

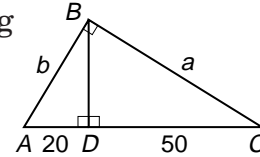
Study Guide

Geometric Mean and the Pythagorean Theorem

The geometric mean between two positive numbers a and b is the positive number x where $\frac{a}{x} = \frac{x}{b}$.

If $\triangle ABC$ is a right triangle with altitude \overline{BD} , then the following relationships hold true.

$$\frac{AD}{BD} = \frac{BD}{DC} \quad \frac{AD}{BC} = \frac{BC}{DC} \quad \frac{AC}{AB} = \frac{AB}{AD}$$



You can use the Pythagorean Theorem to find missing measures for right triangles.

Pythagorean Theorem	In a right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse.
Converse of the Pythagorean Theorem	If the sum of the squares of the measures of two sides of a triangle equals the square of the measure of the longest side, then the triangle is a right triangle.

Use $\triangle ABC$ above for the following examples.

Examples: 1 Find a .

You can use geometric mean relationships.

$$\begin{aligned} \frac{AD}{BC} &= \frac{BC}{DC} \\ \frac{20}{a} &= \frac{a}{50} \\ a^2 &= 1000 \\ a &= \sqrt{1000} \\ a &\approx 31.6 \end{aligned}$$

2 Find b .

You can use the Pythagorean Theorem.

$$\begin{aligned} b^2 + a^2 &= 70^2 \\ b^2 + 1000 &= 4900 \\ b^2 &= 3900 \\ b &= \sqrt{3900} \\ b &\approx 62.4 \end{aligned}$$

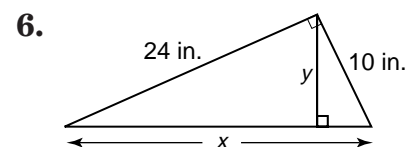
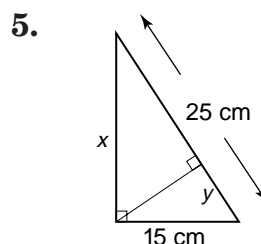
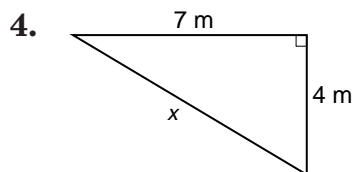
Find the geometric mean between each pair of numbers.

1. 3 and 10

2. 10 and 20

3. 10 and 40

Find the values of x and y . Round to the nearest tenth.



Determine if the given measures are measures of the sides of a right triangle.

7. 18, 24, 30

8. 20, 30, 40

9. 4.5, 6, 7.5