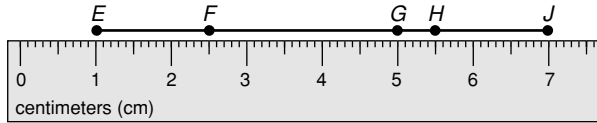Name _____ Date _____ Class _____

Reteach
Measuring and Constructing Segments

The **distance** between any two points is the **length** of the segment that connects them.

The distance between *E* and *J* is *EJ*, the length of $\overline{EJ}$. To find the distance, subtract the numbers corresponding to the points and then take the absolute value.
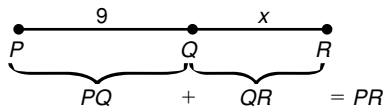
$$EJ = |7 - 1|$$
$$= |6|$$
$$= 6 \text{ cm}$$

Use the figure above to find each length.

1. *EG*

2. *EF*

3. *FH*

_____   _____   _____

On $\overline{PR}$, *Q* is between *P* and *R*. If *PR* = 16, we can find *QR*.

$$PQ + QR = PR$$
$$9 + x = 16$$
$$x = 7$$
$$QR = 7$$

4.

Find *JK*. _____

5.

Find *BC*. _____

6.

Find *SV*. _____

7.

Find *XY*. _____

8.

Find *DF*. _____

9.

Find *ST*. _____

Holt Geometry

LESSON 1-2 Reteach
Measuring and Constructing Segments continued

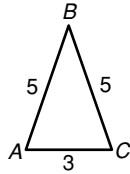Segments are **congruent** if their lengths are equal.

$AB = BC$ The length of $\overline{AB}$ equals the length of $\overline{BC}$.

$\overline{AB} \cong \overline{BC}$ $\overline{AB}$ is congruent to $\overline{BC}$.

Copying a Segment	
Method	**Steps**
sketch using estimation	Estimate the length of the segment. Sketch a segment that is about the same length.
draw with a ruler	Use a ruler to measure the length of the segment. Use the ruler to draw a segment having the same length.
construct with a compass and straightedge	Draw a line and mark a point on it. Open the compass to the length of the original segment. Mark off a segment on your line at the same length.

Refer to triangle *ABC* above for Exercises 10 and 11.

10. Sketch $\overline{LM}$ that is congruent to $\overline{AC}$.

11. Use a ruler to draw $\overline{XY}$ that is congruent to $\overline{BC}$.

12. Use a compass to construct $\overline{ST}$ that is congruent to $\overline{JK}$.
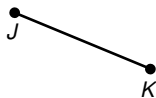
The **midpoint** of a segment separates the segment into two congruent segments. In the figure, *P* is the midpoint of $\overline{NQ}$.
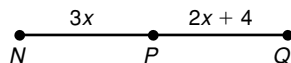
13. $\overline{PQ}$ is congruent to _____.

14. What is the value of *x*? _____

15. Find *NP*, *PQ*, and *NQ*. _____

Holt Geometry

Practice A
1-2 Measuring and Constructing Segments

Complete the statements.

1. The number a point corresponds to on a number line is called its __coordinate__.
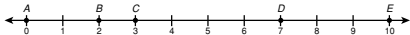
2. The __distance__ between any two points on a number line is the absolute value of the difference of the coordinates.
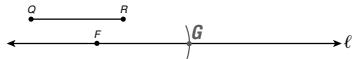
Find the coordinate of each point.

3. D __7__   4. B __2__   5. A __0__

Find each length.

6. DB __5__   7. BC __1__   8. AE __10__

Complete the exercises.

9. Congruent segments are segments that have the same __length__.

10. Use a compass to construct $\overline{FG}$ on line ℓ congruent to $\overline{QR}$.

11. Point K is the midpoint of $\overline{JL}$, and $KL = 4$. Find JK. __4__

Key Largo	25
Islamorada	45
Key West	138

A driver heading south on Highway 1 from Homestead, Florida, sees this road sign:

12. Find the distance in miles from Key Largo to Key West. __113 miles__

13. Find the distance in miles to the midpoint between Key Largo and Islamorada.
__35 miles__

Holt Geometry

Practice B
1-2 Measuring and Constructing Segments

Draw your answer in the space provided.

1. Use a compass and straightedge to construct $\overline{XY}$ congruent to $\overline{UV}$.
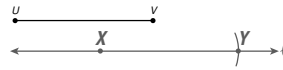
Find the coordinate of each point.

2. D __0__   3. C __2__   4. E __−3.5__

Find each length.

5. BE __0.5__   6. DB __4__   7. EC __5.5__

For Exercises 8–11, H is between I and J.

8. $HI = 3.9$ and $HJ = 6.2$. Find IJ. __10.1__

9. $JI = 25$ and $IH = 13$. Find HJ. __12__

10. H is the midpoint of $\overline{IJ}$, and $IH = 0.75$. Find HJ. __0.75__

11. H is the midpoint of $\overline{IJ}$, and $IJ = 9.4$. Find IH. __4.7__

Find the measurements.

