Sec. 8.1 - Geometric Mean

Geometric Mean

The geometric mean of two positive #'s a & b is the number x such that $\frac{a}{x} = \frac{x}{b}$

So, $x^2 = ab$ **&** $x = \sqrt{ab}$.

Find the geometric mean between 2 & 50.

$$\frac{2}{x} = \frac{x}{50}$$

$$2 \cdot 50 = x \cdot x$$

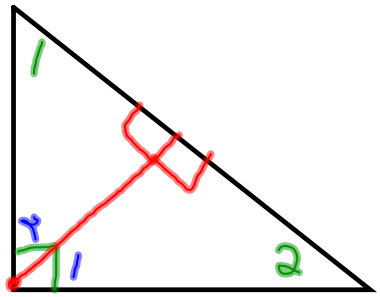
$$\sqrt{100} = \sqrt{x^2}$$

$$10 = x$$

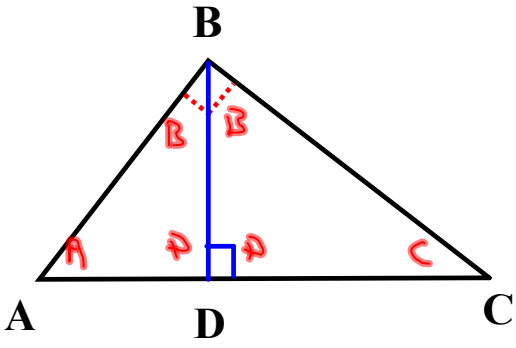
- In pairs, work on exploration, # 1-4.

- Each pair needs a set of triangles.

- Mark each triangle carefully.



In triangle ABC, BD is an altitude to hypotenuse AC. Identify the similar triangles

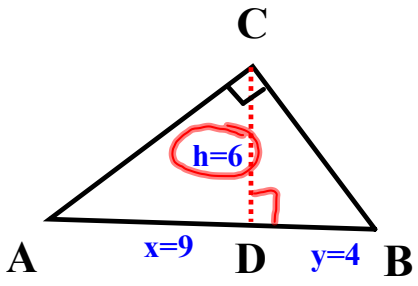


$\triangle ABC \sim \triangle ADB \sim \triangle BDC$

$$\frac{AD}{BD} = \frac{DB}{DC}$$

Geometric Mean (altitude) Theorem

Thm. 8.2 - **If the altitude is drawn to the hypotenuse of a right triangle, then the measure of the altitude is the geometric mean between the measures of the parts of the hypotenuse.**



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

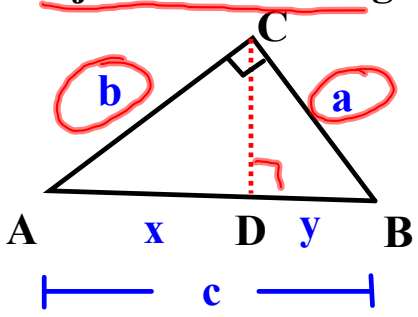
$$\frac{9}{6} = \frac{6}{4}$$

$$9 \cdot 4 = 6 \cdot 6$$

$$36 = 36$$

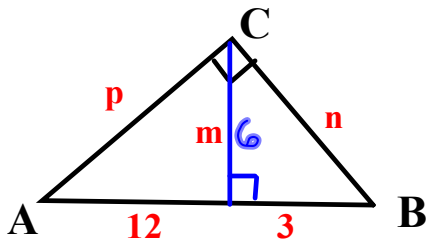
Geometric Mean (leg) Theorem

Thm. 8.3 - **The altitude drawn to the hypotenuse of a right triangle separates the hypotenuse into tow segments. The length of a leg of this triangle is the geometric mean between the length of the hypotenuse & the segment of the hypotenuse adjacent to that leg.**



$$\frac{c}{b} = \frac{b}{x} \quad \text{or} \quad \frac{c}{a} = \frac{a}{y}$$

Find the lengths of m, n, & p.



