GEO (H) date: Whitney Zhou 2/19/16

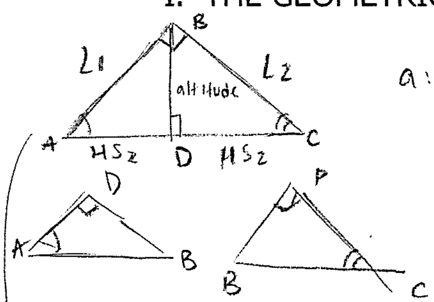
CHAPTER 8 RIGHT TRIANGLES
8-1 : Similarity in right triangles

Objectives: 1. What is the geometric mean?

2. What relationships exist when the altitude is drawn to the hypotenuse of a right triangle?

l = leg
HS = hypothenuse segment

I. THE GEOMETRIC MEAN



$a : x = x : d$ $x^2 = ad$

x is the mean.

Recall: Last pg back.

II. DISCOVERY:

~~△ADB ~ △BDC b/c of AA. similarity Postulate.~~

△ADB ~ △ABC

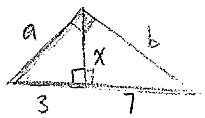
△BDC ~ △ABC

(transitive prop)

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.

iii. DISCOVERY:

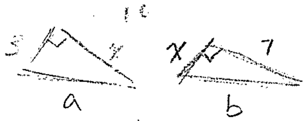
Can we write a proportion to find the length of the altitude?



$\frac{a}{3} = \frac{7}{a}$ $\qquad$ $\frac{b}{7} = \frac{10}{b}$

$\sqrt{a^2} = \sqrt{21}$ $\qquad$ $\sqrt{b^2} = \sqrt{70}$

$a = \sqrt{21}$ $\qquad$ $b =$



$\frac{3}{x} = \frac{x}{7}$

$x^2 = 21$

$x = \sqrt{21}$

Can we write a proportion to find the short leg, "a"?

$\frac{a}{3} = \frac{10}{a}$ (L1, H, hs1, L2)

Let a = short leg (L1)

$\sqrt{a^2} = \sqrt{30}$

$a = \sqrt{30}$

short leg is geo. mean bet. hyp and hs (hypothenuse segment 1)

Can we write a proportion to find the long leg, "b"?

$\frac{b}{7} = \frac{10}{b}$ (L2, H, HS2, L2)

$\sqrt{b^2} = \sqrt{70}$

$b = \sqrt{70}$

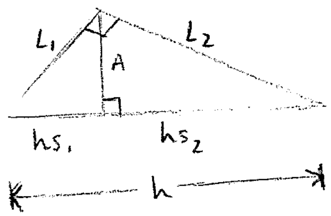
TWO COROLLARIES:

COROLLARY:

1. When the altitude is drawn to the hypotenuse of a right triangle, the length of the altitude is the geometric mean between the segments of the hypotenuse.

2. When the altitude is drawn to the hypotenuse of a right triangle, each leg is the geometric mean between the hypotenuse and the segment of the hypotenuse that is adjacent to that leg.

Summary: 3 relationships

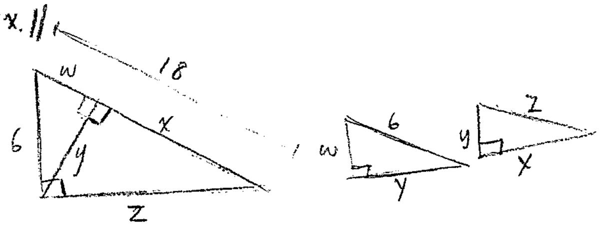


① $\frac{hs_1}{A} = \frac{A}{hs_2}$

② $\frac{h}{L_1} = \frac{L_1}{hs_1}$

③ $\frac{h}{L_2} = \frac{L_2}{hs_2}$

Ex. 1



$\frac{w}{6} = \frac{6}{18}$

$w = 2$

$\frac{x}{y} = \frac{y}{w}$

$y = 4\sqrt{2}$

$\frac{18}{z} = \frac{z}{x}$

$x = 16$

$\frac{z}{16} = \frac{18}{z}$

$z^2 = \sqrt{288}$

$z = 12\sqrt{2}$

geo. mean between 2 and

2 ways

Proposition

$\frac{2}{x} = \frac{x}{9}$ $\sqrt{x^2} = \sqrt{18}$

$x = \pm\sqrt{18}$

$x = 3\sqrt{2}$

Equation

$x^2 = ad$

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

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

$x = 3\sqrt{2}$

Simplify $\sqrt{}$

- no perfect $\sqrt{}$ factors in radicand
- no $\sqrt{}$ in the denomator
- no fraction in the radicand