To find the Geometric Mean of *n* numbers:

1 - Find their product

2 - Take the nth root of this product

Find the geometric mean of 4 and 16

Product: $(4)(16) = 64$

Square Root: 8

In the proportion $\frac{a}{b} = \frac{c}{d}$

a and *d* are called the extremes

b and *c* are called the means

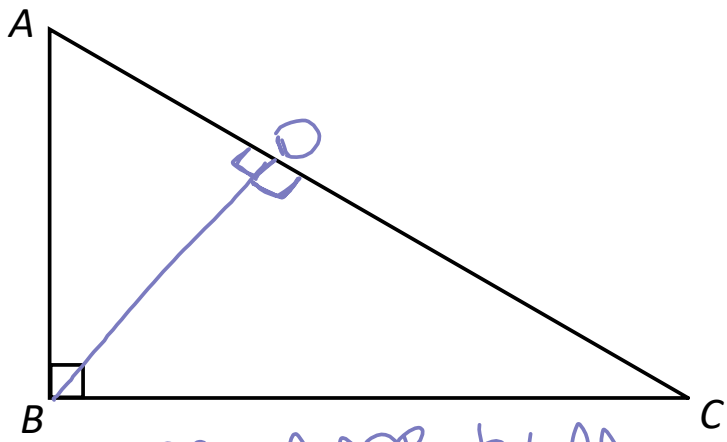
If the means of a proportion are equal, then they represent the geometric mean of the extremes

$$\frac{4}{x} = \frac{x}{16}$$

$\sqrt{x^2} = \sqrt{64}$

$x = 8$

What happens when an altitude is drawn to the hypotenuse in a right triangle?



$\triangle ABC \sim \triangle ADB$ by AA

$\triangle ABC \sim \triangle BDC$ by AA

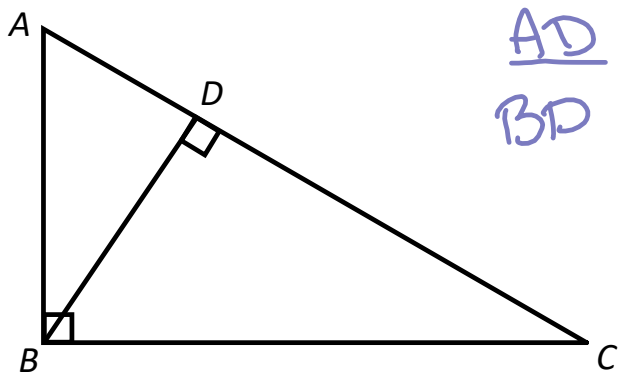
$\triangle ADB \sim \triangle BDC$ by Transitive Prop.

$\therefore \triangle ABC \sim \triangle ADB \sim \triangle BDC$

Because of these similarities, we can conclude two "Altitude on Hypotenuse" Theorems:

<u>Altitude on Hypotenuse Theorem 1</u>

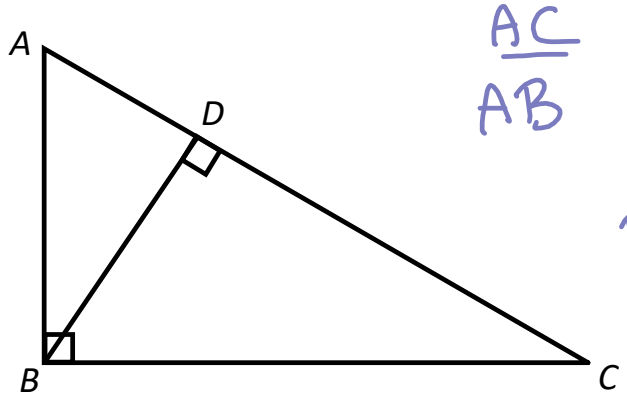
In any right triangle, the altitude from the right angle is the geometric mean between the two segments of the hypotenuse



$$\frac{AD}{BD} = \frac{BD}{DC}$$

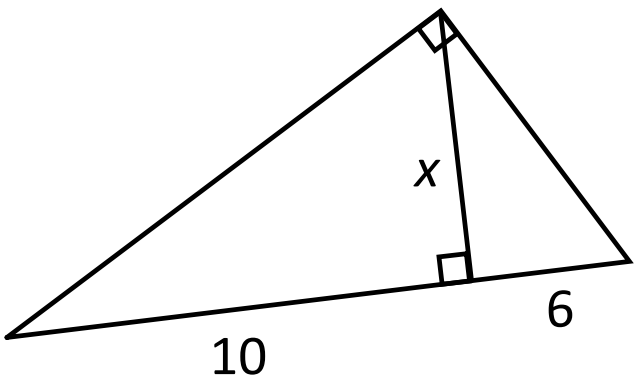
Altitude on Hypotenuse Theorem 2

In any right triangle, the length of each leg is the geometric mean between the hypotenuse and the segment of the hypotenuse adjacent to that leg.



$$\frac{AC}{AB} = \frac{AB}{AD}$$

$$\frac{AC}{BC} = \frac{BC}{DC}$$

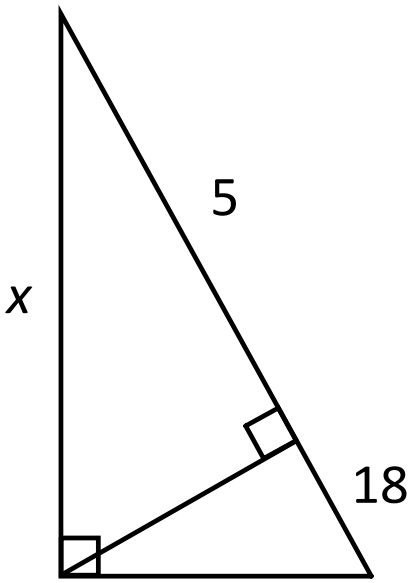


$$\frac{10}{x} = \frac{x}{6}$$

$$\sqrt{x^2} = \sqrt{60}$$

$$= \sqrt{4 \cdot 15}$$

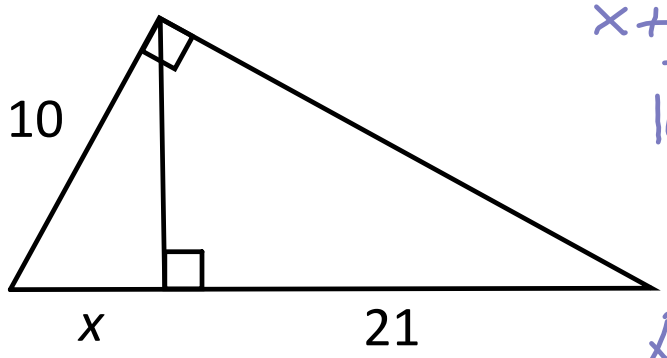
$$= 2\sqrt{15}$$



$$\frac{23}{x} = \frac{x}{5}$$

$$\sqrt{x^2} = \sqrt{115}$$

$$x = \sqrt{115}$$



$$\frac{x+21}{10} = \frac{10}{x}$$

$$x^2 + 21x = 100$$

$$x^2 + 21x - 100 = 0$$

$$(x+25)(x-4) = 0$$

$$\cancel{x = -25} \quad x = 4$$

extraneous