

## SIMILAR RIGHT TRIANGLES

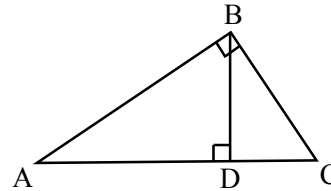
### MEAN PROPORTIONALITY

In a right triangle, if an altitude is drawn from the right angle to the hypotenuse, three similar triangles are created and the ratios of corresponding sides are equal.

$$\frac{\text{short leg of } \triangle BCD}{\text{short leg of } \triangle ABC} = \frac{CD}{BC} = \frac{BC}{AC} = \frac{\text{hypotenuse of } \triangle BCD}{\text{hypotenuse of } \triangle ABC}$$

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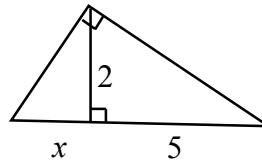
$$\frac{\text{short leg of } \triangle BCD}{\text{short leg of } \triangle ABD} = \frac{CD}{BD} = \frac{BD}{AC} = \frac{\text{long leg of } \triangle BCD}{\text{long leg of } \triangle ABD}$$



These equations are of the form and solution:  $\frac{a}{x} = \frac{x}{b} \rightarrow x^2 = ab \rightarrow x = \sqrt{ab}$ . This relationship is also known as the geometric mean or **mean proportionality**. Many other correct ratios may be written from these similar right triangles if you are consistent in the comparisons.

### Example 1

Write a proportion and solve for the variable.

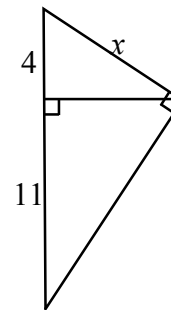


Comparing short leg ratios and long leg ratios:

$$\frac{2}{x} = \frac{5}{2} \rightarrow 5x = 4 \rightarrow x = \frac{4}{5} = 0.8$$

### Example 2

Write a proportion and solve for the variable.



Comparing short leg ratios and hypotenuse ratios:

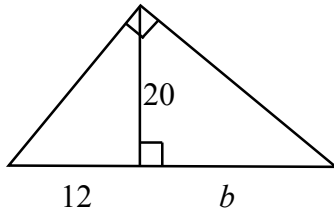
$$\frac{4}{x} = \frac{x}{15} \rightarrow x^2 = 60 \rightarrow x = \sqrt{60}$$

or  $2\sqrt{15}$

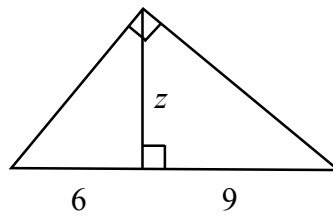
## Problems

Write a proportion and solve for the variable.

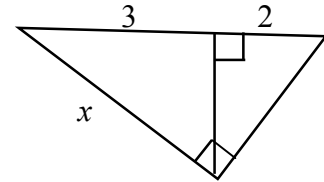
1.



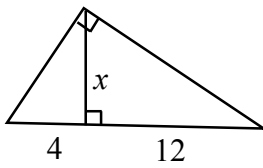
2.



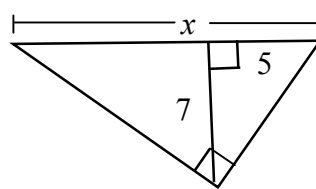
3.



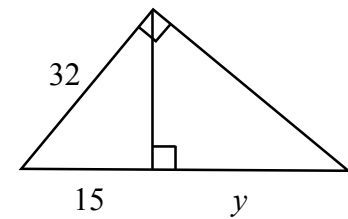
4.



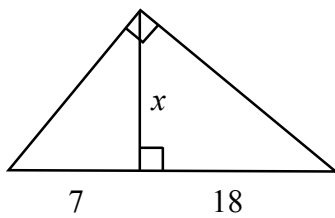
5.



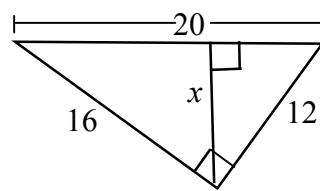
6.



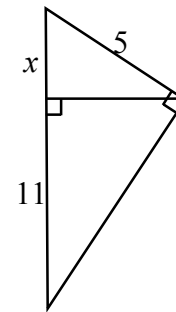
7.



8.



9.



## Answers

1.  $\frac{100}{3} \approx 33.33$

2.  $\sqrt{54} = 3\sqrt{6}$

3.  $\sqrt{15}$

4.  $\sqrt{48} = 4\sqrt{3}$

5.  $\frac{74}{5} = 14.8$

6.  $\frac{799}{15} \approx 53.27$

7.  $\sqrt{126} = 3\sqrt{14}$

8. 9.6

9.  $\frac{-11+\sqrt{221}}{2} \approx 1.93$