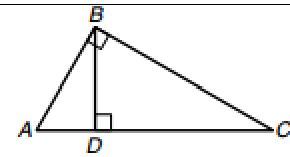
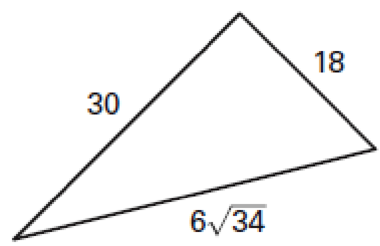
Geometry H Name: ___________________________
7.3 Notes: Similarity in Right Triangles Date: _______________ Period: ______

- I can apply similarity relationships in right triangles to solve problems.
- I can use geometric mean to find segment lengths in right triangles.

Altitudes and Similar Triangles	
Theorem: The altitude to the hypotenuse of a right triangle forms two triangles that are similar to each other and to the original triangle.	**Example:**  $\overline{BD}$ is the altitude to the hypotenuse of ΔABC, so $\Delta ABC \sim$ __________ $\sim$ __________

Example 1: Find the length of the altitude to the hypotenuse.

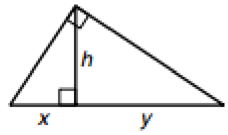
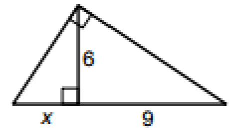
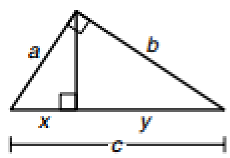
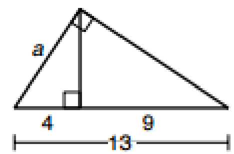
Solution: Tell whether the triangle is a right triangle. If so, find the length of the altitude to the hypotenuse. Round decimal answers to the nearest tenth.



Step 1 Use Converse of Pythagorean Theorem to determine if the triangle is a right triangle.

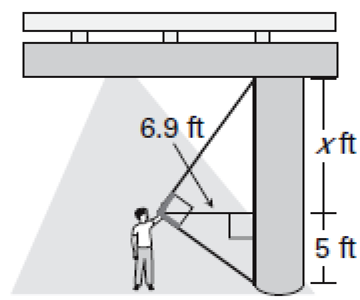
Step 2 Draw in the altitude to the hypotenuse. Identify the similar triangles and sketch them so that the corresponding angles and sides have the same orientation.

Step 3 Find the length of the altitude. Use your diagrams from step 1 to set up and solve a proportion.

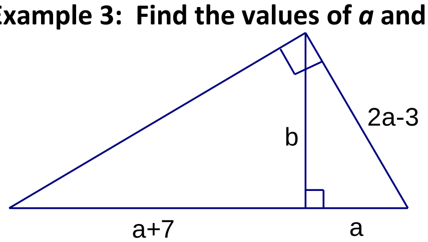
Geometric Means		
Words	**Symbols**	**Example**
Geometric Mean (Altitude) Theorem The length of the altitude to the hypotenuse of a right triangle is the geometric mean of the lengths of the two segments of the hypotenuse.	 $\frac{\_\_\_}{h} = \frac{h}{\_\_\_}$	Solve for x. 
Geometric Mean (Leg) Theorem The length of a leg of a right triangle is the geometric mean of the length of the hypotenuse and the segment of the hypotenuse adjacent to that leg.	 $\frac{\_\_\_}{a} = \frac{a}{\_\_\_}$ **or** $\frac{\_\_\_}{b} = \frac{b}{\_\_\_}$	Solve for a. 

Example 2: Find a height using indirect measurement.

To find the clearance under an overpass, you need to find the height of a concrete support beam. You use a cardboard square to line up the top and bottom of the beam. Your friend measures the vertical distance from the ground to your eye and the distance from you to the beam. Approximate the height of the beam.



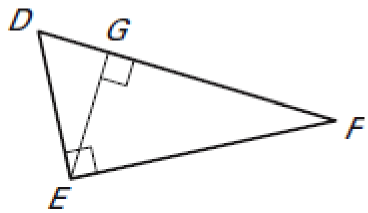
Example 3: Find the values of *a* and *b*.



Geometry H
Homework: 7.3 – Use Similar Right Triangles

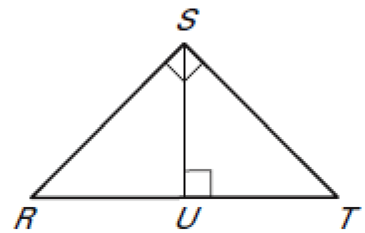
Name: ______________________________
Date: ____________________ Period: ______

Complete the similarity statement for the three similar triangles in the diagram. Then complete the proportion.

1. 