① Find m. $\frac{12}{m} = \frac{m}{3}$

$\sqrt{m^2} = \sqrt{36}$

$m = 6$

② Find p. $\frac{12}{p} = \frac{p}{15}$

$p^2 = 12 \cdot 15$

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

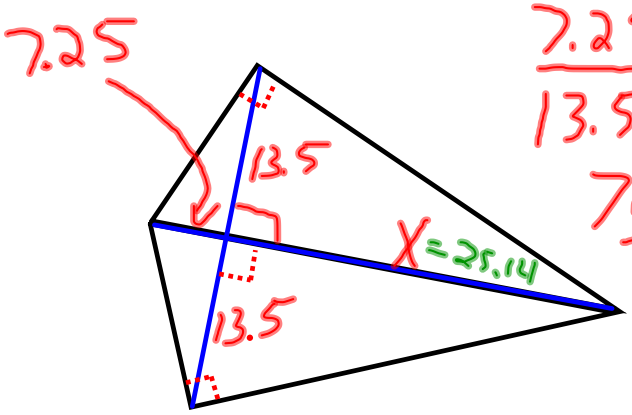
$p = \sqrt{180} \approx 13.4$

③ Find n: $\frac{15}{n} = \frac{n}{3}$

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

$n = \sqrt{45} \approx 6.7$

Mrs. Webb is making a kite for her son. She has to arrange two support rods so that they are perpendicular. The shorter rod is 27 inches long. If she places the short rod 7.25 inches from one end of the long rod in order to form two right angles with the kite fabric, what is the length of the long rod?



$\frac{7.25}{13.5} = \frac{13.5}{x}$

$\frac{7.25x}{7.25} = \frac{182.25}{7.25}$

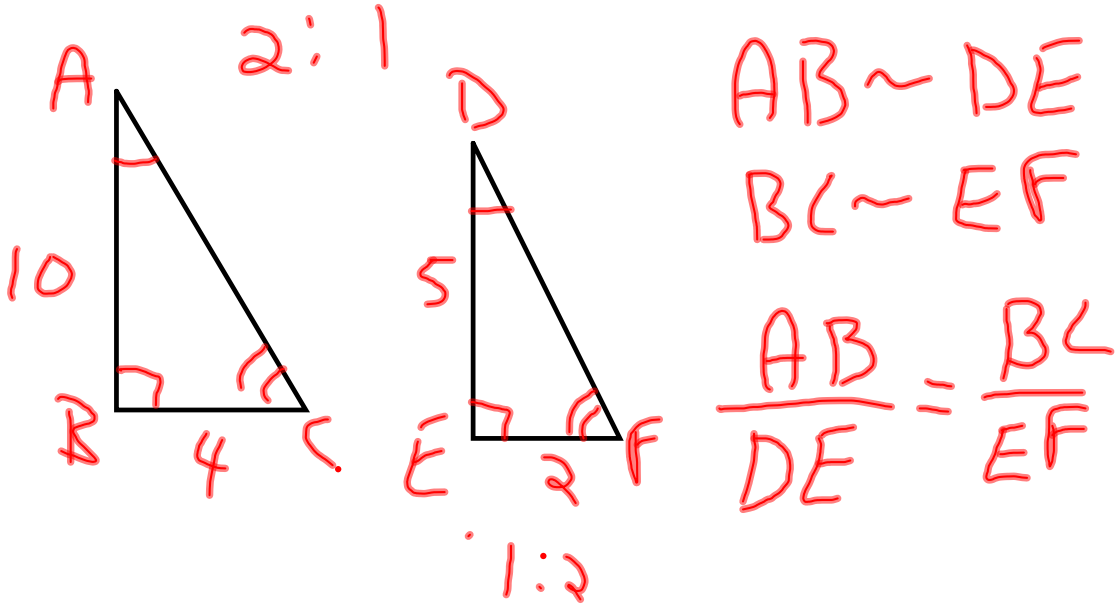
$x = 25.14$

$25.14 + 7.25 = 32.39$ in

Homework:

p.535, # ~~8-14 even~~, 19, 21, 22, 24, ~~26~~, 29, 34, 36, 50, ~~54-57 all, 64~~

14, 19, 21, 22, 24, 29, 34, 36, 50



2 : 1

1 : 2

$AB \sim DE$

$BC \sim EF$

$\frac{AB}{DE} = \frac{BC}{EF}$