Objective 1  Use Altitudes of Right Triangles to Prove Similarity

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

If...  Then...

\[ \Delta ABC \text{ is a right triangle with right } \angle ACB \text{ and } CD \text{ is the altitude to the hypotenuse.} \]

\[ \Delta ABC \sim \Delta ACD \]
\[ \Delta ABC \sim \Delta CBD \]
\[ \Delta ACD \sim \Delta CBD \]

Work Video Exercise 1 with me.

1. Write a similarity statement relating the three triangles in the diagram.
Section 7.5 Geometric Mean and Similarity in Right Triangles

Objective 2   Find the Geometric Mean of the Length of Segments in a Right Triangle

For any two positive numbers $a$ and $b$, the _______ _______ of $a$ and $b$ is the positive number $x$ such that
\[
\frac{a}{x} = \frac{x}{b}.
\]

Work Video Exercise 2 with me.

2. Find the geometric mean of 3 and 16.

Theorems for Geometric Means in Right Triangles

Geometric Mean in the Hypotenuse

<table>
<thead>
<tr>
<th>Geometric Mean in the Legs</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{s_1}{a} = \frac{a}{s_2}$</td>
<td>$\frac{h}{\ell_1} = \frac{\ell_1}{s_1}$, $\frac{h}{\ell_2} = \frac{\ell_2}{s_2}$</td>
</tr>
</tbody>
</table>

Pause and work Video Exercise 3.

3. Solve for $x$ and $y$.

Play and check.
Objective 3  Solve Applications Involving Right Triangles.

Work Video Exercise 4 with me.

The architect’s side-view drawing of a saltbox-style house shows a post that supports the roof ridge. The support post is 10 ft tall. How far from the front of the house is the support post positioned?

4.