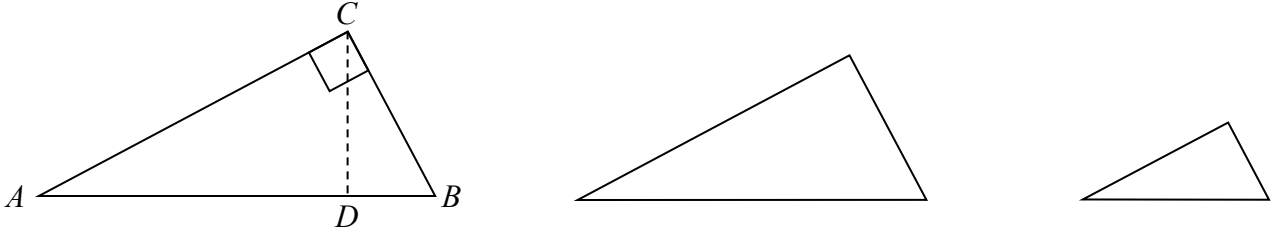# Geometry Notes S - 9: Similarity in Right Triangles

Theorem: The altitude to the hypotenuse of a right triangle forms three similar triangles.

Ex: The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments of length 5 and 8. What is the measure of the altitude?

Ex: In a right triangle, the hypotenuse measures 18 and one leg measures 8. Find the length of the projection of that leg on the hypotenuse.
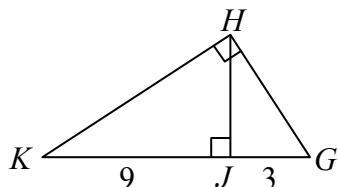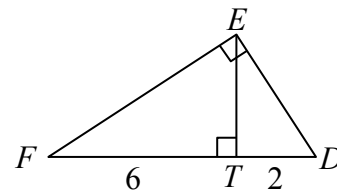
Ex: In a right triangle, the length of the projection of the shorter leg on the hypotenuse is two less than the length of the shorter leg. The length of the projection of the longer leg on the hypotenuse is one less than the length of the shorter leg. Find the lengths of all three sides of the triangle.

Ex: In a right triangle, the hypotenuse measures 25 and the altitude to the hypotenuse measures 10. Find the length of the projection of the shorter leg on the hypotenuse.
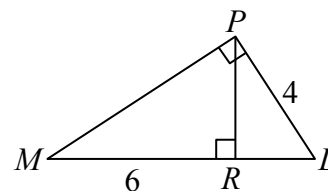
Geometry HW: Similarity - 9

Note: Irrational answers may be left in radical form.

1. ΔDEF is a right triangle with right angle E and altitude $\overline{ET}$. If $DT = 2$ and $TF = 6$, find ET.

2. ΔGHK is a right triangle with right angle H and altitude $\overline{HJ}$. If $GJ = 3$ and $JK = 9$, find GH.

2. ΔLMP is a right triangle with right angle P and altitude $\overline{PR}$. If $LP = 4$ and $RM = 6$, find LR.

4. In a right triangle one leg measures 9 and the projection of that leg on the hypotenuse measures 6. Find the length of the hypotenuse.

5. The legs of a right triangle measure 7 and 24. Find the
   a. length of the projection of the shorter leg on the hypotenuse and
   b. length of the altitude.

6. The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments of lengths 12 and 48. Find the area of the triangle.

R
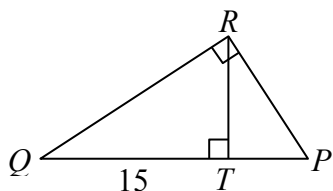
7. In right $\triangle PQR$, $\overline{RT}$ is the altitude to the hypotenuse. If $PT:PR = 2:3$ and $TQ = 15$, find the numerical length of $\overline{PQ}$.

Q ———————— P
15   T

8. $\overline{YS}$ is the altitude to the hypotenuse of right triangle FLY, $FL = 16$ and $YS = \sqrt{48}$. Find FS given that $FS < SL$.

Y

$\sqrt{48}$

F
S
—— 16 ——→

l_1 l_2
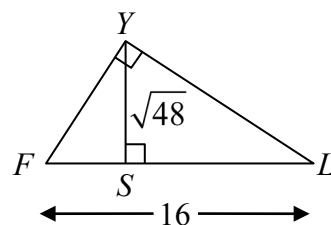
p_1 p_2
←—— h ——→

9. Use the diagram at right to do the following:
   a. Write an equation relating l_1, p_1 and h.
   b. Underneath your first equation, write one relating l_2, p_2 and h.
   c. Add your two equations, factor out h, and figure out what $p_1 + p_2$ equals. Substitute.
   d. What have you just proven?
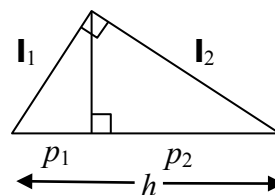
10. Find the value of x in the diagram algebraically.

$x + 3$

x $5x - 6$