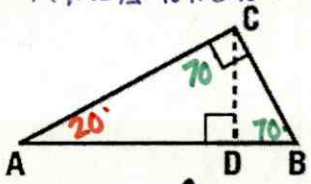
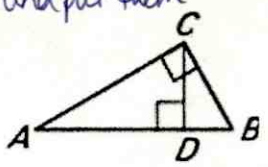
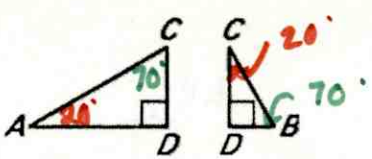
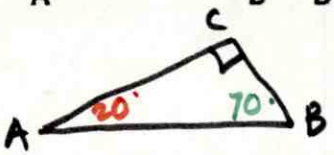
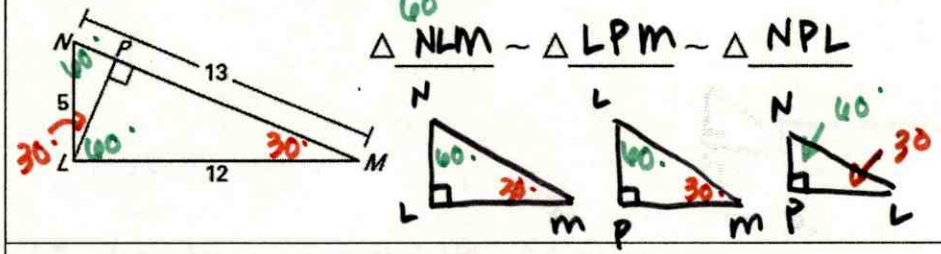
Section 7.3 Date _____

Use Similar Right Triangles

Vocabulary	Definition	Example
THEOREM 7.5	vertex to base and form ⊾ 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.	make up angle measures and put them in the △ to match angles     △CBD ~ △ABC, △ACD ~ △ABC and △CBD ~ △ACD.

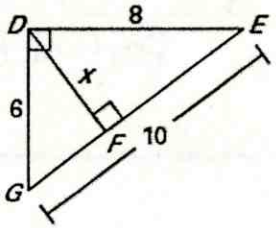
Examples:

Identify the similar triangles in the figure.
(Hint: Draw the 3 triangles seperatly.)



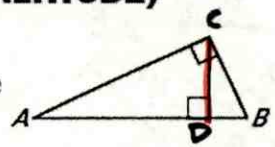
△NLM ~ △LPM ~ △NPL

Identify the similar triangles and then find the value of x.



See back

THEOREM 7.6: GEOMETRIC MEAN (ALTITUDE) THEOREM



In a right triangle, the altitude from the right angle to the hypotenuse divides the hypotenuse into two segments.

The length of the altitude is the geometric mean of the lengths of the two segments. (AD and BD)