12.

Find LM. __7__

13. A pole-vaulter uses a 15-foot-long pole. She grips the pole so that the segment below her left hand is twice the length of the segment above her left hand. Her right hand grips the pole 1.5 feet above her left hand. How far up the pole is her right hand?
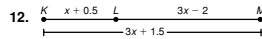__11.5 ft__

Holt Geometry

Practice C
1-2 Measuring and Constructing Segments

Draw your answers in the space provided.

1. Use a compass and straightedge to construct $\overline{FE}$ on $\overline{FG}$ so that $FE = FG − HI$.

2. Use a compass and straightedge to construct $\overline{LM}$ so that $LM = 2(FG) + HI$.

Show your work in the space provided.

3. If the coordinates of points A and B are a and b, then the distance between A and B is $|a − b|$ or $|b − a|$. Choose any positive number for a and any negative number for b. Then show that $|a − b| = |b − a|$.   **Sample answer:**
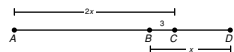$$|5 − (−3)| = |−3 − 5|$$
$$|8| = |−8|$$
$$8 = 8$$

4. X is between Y and Z, and $YZ = 39$. Use a compound inequality to describe the range of possible lengths of $\overline{XY}$. __$0 < XY < 39$__

5. "$DE \cong BC$" This statement is incorrect. Explain what is wrong and show two ways to correct the statement. __DE and BC are lengths, not segments. Lengths can be equal. Segments can be congruent. $DE = BC$; $\overline{DE} \cong \overline{BC}$__

Draw your answer in the space provided.

6. Adams, Greensburg, Middletown, and Waldron are four towns in Indiana on a nearly straight highway. If the highway is represented by a line, the towns can be represented by four points: A, G, M, and W. Given that $MG + WM = WG$ and $MA = MG − AG$, draw a diagram that shows the towns in their proper order.

7. $AD = 27$. Find x. __10__

Holt Geometry

Reteach
1-2 Measuring and Constructing Segments

The **distance** between any two points is the **length** of the segment that connects them.

The distance between E and J is EJ, the length of $\overline{EJ}$. To find the distance, subtract the numbers corresponding to the points and then take the absolute value.
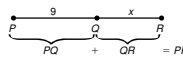$$EJ = |7 − 1|$$
$$= |6|$$
$$= 6 \text{ cm}$$

Use the figure above to find each length.

1. EG __4 cm__   2. EF __1.5 cm__   3. FH __3 cm__
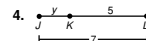

On $\overline{PR}$, Q is between P and R. If $PR = 16$, we can find QR.
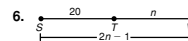$$PQ + QR = PR$$
$$9 + x = 16$$
$$x = 7$$
$$QR = 7$$

4.

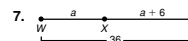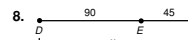Find JK. __2__

5.

Find BC. __6__

6.

Find SV. __41__

7.

Find XY. __21__

8.

Find DF. __135__

9.

Find ST. __22__

Holt Geometry

Holt Geometry

Reteach
1-2 Measuring and Constructing Segments continued

Segments are **congruent** if their lengths are equal.

$AB = BC$	The length of $\overline{AB}$ equals the length of $\overline{BC}$.
$\overline{AB} \cong \overline{BC}$	$\overline{AB}$ is congruent to $\overline{BC}$.

Copying a Segment	
Method	**Steps**
sketch using estimation	Estimate the length of the segment. Sketch a segment that is about the same length.
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Refer to triangle *ABC* above for Exercises 10 and 11.

10. Sketch $\overline{LM}$ that is congruent to $\overline{AC}$.
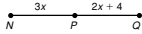
L   M

11. Use a ruler to draw $\overline{XY}$ that is congruent to $\overline{BC}$.

X   Y

12. Use a compass to construct $\overline{ST}$ that is congruent to $\overline{JK}$.

S   T

The **midpoint** of a segment separates the segment into two congruent segments.
In the figure, *P* is the midpoint of $\overline{NQ}$.

N $3x$ P $2x+4$ Q

13. $\overline{PQ}$ is congruent to ____ **NP or PN** ____.

14. What is the value of *x*? ____ **4** ____

15. Find *NP*, *PQ*, and *NQ*. ____ **12, 12, 24** ____

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Holt Geometry

Challenge
1-2 Center of Mass

The **center of mass**, also called the *center of gravity*, is the point where the weight of an object is focused. It is the point of balance of an object.

In a triangle, the center of mass is called the **centroid**. The centroid is found by drawing the three medians of the triangle. A **median** of a triangle is a segment that joins a vertex and the midpoint of the side opposite the vertex. The centroid of the triangle is the intersection point of the medians.

$\overline{RT}$ is a median of $\triangle QRS$.
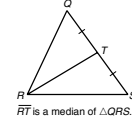
1. Use a ruler to draw a triangle with vertices *J*, *K*, and *L*. Draw and label the three midpoints *A*, *B*, and *C*. Draw the three medians. Label the centroid *M*.

