Chapter 8: Right Triangles & Trigonometry

SECTION 1: SIMILARITY IN RIGHT TRIANGLES

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I Can

- Use geometric mean to find segment lengths in right triangles
- Apply similarity relationships in right triangles to solve problems

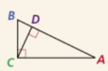
Background

REMEMBER: In a right triangle, an altitude drawn from the vertex of the right angle to the hypotenuse forms two right triangles.

Theorem 8-1-1

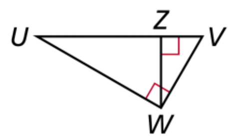
The altitude to the hypotenuse of a right triangle forms two triangles that are similar to each other and to the original triangle.

$\triangle ABC \sim \triangle ACD \sim \triangle CBD$



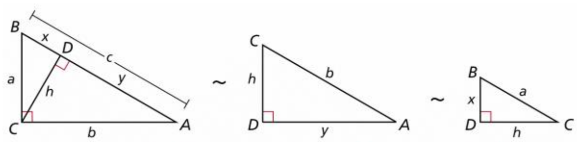
Example

Write a similarity statement comparing the three triangles.



Consequences

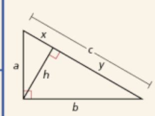
You can use Theorem 8-1-1 to write proportions comparing the side lengths of the triangles formed by the altitude to the hypotenuse of a right triangle. All the relationships in red involve geometric means.



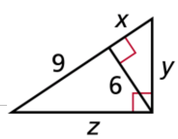
$\frac{b}{a} = \frac{y}{h} = \frac{h}{x}$ $\frac{c}{a} = \frac{b}{h} = \frac{a}{x}$ $\frac{c}{b} = \frac{b}{y} = \frac{a}{h}$

Corollaries

Corollaries Geometric Means

COROLLARY		EXAMPLE	DIAGRAM
8-1-2	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.	$h^2 = xy$	
8-1-3	The length of a leg of a right triangle is the geometric mean of the lengths of the hypotenuse and the segment of the hypotenuse adjacent to that leg.	$a^2 = xc$ $b^2 = yc$	

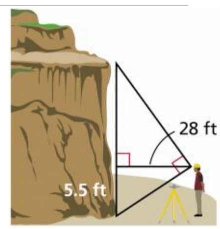
Example



Find *x*, *y*, and *z*.

Example

A surveyor positions himself so that his line of sight to the top of a cliff and his line of sight to the bottom form a right angle as shown. What is the height of the cliff to the nearest foot?



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