# 8-1

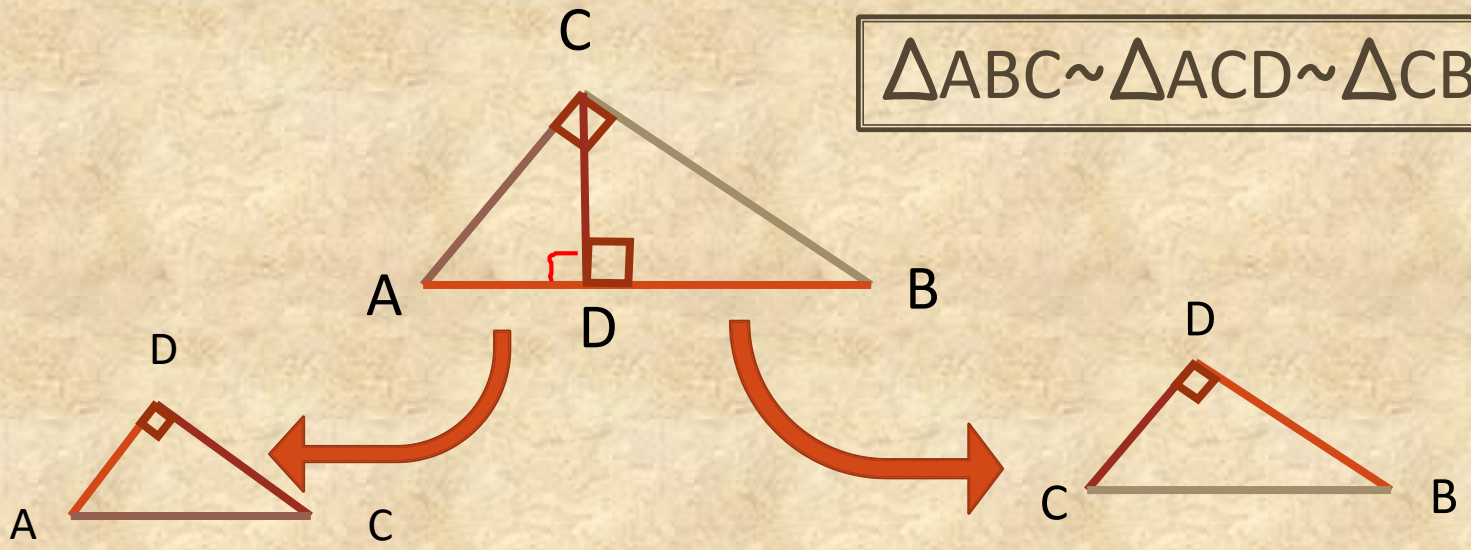
# SIMILARITY IN RIGHT TRIANGLES

# OBJECTIVE

TO FIND AND USE RELATIONSHIPS IN RIGHT TRIANGLES

# VOCABULARY

Theorem 8-1-1: The altitude to the hypotenuse of a right triangle divides the triangle into two triangles that are similar to the original triangle and to each other.

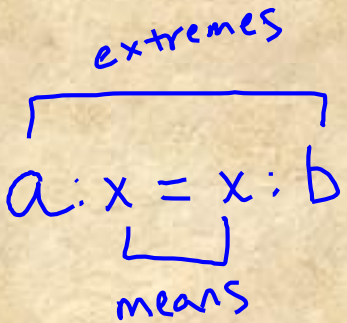



$\Delta ABC \sim \Delta ACD \sim \Delta CBD$

# VOCABULARY

Geometric mean – For any two positive numbers *a* and *b*, the geometric mean of *a* and *b* is the positive number *x* such that:

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



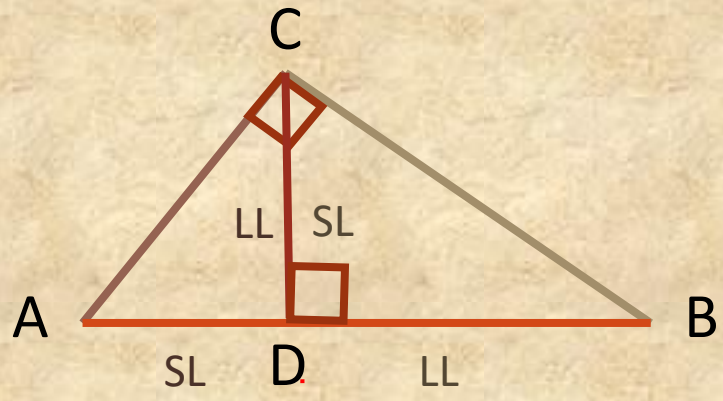

$$x^2 = ab$$

$$x = \sqrt{ab}$$

The positive numbers are the extremes, and x represents both means to show that the means are equal.