Possible drawing:
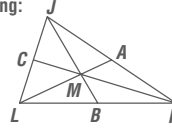
2. Use a ruler to find the length of each median. Then find the distance from each vertex to the centroid. Round your answers to the nearest tenth of a centimeter.

____ **Check students' work.** ____

3. Use your results from Exercise 2 to make a conjecture about how the distance from a vertex to the centroid is related to the distance from that vertex to the midpoint of the opposite side.

The centroid is $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.

4. Points *W*, *X*, and *Y* are the midpoints of $\overline{EF}$, $\overline{FG}$, and $\overline{GE}$, respectively. Use the triangle to verify the conjecture that you made in Exercise 3.
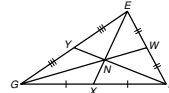
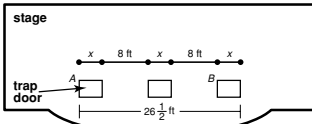$EN = 2$ cm, $EX = 3$ cm, $\frac{2}{3}$ of 3 cm is 2 cm, therefore $EN = \frac{2}{3} EX$;

$FN = 2$ cm, $FY = 3$ cm, therefore $FN = \frac{2}{3} FY$;

$GN = 2$ cm, $GW = 3$ cm, therefore $GN = \frac{2}{3} GW$

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Holt Geometry

Problem Solving
1-2 Measuring and Constructing Segments

For Exercises 1 and 2, use the figure. It shows the top view of a stage that has three trap doors.

stage

trap door

x 8 ft x 8 ft x

$26\frac{1}{2}$ ft

1. The total length of the stage is 76 feet. If the trap doors are centered across the stage, what is the distance from the left side of the stage to the first trap door?

$24\frac{3}{4}$ ft

2. An actor starts at point *A*, walks across the stage, and then stops at point *B* before disappearing through the trap door. How far does he walk across the stage?

23 ft

3. Anna is 26 feet high on a rock-climbing wall. She descends to the 15-foot mark, rests, and then climbs down until she reaches her friend, who is 8 feet from the ground. How many feet has Anna descended?

18 ft

4. Jamilla has a piece of ribbon that is 48.5 centimeters long. For her scrapbook, she cuts it into two pieces so that one piece is 4 times as long as the other. What are the lengths of the pieces?

9.7 cm and 38.8 cm

Choose the best answer.

5. Jordan wants to adjust the shelves in his bookcase so that there is twice as much space on the bottom shelf as on the top shelf, and one and a half times more space on the middle shelf as on the top shelf. If the total height of the bookcase is 0.9 meter, how much space is the middle shelf on?

top shelf x
middle shelf $1.5x$
bottom shelf $2x$

A 0.2 m C 0.4 m
(B) 0.3 m D 0.5 m

6. In a rowing race, the distance between the teams in first and second place is 5.7 meters. The distance between the teams in second and third place is one-third that distance. How much farther ahead is the team in first place than the team in third?

(F) 7.6 m H 2.5 m
G 5.7 m J 1.9 m
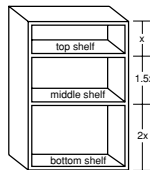
7. On a subway route, station C is located at the midpoint between stations A and D. Station B is located at the midpoint between stations A and C. If the distance between stations A and D is 2.4 kilometers, what is the distance between stations B and D?

A 0.3 km C 1.2 km
B 0.6 km (D) 1.8 km

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Holt Geometry

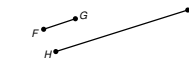
Reading Strategies
1-2 Understanding Vocabulary

Consider the following terms:
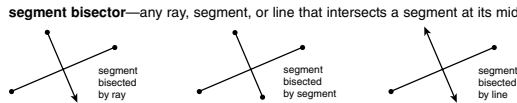
congruent segments—segments of the same length

These segments are not congruent.

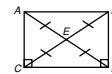**midpoint**—point at the exact center of a segment

bisect—dividing into two congruent parts

segment bisector—any ray, segment, or line that intersects a segment at its midpoint

segment bisected by ray segment bisected by segment segment bisected by line

Use the figure for Exercises 1–3.
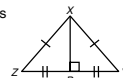
1. Name the congruent segments in this figure.

$\overline{AB}$, $\overline{CD}$; $\overline{BC}$, $\overline{AD}$; $\overline{AC}$, $\overline{BD}$; $\overline{DE}$, $\overline{BE}$, $\overline{CE}$, and $\overline{AE}$

2. Name the midpoint of $\overline{BC}$. ____ **Point E** ____

3. Name the segment bisector of $\overline{BC}$. ____ **AD** ____

Use the figure for Exercises 4–6.

4. Name the congruent segments in this figure.

$\overline{XY} \cong \overline{XZ}$; $\overline{ZP} \cong \overline{PY}$

5. Name the midpoint of $\overline{ZY}$. ____ **Point P** ____

6. Name the segment bisector of $\overline{ZY}$. ____ **XP** ____

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Holt Geometry

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Holt Geometry