

4-4 Geometric Mean

pages 303-310

Warm-Up

What are the next 3 terms in the geometric sequence:

2, 6, 18, 54, 162, 486, 1458
 $\cdot 3 \cdot 3 \cdot 3$

Simplify the radicals:

$$\sqrt{9}$$

$$\sqrt{27}$$

$$3\sqrt{18}$$

$x = \text{geometric mean}$ p 307

Geometric Mean: The geometric mean between two positive numbers a and b is the positive number x such that

$$\frac{a}{x} = \frac{x}{b}$$

$$\sqrt{ab} = x$$

$$\boxed{\sqrt{ab} = x}$$

$$2x = x + x$$

$$x \cdot x = x^2$$

Find the ^{x} geometric mean between $\frac{20}{a}$ and $\frac{5}{b}$.

$$\frac{20}{x} = \frac{x}{5}$$

$$\sqrt{100} = x$$

$$\boxed{10 = x}$$

Find the geometric mean between 24 and 4.

$$\frac{24}{x} = \frac{x}{4}$$

$$\sqrt{96} = x$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$$

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

$$\boxed{4\sqrt{6}}$$

The geometric mean between two numbers is 20. One of the numbers is 50, find the other number.

$$\frac{50}{20} = \frac{20}{x}$$

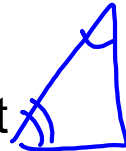
$$\frac{5x}{5} = \frac{40}{5}$$

$$x = 8$$

$$\frac{50}{x} = \frac{x}{8} \rightarrow x = 20$$

Cut out all three triangles.

1) Mark any angles that are congruent.