$\Delta FED \sim$ ________ $\sim$ ________

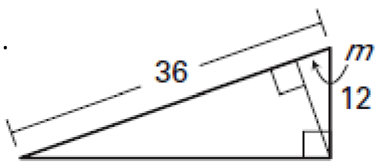
$\frac{DG}{EG} = \frac{\_\_\_\_\_}{GF}$

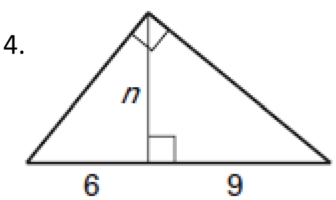
2. 

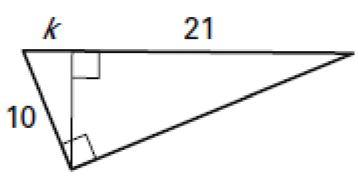
$\Delta RST \sim$ ________ $\sim$ ________

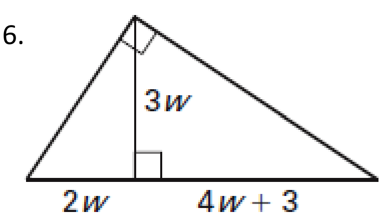
$\frac{\_\_\_\_\_}{RU} = \frac{RT}{RS}$

Find the value of the variable.

3. 

4. 

5. 

6. 

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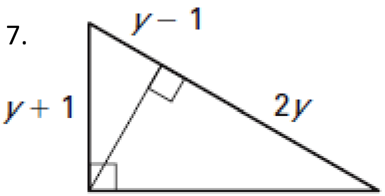
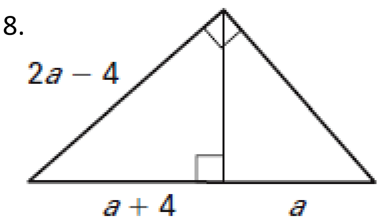
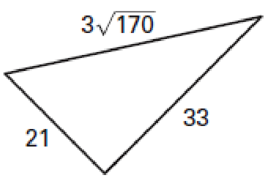


8.

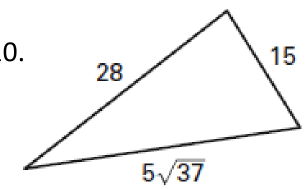


Tell whether the triangle is a right triangle. If so, find the length of the altitude to the hypotenuse. Round decimal answers to the nearest tenth.

9.

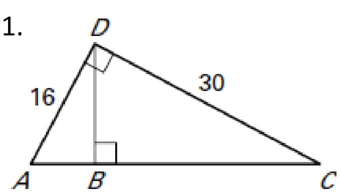


10.

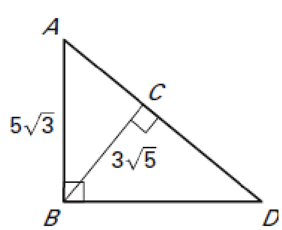


Find the lengths of $\overline{AC}$ and $\overline{BD}$. Leave answers in simplest radical form.

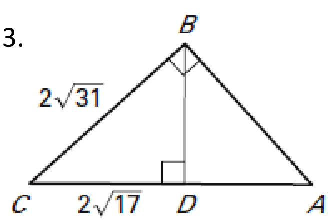
11.



12.

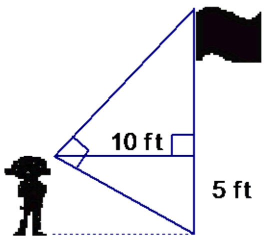


13.

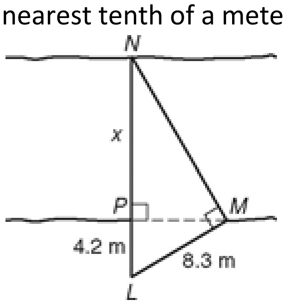


Applications

14. To estimate the height of a flagpole, Maddie stands so that her lines of sight to the top and bottom of the flagpole form a right angle. If Maddie's eyes are 5 feet above the ground, and she is standing 10 feet from the pole, what is the height of the pole?



15. A surveyor sketched the diagram below to calculate the distance across a ravine. What is *x*, the distance across the ravine, to the nearest tenth of a meter?



Answer Key

1. $\Delta FED \sim \Delta FGE \sim \Delta EGD;\ EG$		2. $\Delta RST \sim \Delta RUS \sim \Delta SUT;\ RS$	
3. *m* = 4	4. $n = 3\sqrt{6}$	5. *k* = 4	6. *w* = 6
7. *y* = 3	8. *a = 14*	9. Yes; 17.7	10. No
11. AC = 34, BD = $\frac{240}{17}$		12. $AC = \sqrt{30}, BD = \frac{15\sqrt{2}}{2}$	
13. $AC = \frac{62\sqrt{17}}{17}, BD = 2\sqrt{14}$		14. 25 ft	15. 12.2 m