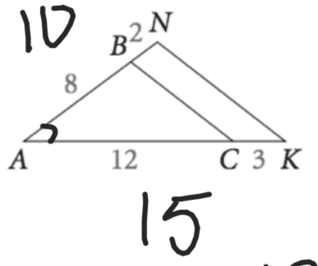
1.) Complete the statement $\triangle ABC \sim$ __?__, and identify the reason why the triangles are similar.

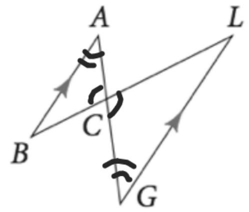
A. $\triangle AKN$; SSS ~
B. $\triangle AKN$; SAS ~
C. $\triangle ANK$; SAS ~
D. $\triangle ANK$; AA ~



$$\frac{8}{10} = \frac{12}{15}$$

2.) Complete the statement $\triangle ABC \sim$ __?__, and identify the reason why the triangles are similar.

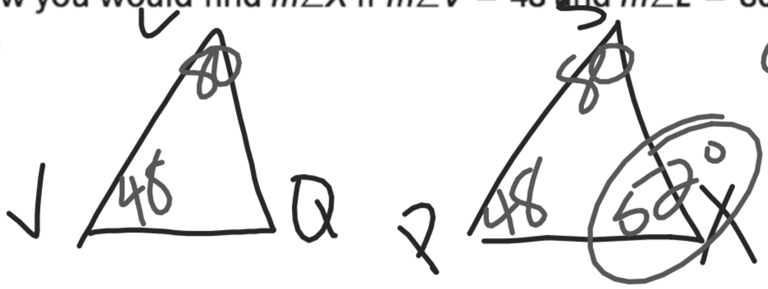
F. $\triangle LGC$; SSS ~
G. $\triangle GLC$; SSS ~
H. $\triangle LGC$; AA ~
I. $\triangle GLC$; AA ~



3.) Suppose $\triangle VLQ \sim \triangle PSX$.

a. Explain how you would find $m\angle X$ if $m\angle V = 48$ and $m\angle L = 80$.

b. Find $m\angle X$.

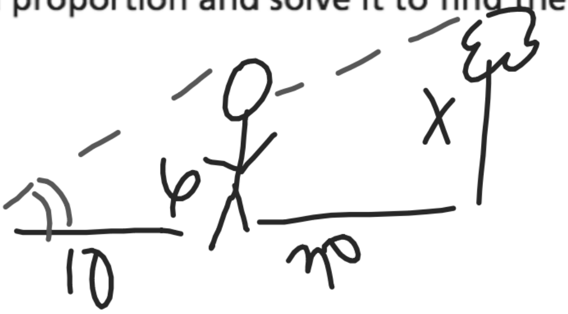


a. corr. angles in ~ Δs are ≅.

4.) Hank is 6 ft tall. Hank measured the shadow of a tree and found it to be 30 ft long. He then measured his own shadow. It was 10 ft long.

a. Draw and label a diagram that you could use to find the height of the tree. Write a similarity statement and justify your answer.

b. Write a proportion and solve it to find the height of the tree.



$$\frac{6}{X} = \frac{10}{30}$$

$$10X = 180$$

$$X = 18\text{ft}$$

Geometry 7-4: Similarity in Right Triangles

Objective: I can find and use relationships in similar right triangles

*Triangle Activity on page 391. You will need a ruler and a sheet of computer paper.

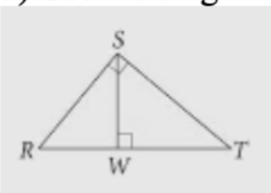
1) Which angles have the same measure as $\angle 1$?

2) Which angles have the same measure as $\angle 2$?

3) Which angles have the same measure as $\angle 3$?

4) Based on your results, what is true about these three triangles?

5) Use the diagram below to complete the similarity statement.



$\Delta RST \sim \Delta$________ $\sim \Delta$________

From the activity, we can conclude that when you draw an altitude in a right triangle, it creates three similar triangles.

Theorem 7-3

The altitude to the hypotenuse of a right triangle divides the triangle into two triangles that are similar to the original Δ and to each other.

The reason all three triangles are similar is by the __AA~__ postulate. The two new triangles have a __right__ angle and at least one angle in common with the original triangle.

In this situation, we have a length that both of the two smaller right triangles share. This length is called the __altitude__. The geometric mean in the diagram above is __X__. For any two positive numbers *a* and *b*, the __geomean__ of *a* and *b* is the positive number *x* such that:

$$\frac{a}{x} = \frac{x}{b} \qquad x = \sqrt{a \cdot b}$$

Example 1: Find the geometric mean of 4 and 18. *What does this mean??

$$\frac{4}{x} = \frac{x}{18} \qquad x^2 = 72 \qquad x = \sqrt{72} \qquad x = 6\sqrt{2}$$

36, 2

QC 1: Find the geometric mean of 15 and 20.

$$\frac{15}{x} = \frac{x}{20}$$

$$x^2 = 300$$

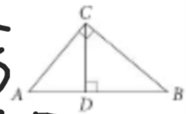
100, 3

$$x = 10\sqrt{3}$$

Two important corollaries of Theorem 7-3 involve a geometric mean.

