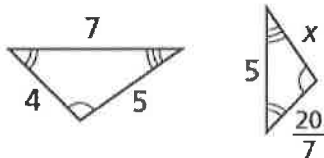


9.3 - Similar Right Triangles

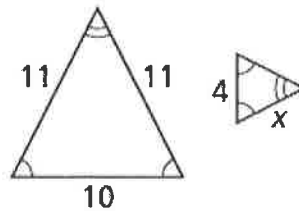
Given that the triangles are similar, find the missing side length.



$$\frac{x}{5} = \frac{5}{7}$$

$$7x = 25$$

$$x = \frac{25}{7}$$



$$\frac{x}{4} = \frac{11}{10}$$

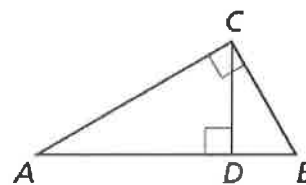
$$10x = 44$$

$$x = \frac{44}{10}$$

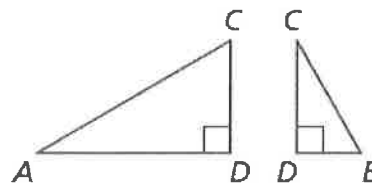
$$x = \frac{22}{5}$$

Theorem 9.6 Right Triangle Similarity Theorem

If the altitude is drawn to the hypotenuse of a right triangle, then the two triangles formed are similar to the original triangle and to each other.



$\triangle CBD \sim \triangle ABC$, $\triangle ACD \sim \triangle ABC$,
and $\triangle CBD \sim \triangle ACD$.

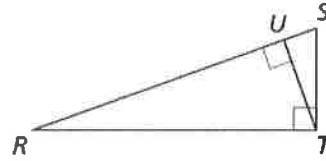


Proof Ex. 45, p. 484

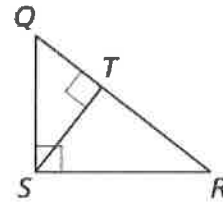
9.3 - Similar Right Triangles.notebook

Identify the similar triangles in the diagram.

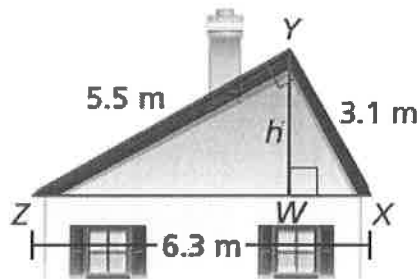
$$\triangle SUT \sim \triangle STR \sim \triangle TUR$$



$$\triangle QSR \sim \triangle QTS \sim \triangle STR$$



A roof has a cross section that is a right triangle. The diagram shows the approximate dimensions of this cross section. Find the height h of the roof.



$$\triangle XYW \sim \triangle XZY \sim \triangle YZW$$

$$\triangle XZY \sim \triangle YZW$$

$$\frac{YW}{YZ} = \frac{YX}{XZ}$$

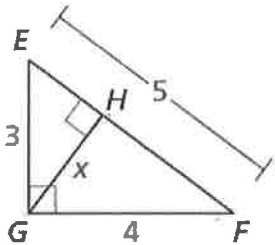
$$\frac{h}{5.5} = \frac{3.1}{6.3}$$

$$6.3h = 17.05$$

$$h = 2.71 \text{ meters}$$

9.3 - Similar Right Triangles.notebook

Find the value of x .



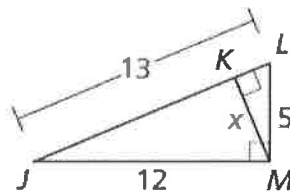
$$\triangle HGF \sim \triangle GEF$$

$$\frac{HG}{GF} = \frac{EG}{EF}$$

$$\frac{x}{4} = \frac{3}{5}$$

$$5x = 12$$

$$x = \frac{12}{5} = 2.4$$



$$\triangle KMJ \sim \triangle MLJ$$

$$\frac{KM}{MJ} = \frac{ML}{LJ}$$

$$\frac{x}{12} = \frac{5}{13}$$

$$13x = 60$$

$$x = \frac{60}{13} \approx 4.62$$

Geometric Sequences:

3, 6, 12, 24,

400, 200, 100, 50, ...

* Geometric sequences increase or decrease by a common ratio, meaning you need to multiply by a common factor to find the next term in the sequence.

Core Concept

Geometric Mean

The **geometric mean** of two positive numbers a and b is the positive number x that satisfies $\frac{a}{x} = \frac{x}{b}$. So, $x^2 = ab$ and $x = \sqrt{ab}$.

