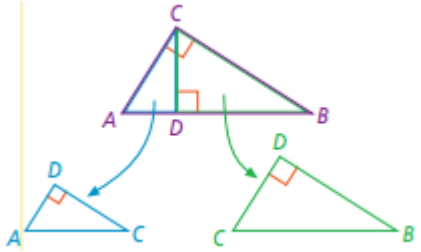
Similar Right Triangles

In this lesson you will learn to use the **altitude to the hypotenuse** of a right triangle to find the measurements of the parts of the similar triangles formed.

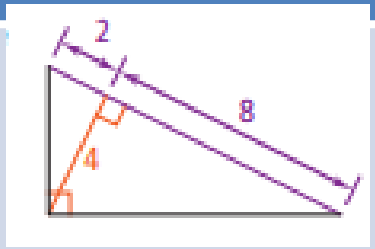
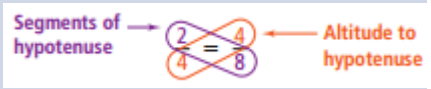
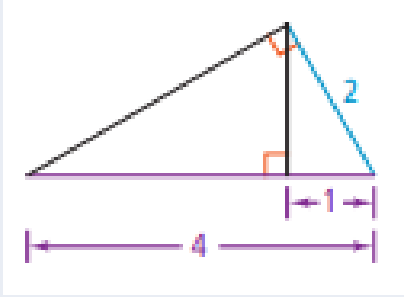
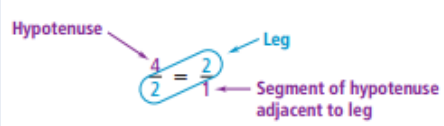
Agenda

- Definitions
- Corollary's 1 and 2
- Writing Proportions for Corollary 1 and 2
- Using Corollary 1 and 2

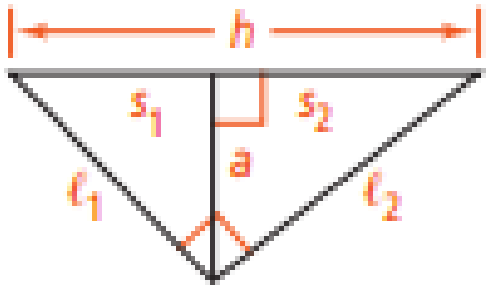
Definitions

Word	Definition from book	Definition in my own words	Example
Theorem 7-3	The altitude to the hypotenuse of a right triangle divides the triangle into two triangles that are similar to the original triangle and to eachother.	When you draw the altitude to the hypotenuse of a right triangle, you create 3 similar triangles	 $\triangle ABC \sim \triangle ACD$ $\triangle ABC \sim \triangle CBD$ $\triangle ACD \sim \triangle CBD$

Corollary's 1 and 2

Word	Definition from book	Definition in my own words	Example
Corollary 1 to Theorem 7-3	The length of the altitude to the hypotenuse or a right triangle is the geometric mean of the length of the segments of the hypotenuse	The altitude to the hypotenuse squared is equal to the product of the parts of the hypotenuse.	 
Corollary 2 to Theorem 7-3	The altitude to the hypotenuse of a right triangle separates the hypotenuse so that the length of each leg of the triangle is the geometric mean of the length of the hypotenuse and the length of the segment of the hypotenuse adjacent to the leg.	The product of the smaller segment and the hypotenuse is the same as the short leg squared.	 

Writing proportions for Corollary's 1 and 2



Corollary 1

$$\frac{s_1}{a} = \frac{a}{s_2}$$

Corollary 2

$$\frac{h}{l_1} = \frac{l_1}{s_1}$$

$$\frac{h}{l_2} = \frac{l_2}{s_2}$$

Using Corollary 1 and 2

Step 1: Identify the parts of the triangles

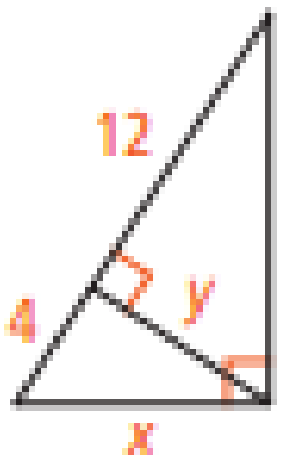
a, s_1, s_2, h, l_1, and l_2

Step 2: Decide which corollary to use

Step 3: Substitute numbers or variables into the formula

Step 4: Cross multiply and solve

Using Corollary 1 and 2



Step 1: Identify the parts of the triangle

a = y $s_1 = 4$ $s_2 = 12$

h = 16 $l_1 = x$ l_2 = not given

h is the sum of the two segments of the hypotenuse (4 + 12)

Step 2: Decide which corollary to use.

Use corollary 1 to find y. Use corollary 2 to find x.

Step 3: Substitute numbers or variables into the formula

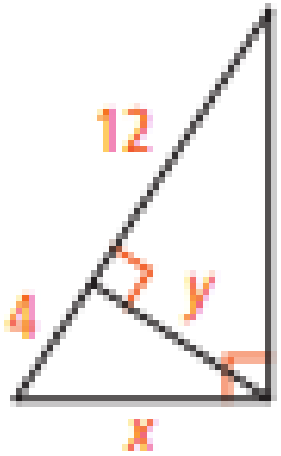
$$\frac{s_1}{a} = \frac{a}{s_2} \qquad \frac{4}{y} = \frac{y}{12}$$

$$\frac{h}{l_1} = \frac{l_1}{s_1} \qquad \frac{16}{x} = \frac{x}{4}$$

Using Corollary 1 and 2

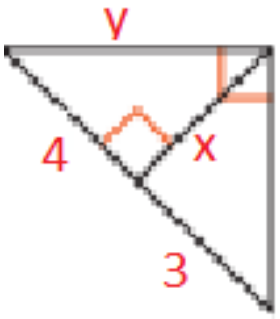
Step 4: Cross multiply and solve

$$\frac{4}{y} = \frac{y}{12}$$
$$y^2 = 4 \cdot 12$$
$$y^2 = 48$$
$$y = 4\sqrt{3}$$



$$\frac{16}{x} = \frac{x}{4}$$
$$x^2 = 16 \cdot 4$$
$$x^2 = 64$$
$$x = 8$$

Using Corollary 1 and 2



Step 1: Identify the parts of the triangle

a = x s_1 = 3 s_2 = 4

h = 7 l_1 = l_2 = y

h is the sum of the two segments of the hypotenuse (3 + 4)

Step 2: Decide which corollary to use.

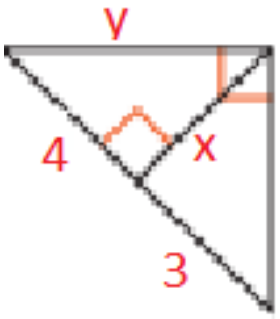
Use corollary 1 to find y. Use corollary 2 to find x.

Step 3: Substitute numbers or variables into the formula

$$\frac{s_1}{a} = \frac{a}{s_2} \qquad \frac{3}{x} = \frac{x}{4}$$

$$\frac{h}{l_2} = \frac{l_2}{s_2} \qquad \frac{7}{y} = \frac{y}{4}$$

Using Corollary 1 and 2



Step 4: Cross multiply and solve

$$\frac{3}{x} = \frac{x}{4}$$
$$x^2 = 3 \cdot 4$$
$$x^2 = 12$$
$$x = 2\sqrt{3}$$

$$\frac{7}{y} = \frac{y}{4}$$
$$y^2 = 7 \cdot 4$$
$$y^2 = 28$$
$$y = 2\sqrt{7}$$