Corollary 1 to Theorem 7-3

The length of the altitude to the hypotenuse of a right triangle is the geo. mean of the lengths of the segments of the hyp.

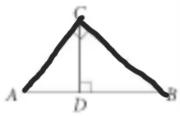


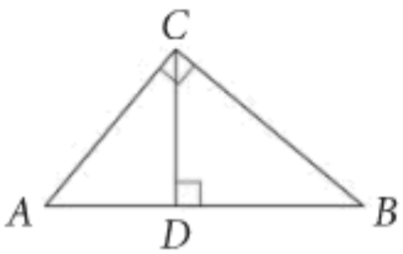
$$\frac{AD}{CD} = \frac{CD}{DB}$$

$$\frac{DB}{CB} = \frac{CB}{AB} \text{ or } \frac{AD}{AC} = \frac{AC}{AB}$$

Corollary 2 to Theorem 7-3

The length of the altitude to the hypotenuse of a right triangle separates the hypotenuse so that the length of each leg of the triangle is the geo mean of the length of the adj hyp segment and the length of the hyp.





Corollary | **Corollary 1 to Theorem 7-3**

The length of the altitude to the hypotenuse of a right triangle is the geometric mean of the lengths of the segments of the hypotenuse.

$$\frac{AD}{CD} = \frac{CD}{DB}$$

Corollary | **Corollary 2 to Theorem 7-3**

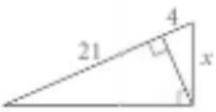
The altitude to the hypotenuse of a right triangle separates the hypotenuse so that the length of each leg of the triangle is the geometric mean of the length of the adjacent hypotenuse segment and the length of the hypotenuse.

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

Examples of Corollary 1 and 2

<u>Example 2:</u> cor 2

A. Solve for x.



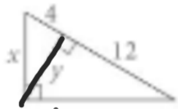
$\frac{4}{x} = \frac{x}{25}$

$x^2 = 100$

$x = 10$

cor1 & 2

B. Solve for x and y.



cor1:

$\frac{4}{y} = \frac{y}{12}$

$y^2 = 48$

$y = 4\sqrt{3}$

cor2:

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

$x^2 = 64$

$x = 8$

C. Solve for x and y.

cor1:

$\frac{4}{y} = \frac{y}{5}$

$y^2 = 20$

$y = 2\sqrt{5}$

cor2:

$\frac{4}{x} = \frac{x}{9}$

$x^2 = 36$

$x = 6$

D. Solve for x, y and z.

cor1:

$\frac{1}{y} = \frac{y}{4}$

$y^2 = 4$

$y = 2$

cor2:

$\frac{1}{x} = \frac{x}{5}$

$x^2 = 5$

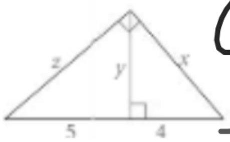
$x = \sqrt{5}$

$\frac{4}{z} = \frac{z}{5}$

$z^2 = 20$

$z = 2\sqrt{5}$

E. Solve for x, y and z.



cor1:

$\frac{4}{y} = \frac{y}{5}$

$y^2 = 20$

$y = 2\sqrt{5}$

cor2:

$\frac{5}{z} = \frac{z}{9}$

$z^2 = 45$

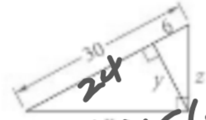
$z = 3\sqrt{5}$

$\frac{4}{x} = \frac{x}{9}$

$x^2 = 36$

$x = 6$

F. Solve for x, y and z.



$\frac{6}{z} = \frac{z}{30}$

$z = 6\sqrt{5}$

cor1:

$\frac{6}{y} = \frac{y}{24}$

$y^2 = 144$

$y = 12$

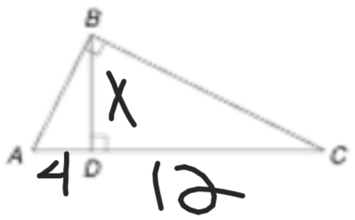
$\frac{24}{x} = \frac{x}{30}$

$x^2 = 720$

$x = 12\sqrt{5}$

G.

In $\triangle ABC$, $AD = 4$ and $CD = 12$. Find BD.



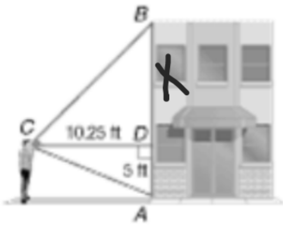
$\frac{4}{x} = \frac{x}{12}$

$x^2 = 48$ 16 · 3

$x = 4\sqrt{3}$

H.

ARCHITECTURE To find the height of her school building, Mieko held a book near her eye so that the top and bottom of the building were in line with the edges of the cover. If Meiko's eye level is 5 feet above the ground and she is standing about 10.25 feet from the building, how tall is the building? Round to the nearest tenth.



$$\frac{5}{10.25} = \frac{10.25}{X}$$

$$5X = 105.0625$$

$$X = 21.0125 + 5$$

$$\boxed{26.0 \text{ ft}}$$

HW #11 -

Sec. 7-4

Pages 394-395

Problems: 1, 5, 6, 9-14, 17, 18, 50

IXL #7 - P.5 & P.7 due Friday at 4pm!