square 5 and 6.
$= 61$	Add.
$c = \sqrt{61}$ or about 7.8	Take the square root.

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

11. 

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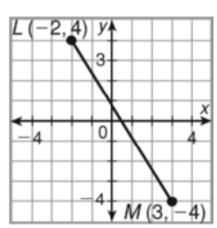
12. 

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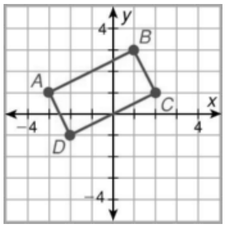
2. $(-a, -b)$

3. $(2d, 2e)$

4. 

rectangle

5. 13.4 m

6. 10 m^2

7. 11.7 m

8. (17, 3)

Reteach

1. (1, 5)
2. (–1, –1)
3. (3, 6)
4. (5, –0.5)
5. (–12, 4)
6. (15, –3)
7. 7.1 units
8. 9 units
9. 8.5 units
10. 11.4 units
11. 5.7 units
12. 9.4 units

Challenge

1. 29.6 units
2. (–3, 2.5), (1.5, –0.5), (–0.5, 5)
3. 14.8 units
4. The perimeter of $\triangle ABC$ is twice the perimeter of the second triangle.
5. 12.2; 16.1 units
6. Both midpoints are at (1, 1). This is the point where the diagonals intersect.
7. (1, 19)
8. 78.7 units; 493.2 units^2
9. The diameter of the circle is approximately 25.1 units, so the radius is half that distance, or about 12.55 units. The distance from the center of the circle to *G* is 18 units. So *G* is not a point on the circle.

Problem Solving

1. 82.5 ft
2. 85.9 ft
3. 47.4 m
4. 18.4 m
5. B
6. H
7. C

Reading Strategies

1. (2, 2); (–1, –2)

2. $d = \sqrt{(2-(-1))^2 + (2-(-2))^2}$

$$= \sqrt{(3)^2 + (4)^2}$$
$$= \sqrt{9+16}$$
$$= \sqrt{25}$$
$$= 5$$

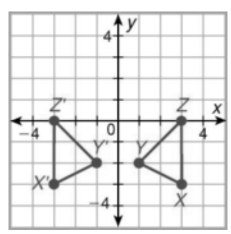
4. $a = 4,\ b = 3$

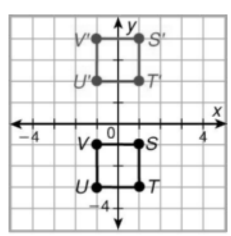
$$c^2 = 4^2 + 3^2$$
$$= 16 + 9$$
$$= 25$$
$$c = \sqrt{25}$$
$$= 5$$

5. Sample answer: The Distance Formula uses a coordinate plane. The Pythagorean Theorem uses known measures of two sides of a triangle.

LESSON 1-7

Practice A

1. transformation
2. original; image
3. reflection
4. slide
5. rotation
6. 2; $ABCD \to A'B'C'D'$
7. 3; $\triangle PQR \to \triangle P'Q'R'$
8. 1; $\triangle HIJ \to \triangle H'I'J'$
9. 

reflection
10. 

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Practice B

1. 2
2. 1
3. 3
4. rotation