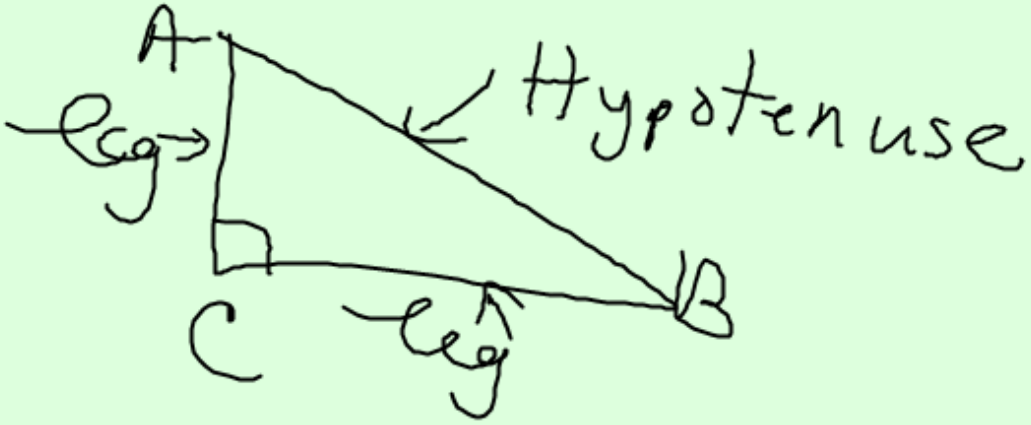
Lesson 8-1

# Geometric Mean


You will find the geometric mean between two numbers

You will solve problems involving relationships between parts of a right triangle and the altitude to its hypotenuse



# Geometric Mean

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

If $x$ is geometric mean of $a$ & $b$

Find the geometric mean of 2 and 8.

$$\frac{2}{x} = \frac{x}{8}$$

$$x^2 = 16$$

$$x = \sqrt{16} = 4$$

**Find the geometric mean between 2 and 50.**

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

$$x^2 = 100$$

$$x = \sqrt{100} = 10$$

**Find the geometric mean between 3 and 12.**

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

$$x^2 = 36$$

$$x = \sqrt{36} = 6$$

Find geometric mean of 4 and 6

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

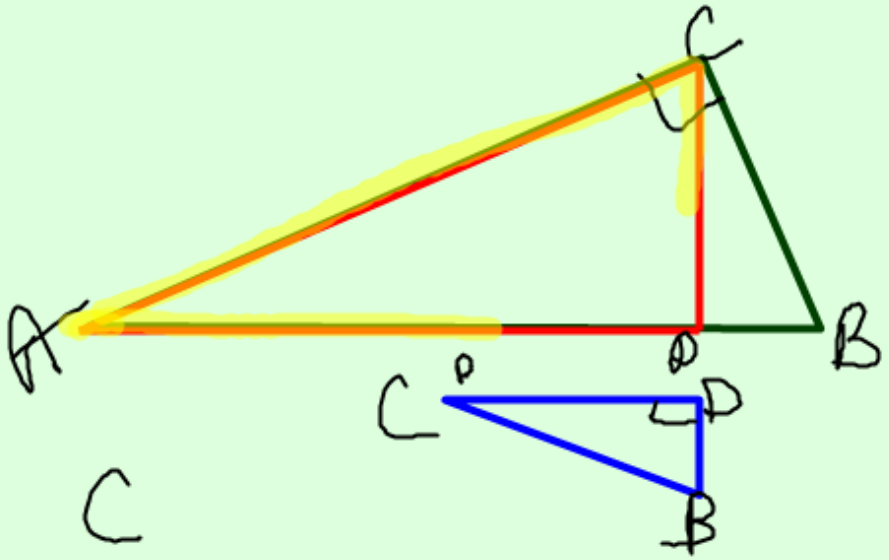
$$x^2 = 24$$

$$x = \sqrt{24}$$

$$x = \sqrt{4}\sqrt{6}$$

$$x = 2\sqrt{6}$$

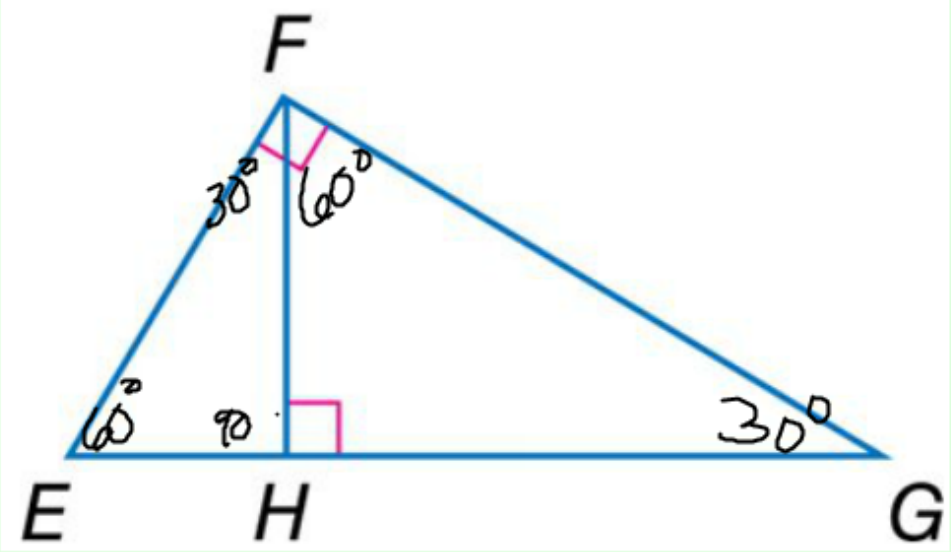
If CD is the altitude to hypotenuse of a right $\Delta$ then the two smaller $\Delta$'s formed are similar to the original triangle and to each other




largest
med.

