SIMILARITY IN RIGHT TRIANGLES: ADDITIONAL EXAMPLES

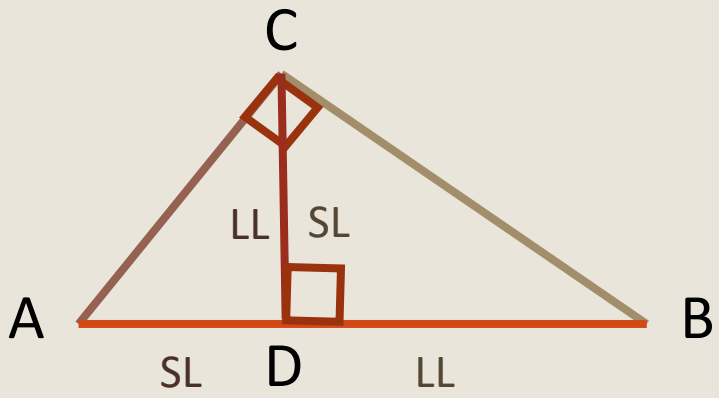
8-1

OBJECTIVE

TO FIND AND USE RELATIONSHIPS IN RIGHT TRIANGLES

VOCABULARY

Geometric Mean Corollary 8-1-2: 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.

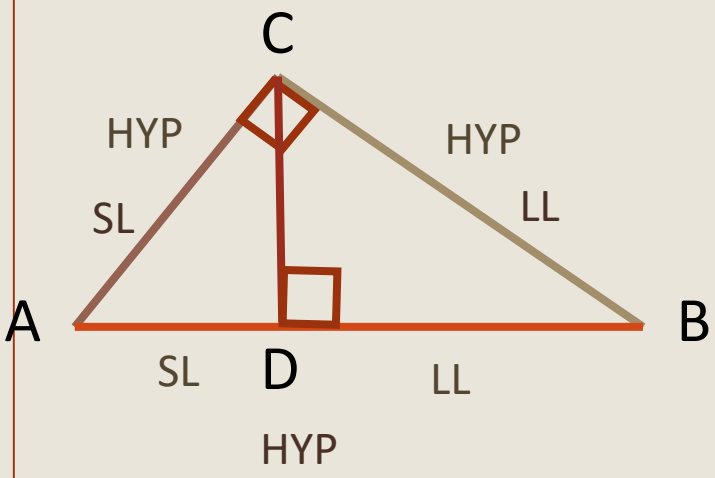


$$\frac{SL}{SL} = \frac{LL}{LL}$$

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

VOCABULARY

Geometric Mean Corollary 8-1-3: Each leg of the original (largest) triangle is the geometric mean of the hypotenuse and the segment of the hypotenuse adjacent to the leg.



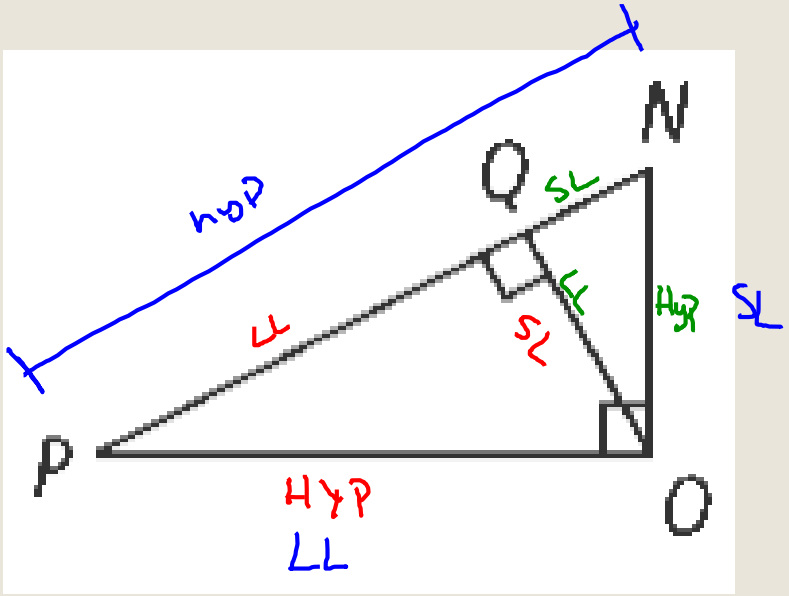
$$\frac{SL}{SL} = \frac{HYP}{HYP} \qquad \frac{AD}{AC} = \frac{AC}{AB}$$

$$\frac{LL}{LL} = \frac{HYP}{HYP} \qquad \frac{DB}{CB} = \frac{CB}{AB}$$

CLASS WORK

Write a similarity statement relating the three triangles in the diagram.

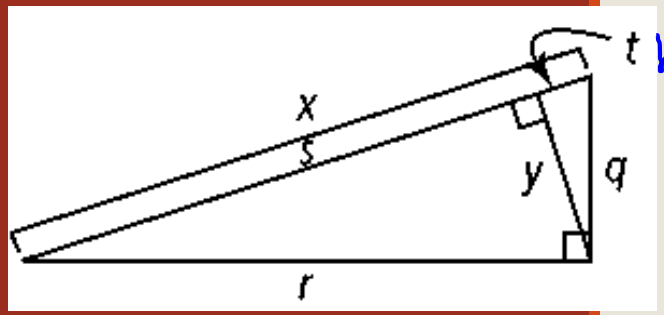
1.