# 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.

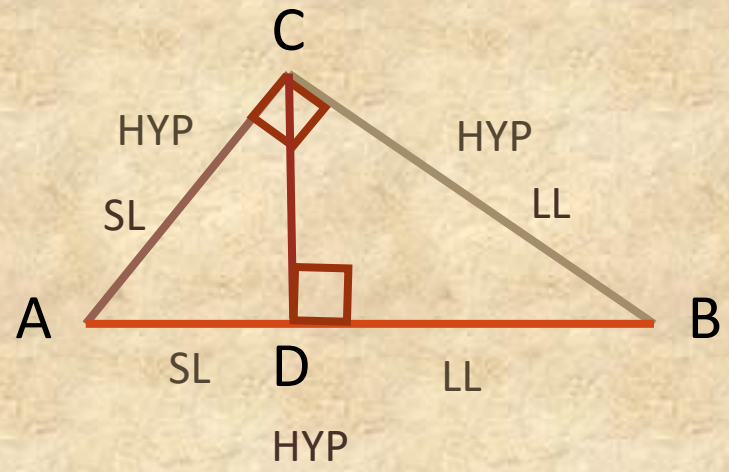



$$\frac{SL}{SL} = \frac{LL}{LL}$$

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

# 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.

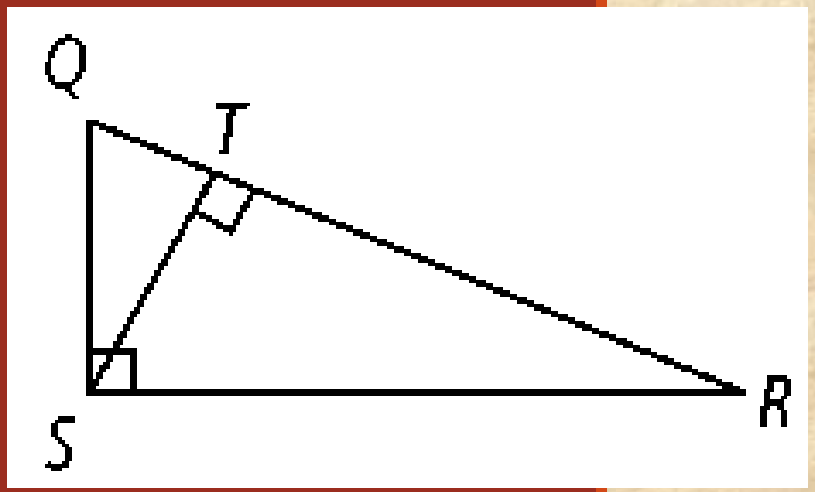



$$\frac{SL}{SL} = \frac{HYP}{HYP} \qquad \frac{AD}{AC} = \frac{AC}{AB}$$

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

# CLASS WORK

**Identify the following in right $\Delta QRS$.**

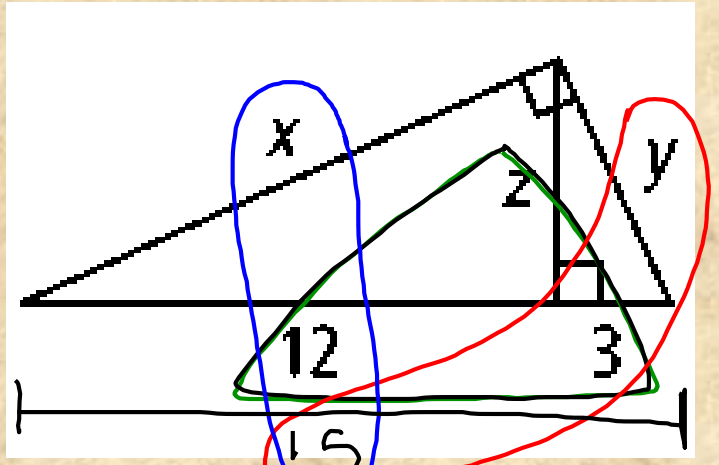



1. the hypotenuse $\overline{QR}$
2. the segments of the hypotenuse $\overline{QT}$ and $\overline{TR}$
3. the altitude to the hyp. $\overline{ST}$
4. the segment of the hypotenuse adjacent to leg $\overline{QS}$ $\overline{QT}$

# CLASS WORK

**Solve for the values of the variables.**

1.




$\frac{12}{x} = \frac{x}{15}$

$\sqrt{x^2} = \sqrt{180}$

$x = 6\sqrt{5}$

$12 = 2 \cdot 2 \cdot 3$

$15 = 3 \cdot 5$

$\frac{3}{y} = \frac{y}{15}$

$\sqrt{y^2} = \sqrt{45}$

$y = 3\sqrt{5}$

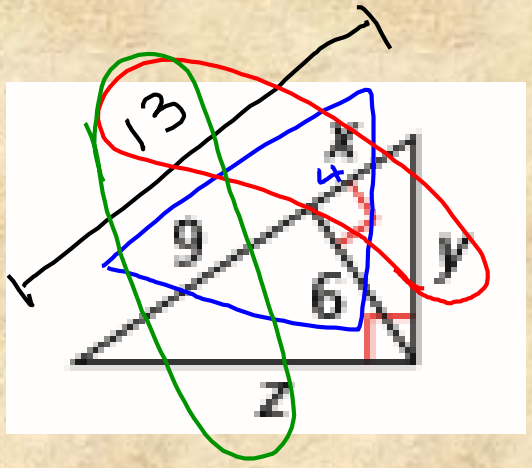
$\frac{12}{z} = \frac{z}{3}$

$z^2 = 36$

$z = 6$

# CLASS WORK

2. Find x, y, and z.




$\frac{9}{6} = \frac{6}{x}$

$9x = 36$

$x = 4$

$\frac{4}{y} = \frac{y}{13}$

$\sqrt{y^2} = \sqrt{52}$

$y = 2\sqrt{13}$

$\frac{9}{z} = \frac{z}{13}$

$\sqrt{z^2} = \sqrt{117}$

$z = 3\sqrt{13}$

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.

# SUMMARY