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

Write a similarity statement identifying the three similar triangles in the figure.




$\triangle EFG \sim \triangle EHG \sim \triangle EHF$

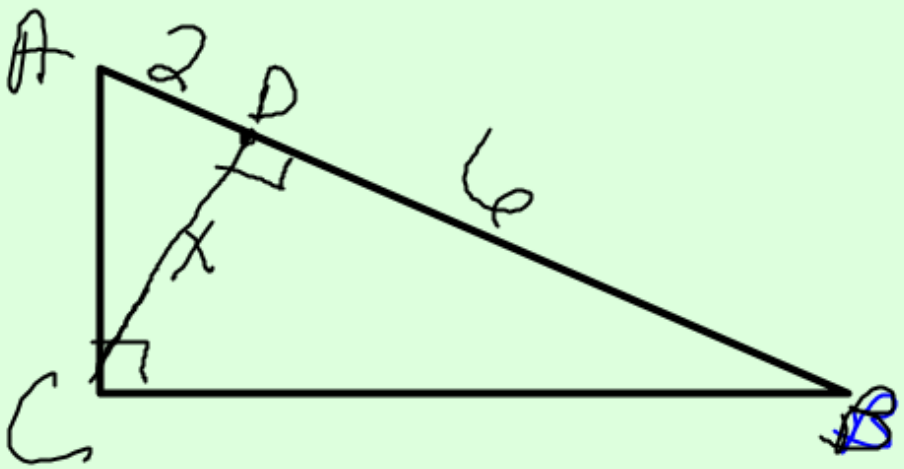
60° 90° 30°

60° 90° 30°

60° 90° 30°

# Geometric Means in a Right Triangle

1) The altitude is the geometric mean between the 2 parts of the hypotenuse




$$\frac{2}{x} = \frac{x}{6}$$

$$x^2 = 12$$

$$x = \sqrt{12}$$

$$x = \sqrt{4}\sqrt{3}$$

$$x = 2\sqrt{3}$$

# Geometric Mean in a Right Triangle

2) A leg of the big right triangle is the geometric mean of the hypotenuse (of the big triangle) to the part of the hypotenuse touching that leg