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

$(CD)^2 = BD \cdot AD$

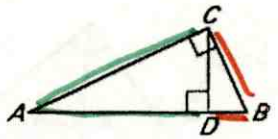
$(alt)^2 = PH_1 \cdot PH_2$

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

$x^2 = ab$

$x = \sqrt{ab}$

THEOREM 7.7: GEOMETRIC MEAN (LEG) THEOREM



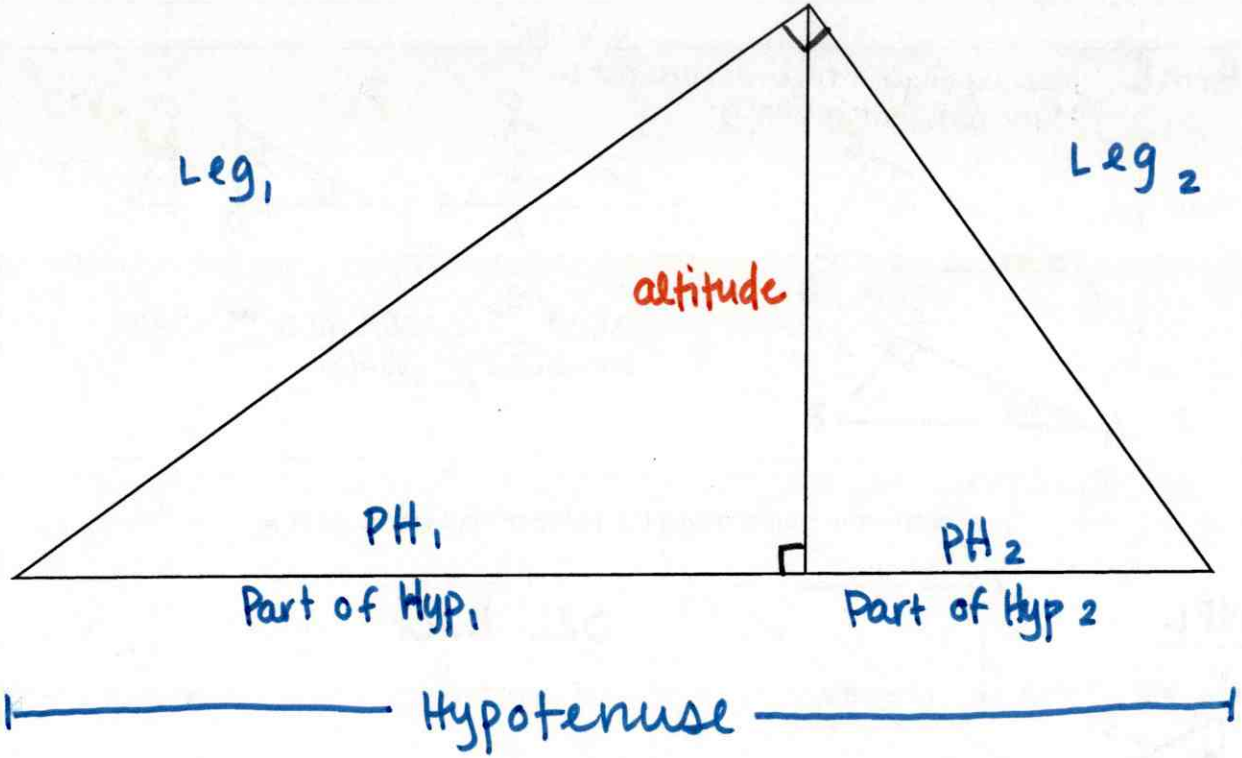
In a right triangle, the altitude from the right angle to the hypotenuse divides the hypotenuse into two segments.

The length of each leg of the right triangle is the geometric mean of the lengths of the hypotenuse and the segment of the hypotenuse that is adjacent to the leg.

$\frac{AB}{CB} = \frac{CB}{BD}$ and $\frac{AB}{AC} = \frac{AC}{AD}$

AC is adjacent to AD
BC is adjacent to BD

$(Leg)^2 = PH \cdot Hyp$



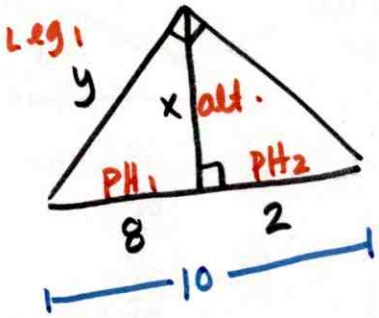
Geometric Mean Altitude

$$(alt)^2 = PH_1 \cdot PH_2$$

Geometric mean Leg

$$(Leg_1)^2 = PH_1 \cdot Hyp$$

$$(Leg_2)^2 = PH_2 \cdot Hyp$$



$(alt)^2 = PH_1 \cdot PH_2$

$x^2 = 8(2)$

$x^2 = 16$

$\boxed{x = 4}$

$(Leg_1)^2 = PH_1 \cdot Hyp$

$y^2 = 8(10)$

$y^2 = 80$

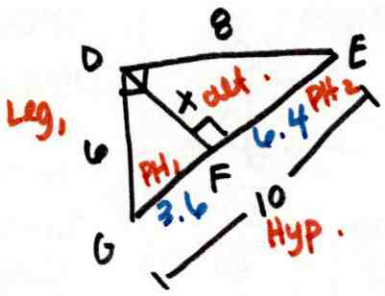
$y = \sqrt{80}$ $\boxed{y = 4\sqrt{5}}$

$80 = 40 \cdot 2$

$40 = 20 \cdot 2$

$20 = 10 \cdot 2$

$10 = 5 \cdot 2$



$(Leg_1)^2 = PH_1 \cdot Hyp$

$6^2 = 10(PH_1)$

$\frac{36}{10} = \frac{10(PH_1)}{10}$

$PH_1 = 3.6$

$PH_2 = Hyp - PH_1$

$PH_2 = 10 - 3.6$

$PH_2 = 6.4$

$(alt)^2 = PH_1 \cdot PH_2$

$x^2 = (3.6)(6.4)$

$x^2 = 23.04$

$\boxed{x = 4.8}$