$\triangle NOP \sim \triangle NQO \sim \triangle OQP$

CLASS WORK

Use the figure to complete each proportion.



2. $\frac{s}{y} = \frac{\boxed{y}}{t}$ (LL-med / LL-sm; SL-med / SL-sm)

3. $\frac{\boxed{s}}{r} = \frac{r}{x}$ (LL-med / LL-lg; hyp-med / hyp-lg)

4. $\frac{q}{r} = \frac{\boxed{t}}{y}$ (hyp-sm / hyp-med; SL-sm / SL-med)

CLASS WORK

Find the geometric mean of the pair of numbers.

5. 14 (a) and 6 (b)

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

$$\frac{14}{x} = \frac{x}{6}$$

$\sqrt{x^2} = \sqrt{84}$

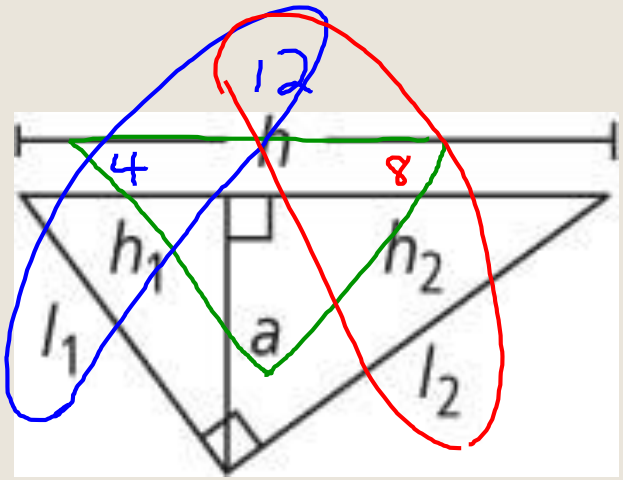
$x = 2\sqrt{21}$

14 = 7 · 2 · 2 · 3

CLASS WORK

6. The diagram shows the parts of a right triangle with an altitude to the hypotenuse. For the two given measures, find the other four. Use simplest radical form.

$h = 12, h_1 = 4$



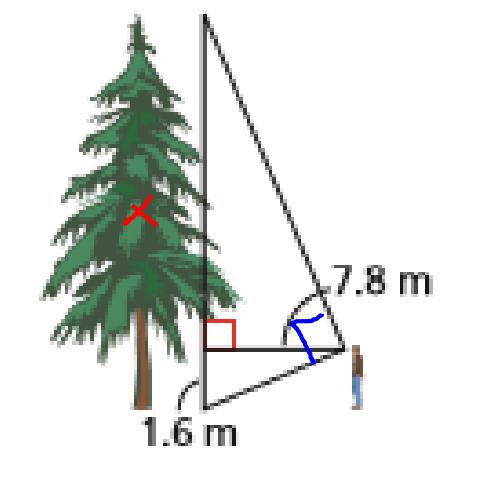
$\frac{4}{a} = \frac{a}{8}$ $\quad \frac{4}{l_1} = \frac{l_1}{12}$ $\quad \frac{8}{l_2} = \frac{l_2}{12}$

$\sqrt{a^2} = \sqrt{32}$ $\quad \sqrt{(l_1)^2} = \sqrt{48}$ $\quad \sqrt{(l_2)^2} = \sqrt{96}$

$a = 4\sqrt{2}$ $\quad l_1 = 4\sqrt{3}$ $\quad l_2 = 4\sqrt{6}$

7. To estimate the height of a Douglas fir, Jan positions herself so that her lines of sight to the top and bottom of the tree form a 90° angle. Her eyes are about 1.6 m above the ground, and she is standing 7.8 m from the tree. What is the height of the tree to the nearest meter?

CLASS WORK



$\frac{x}{7.8} = \frac{7.8}{1.6}$

$1.6x = 60.84$

$x = 38.025$

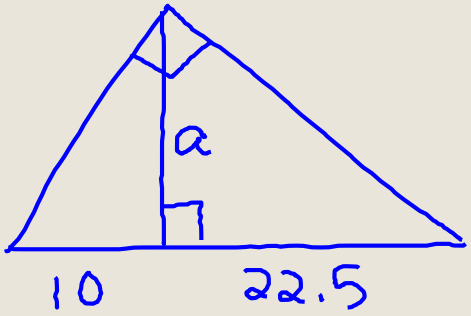
$+ 1.6$

39.625

$\approx 40\text{ m}$

8. The altitude to the hypotenuse of a right triangle divides the hypotenuse into two segments that are 10 in. long and 22.5 in. long. What is the area of the triangle?

CLASS WORK



$$\frac{10}{a} = \frac{a}{22.5}$$

$$a^2 = 225$$

$$a = 15$$

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(32.5)(15)$$

$$A = 243.75\,in^2$$

SUMMARY

THE ALTITUDE TO THE HYPOTENUSE OF A RIGHT TRIANGLE DIVIDES THE TRIANGLE INTO TWO RIGHT TRIANGLES THAT ARE SIMILAR TO EACH OTHER AND TO THE ORIGINAL TRIANGLE.

HOMEWORK

PAGES 537 – 539

16 – 38 EVEN; 42, 48