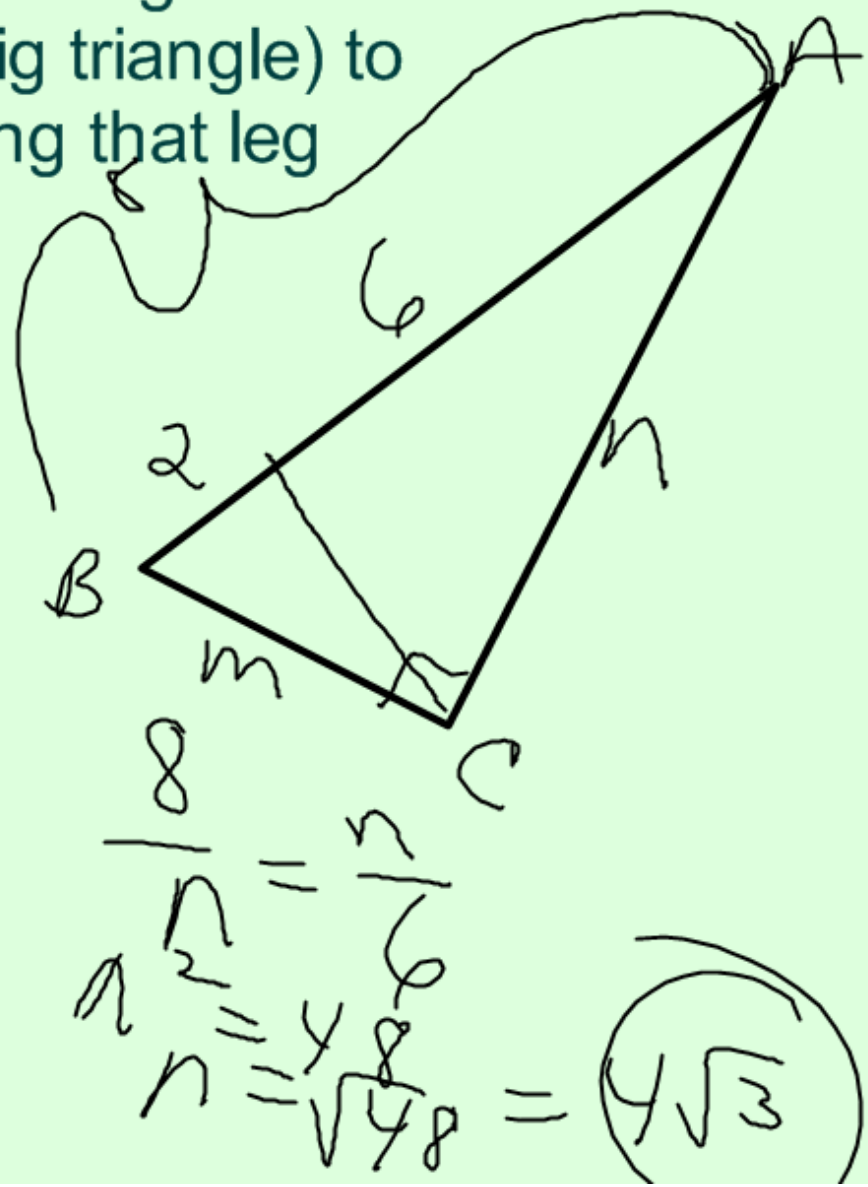
whole hyp

$$\frac{8}{m} = \frac{m}{2}$$ ← leg

← part touching

$m^2 = 16$

$m = 4$

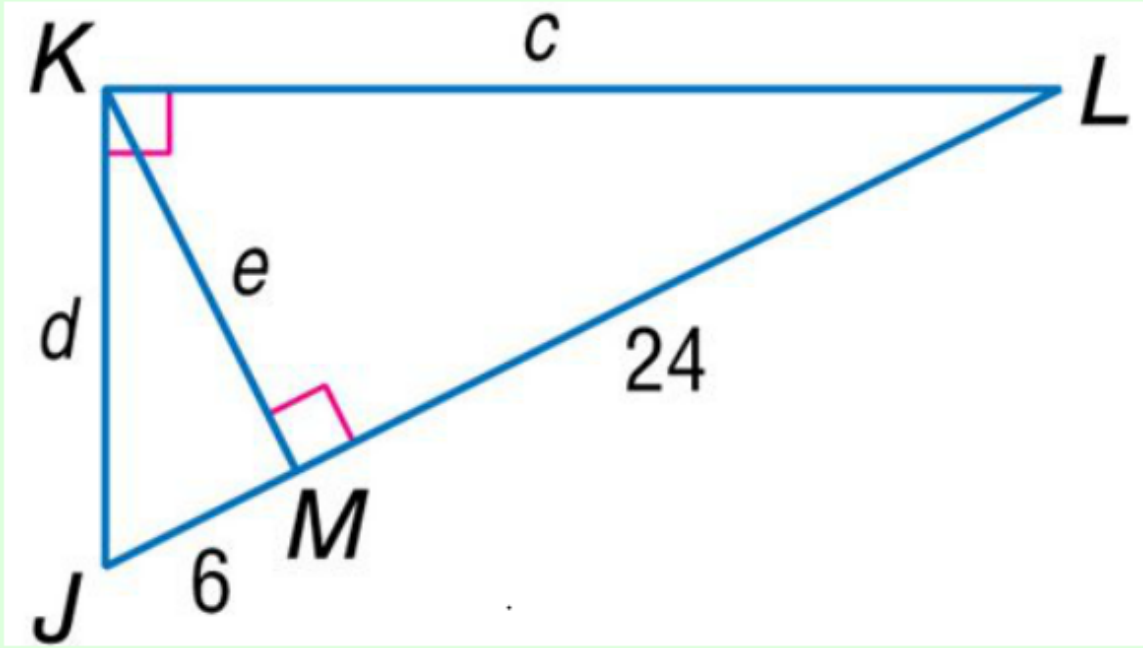



$$\frac{8}{n} = \frac{n}{6}$$

$n^2 = 48$

$n = \sqrt{48} = 4\sqrt{3}$

# Find *c*, *d*, and *e*.




$$\frac{30}{d} = \frac{d}{6}$$

$$d^2 = 180$$

$$d = \sqrt{180}$$

$$d = \sqrt{9}\sqrt{20}$$

$$= 3\sqrt{20}$$

$$= 3\sqrt{4}\sqrt{5}$$

$$= 3 \cdot 2\sqrt{5}$$

$$d = 6\sqrt{5}$$

$$\frac{30}{c} = \frac{c}{24}$$

$$c^2 = 720$$

$$c = \sqrt{720}$$

$$= \sqrt{36}\sqrt{20}$$

$$= 6\sqrt{4}\sqrt{5}$$

$$= 6 \cdot 2\sqrt{5}$$

$$= 12\sqrt{5}$$

$$\frac{6}{e} = \frac{e}{24}$$

$$e^2 = 144$$

$$e = 12$$

# Find *e* and *f* to the nearest tenth

$\frac{20}{e} = \frac{e}{16}$

$e^2 = 320$

$e = \sqrt{320}$

$e = 8\sqrt{5}$

$\frac{20}{f} = \frac{f}{4}$

$f^2 = 80$

$f = \sqrt{80}$

$f = \sqrt{16}\sqrt{5}$

$f = 4\sqrt{5}$