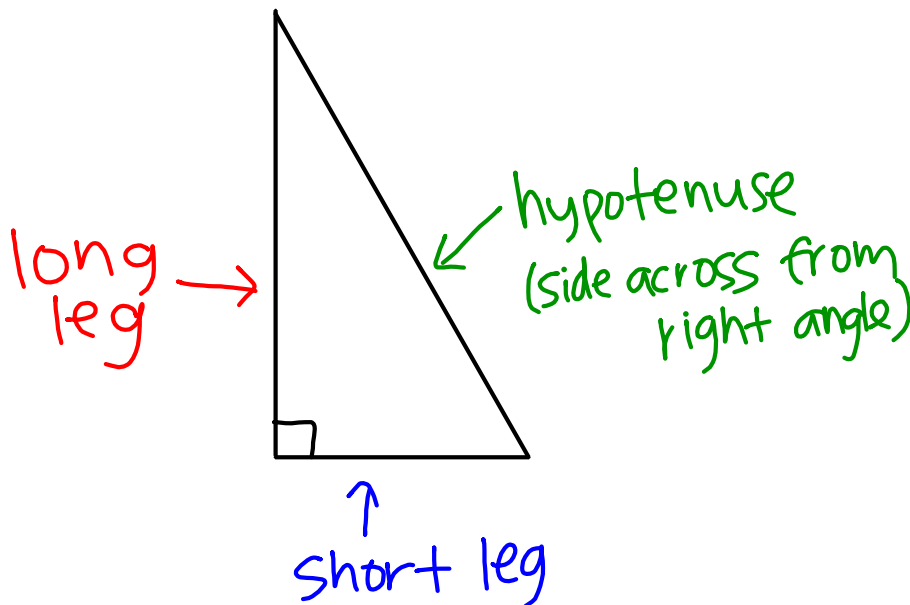
2) Mark any sides that are congruent

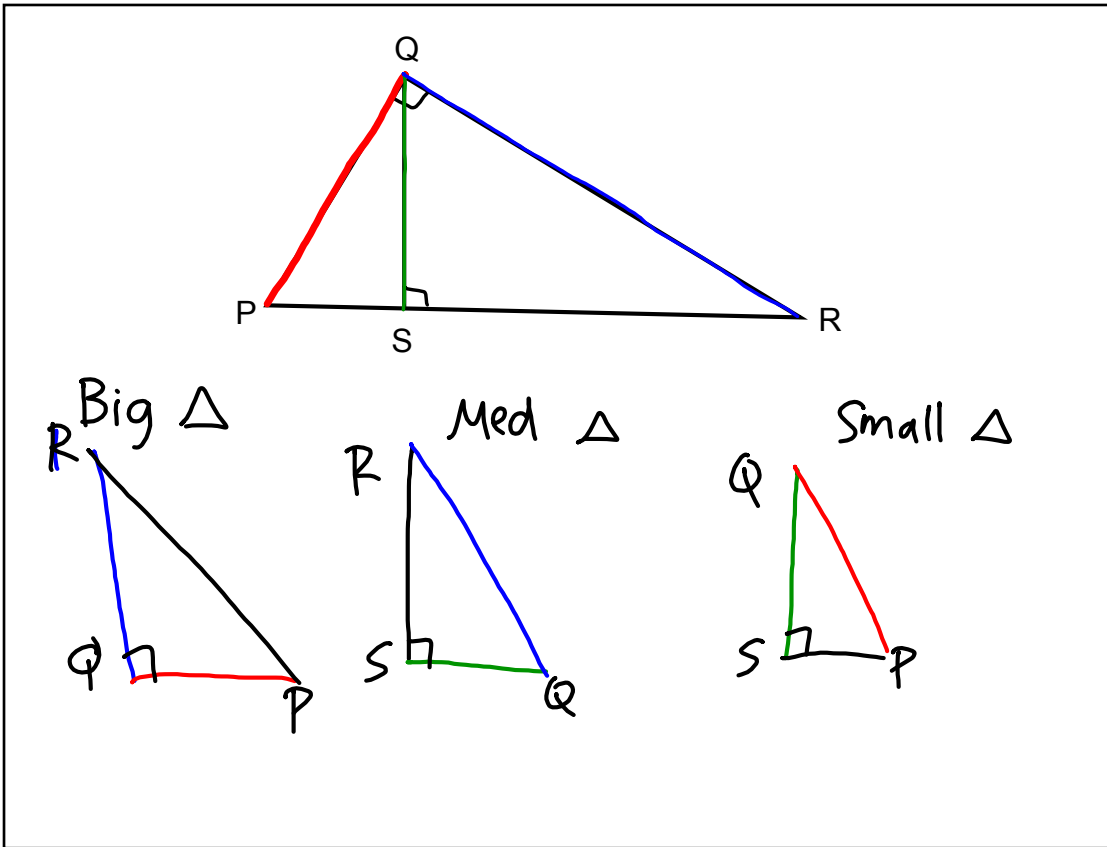
3) Determine whether all 3 triangles are similar (remember, AA, SSS, SAS - Angles are congruent and sides are proportional)

same

Right Triangle Altitude Similarity Theorem:

The altitude to the hypotenuse of a right triangle forms two triangles Similar to the original right triangle.





Set up a proportions to solve for the geometric mean

- $\frac{RS}{QS} = \frac{QS}{SP}$
- $\frac{RP}{QP} = \frac{QP}{SP}$
- $\frac{RP}{RQ} = \frac{RQ}{RS}$

Big Δ

Med Δ

Small Δ

$\frac{RS}{QS} = \frac{QS}{PS}$

$\frac{RP}{QP} = \frac{QP}{PS}$

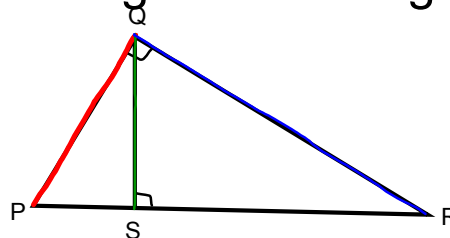
$\frac{RP}{QR} = \frac{QR}{RS}$

When solving for a variable, you can

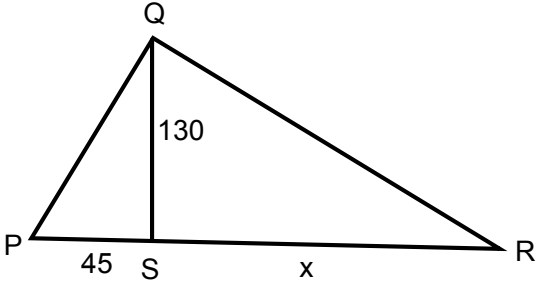
1) see which conductor method uses the variable and numbers given

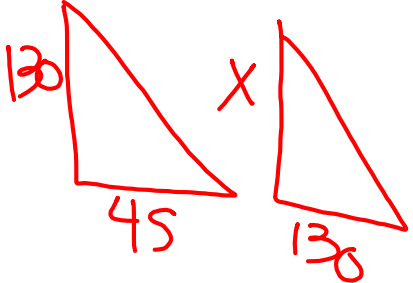


2) see which two triangles use the given geometric mean



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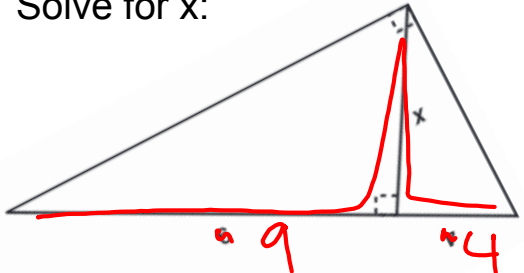