Find the geometric mean of the numbers:

24 and 48.

$$x^2 = 24(48)$$

$$\sqrt{x^2} = \sqrt{1152}$$

$$x = \sqrt{24} \sqrt{48}$$

$$x = \sqrt{24} \sqrt{24} \sqrt{2}$$

$$x = 24\sqrt{2}$$

12 and 27

$$x^2 = (12)(27)$$

$$\sqrt{x^2} = \sqrt{324}$$

$$x = 18$$

18 and 54

$$x^2 = (18)(54)$$

$$\sqrt{x^2} = \sqrt{972}$$

$$x = \sqrt{18} \sqrt{54}$$

$$x = \sqrt{18} \sqrt{18} \sqrt{3}$$

$$x = 18\sqrt{3}$$

16 and 18

$$x^2 = (16)(18)$$

$$\sqrt{x^2} = \sqrt{288}$$

$$x = \sqrt{16} \sqrt{18}$$

$$x = \sqrt{4} \sqrt{4} \sqrt{9} \sqrt{2}$$

$$x = \sqrt{3} \sqrt{3} \sqrt{2}$$

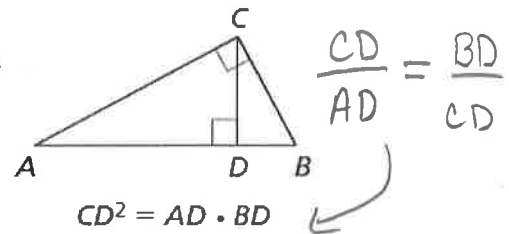
$$x = 12\sqrt{2}$$

Theorem 9.7 Geometric Mean (Altitude) Theorem

In a right triangle, the altitude from the right angle to the hypotenuse divides the hypotenuse into two segments.

The length of the altitude is the geometric mean of the lengths of the two segments of the hypotenuse.

Proof Ex. 41, p. 484

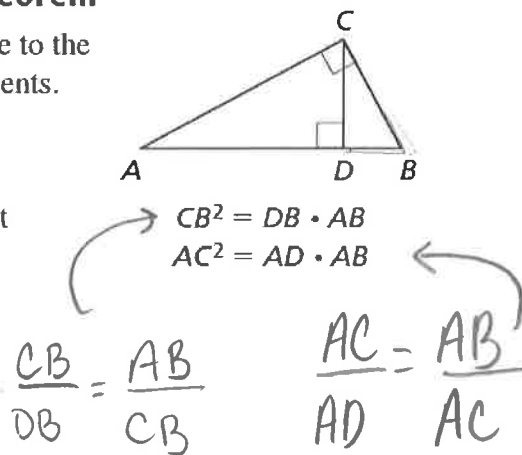


Theorem 9.8 Geometric Mean (Leg) Theorem

In a right triangle, the altitude from the right angle to the hypotenuse divides the hypotenuse into two segments.

The length of each leg of the right triangle is the geometric mean of the lengths of the hypotenuse and the segment of the hypotenuse that is adjacent to the leg.

Proof Ex. 42, p. 484



9.3 - Similar Right Triangles.notebook

Find the value of each variable.

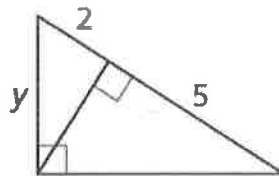
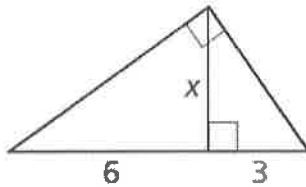
$$x^2 = 3 \cdot 6$$

$$\sqrt{x^2} = \sqrt{18}$$

$$\sqrt{9 \cdot 2}$$

$$\sqrt{3 \cdot 3 \cdot 2}$$

$$x = 3\sqrt{2}$$



$$y^2 = 2(7)$$

$$y^2 = 14$$

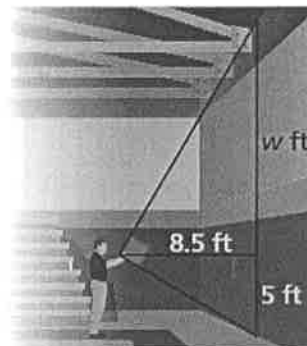
$$y = \sqrt{14}$$

To find the cost of installing a rock wall in your school gymnasium, you need to find the height of the gym wall. You use a cardboard square to line up the top and bottom of the gym wall. Your friend measures the vertical distance from the ground to your eye and the horizontal distance from you to the gym wall. Approximate the height of the gym wall.

$$(8.5)^2 = 5w$$

$$72.25 = 5w$$

$$14.45 = w$$

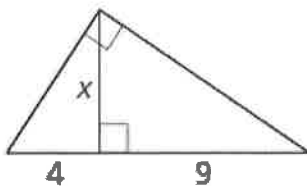


$$\text{Wall height} = 14.45 + 5$$

$$= 19.45 \text{ ft}$$

9.3 - Similar Right Triangles.notebook

Find the value of x in the triangle.



$$x^2 = (4)(9)$$

$$x^2 = 36$$

$$x = 6$$

Homework:

pg. 482 # 7-14, 19-26, 31 - 34