$$\frac{45}{130} = \frac{130}{x}$$


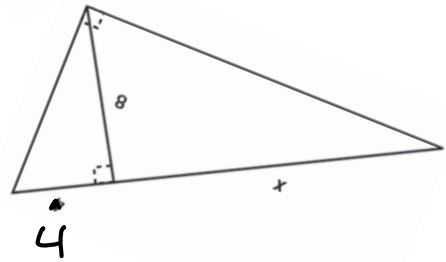
$$\frac{45}{130} = \frac{130}{x}$$

Solve for x:

p 308 #3a,b



$$\frac{9}{x} = \frac{x}{4} \quad \sqrt{36 = x^2}$$

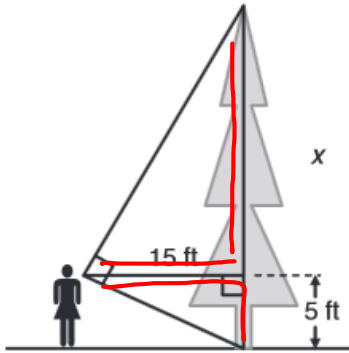
$$\boxed{6 = x}$$


$$\frac{x}{8} = \frac{8}{4}$$

$$\frac{4x}{4} = \frac{64}{4}$$

$$\boxed{x = 16}$$

You are standing 15 feet from a tree. Your line of sight to the top of the tree and to the bottom of the tree forms a 90-degree angle as shown in the diagram. The distance between your line of sight and the ground is 5 feet. Estimate the height of the tree.



$$\frac{5}{15} \times \frac{15}{x} = \frac{5x}{5} = 225$$

$$x = 45$$

height of tree = $x + 5$
 $45 + 5$

50 feet

Bridge Over Canyon:

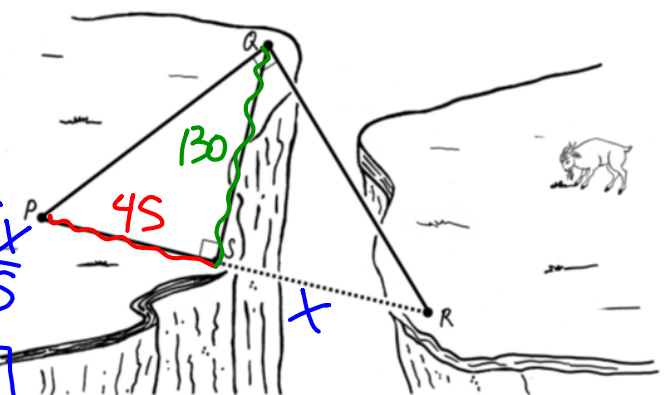
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A bridge is needed to cross over a canyon. The dotted line segment connecting points S and R represents the bridge. The distance from point P to point S is 45 yards. The distance from point Q to point S is 130 feet. How long is the bridge?

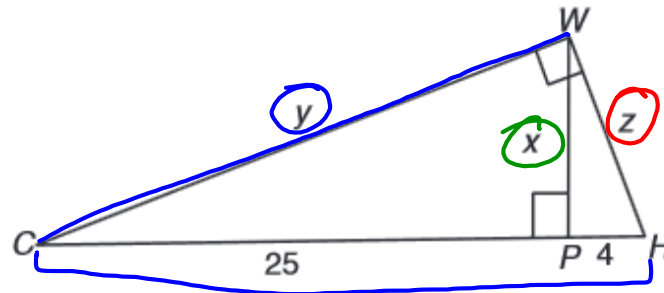
$$\frac{45}{130} = \frac{130}{x}$$

$$\frac{16900}{45} = \frac{45x}{45}$$

**$x \approx 375.5$
ft**



Solve for x, y, and z.

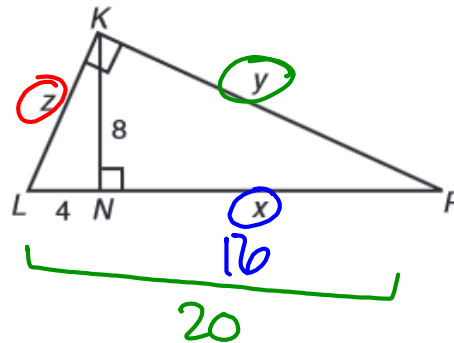


$$\frac{29}{y} = \frac{y}{25}$$

$$\frac{29}{z} = \frac{z}{4}$$

$$\frac{4}{x} = \frac{x}{25}$$

Solve for x, y, and z.



$$\frac{4}{8} = \frac{8}{x} \quad \frac{4x}{4} = \frac{64}{4}$$

$$x = 16$$

$$\frac{20}{y} = \frac{y}{16}$$

$$\frac{20}{z} = \frac{z}{4}$$

HOMEWORK: ONLY DO

5, 6-9, 22-25

28, 29, 33 (← solve for x only)

34, 37-39