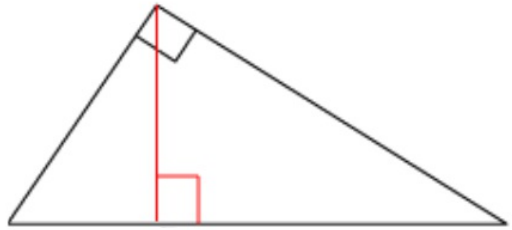
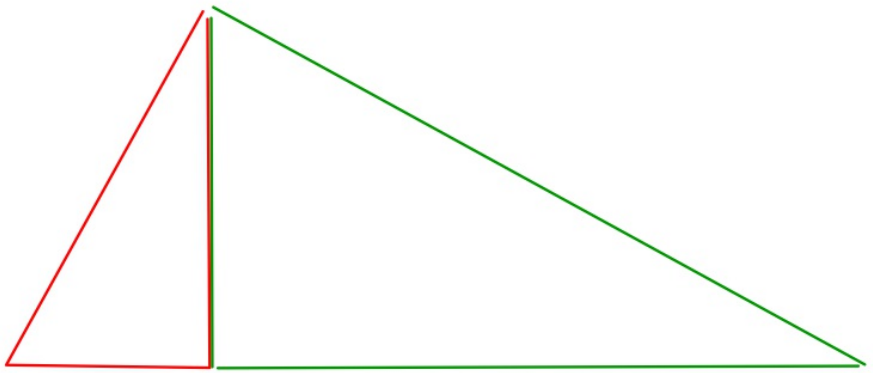
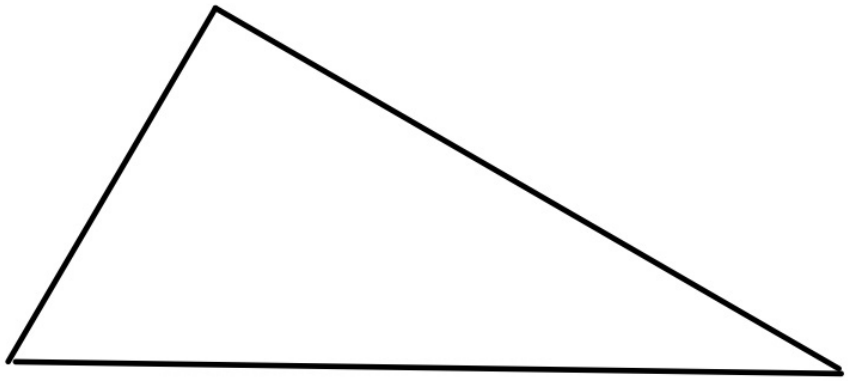
[If needed, trim paper so it is rectangular]

1. Cut rectangle across 1 diagonal, creating congruent right triangles.
2. Create altitude on one of the triangles.



3. Cut along this altitude. You should now have 3 triangles.
4. What do you notice about the 3 triangles? What do you wonder?



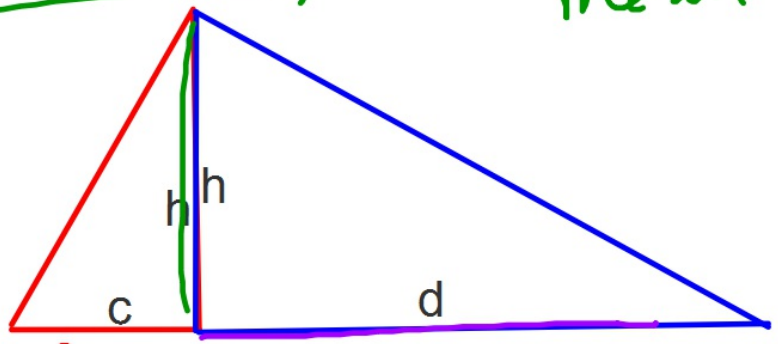


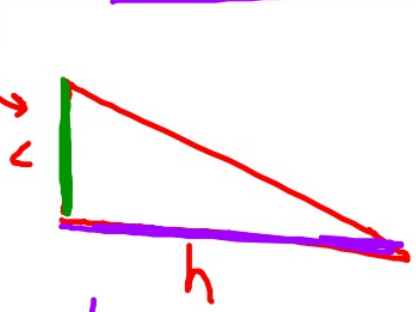
They're all
similar to
each other!

AA~

Self-Similarity / Geometric mean

[Draw this in notes]



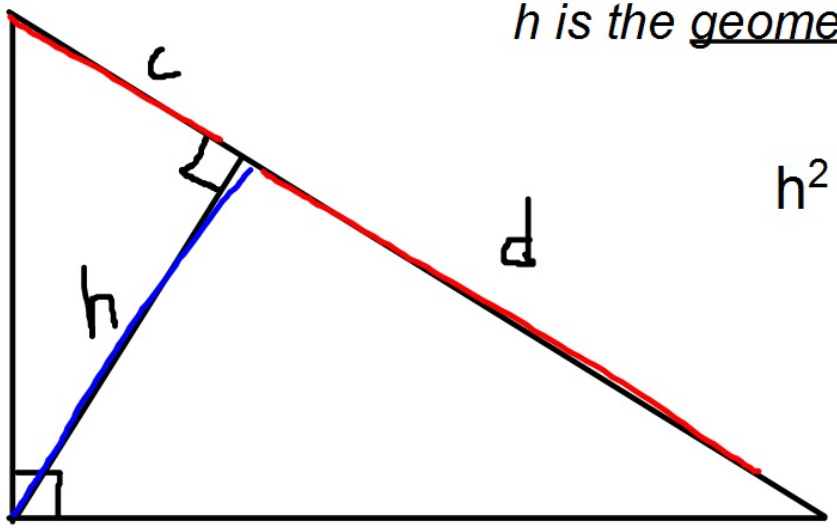


$$\frac{c}{h} = \frac{h}{d} \rightarrow \sqrt{c \cdot d} = \sqrt{h^2}$$

Geometric mean

$$h = \sqrt{c \cdot d}$$

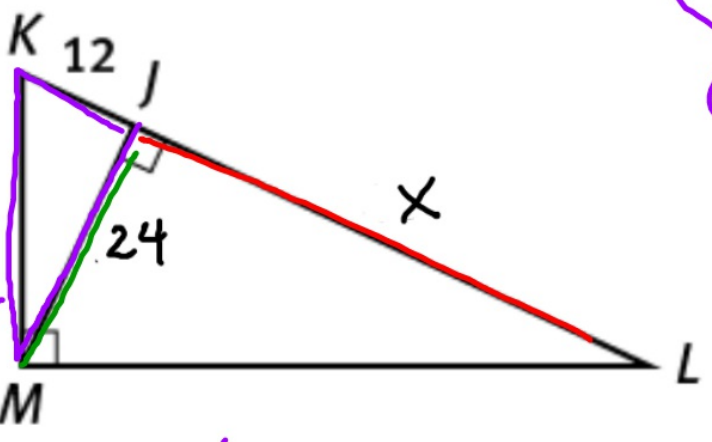
Geometric Mean Formula

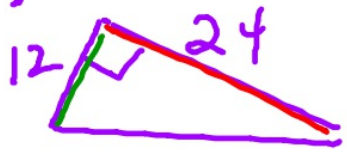


h is the geometric mean of c and d

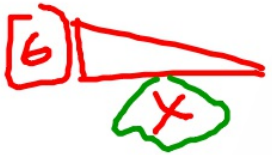
$h^2 = c*d$ or, $h = \sqrt{cd}$

Find the value of x in each

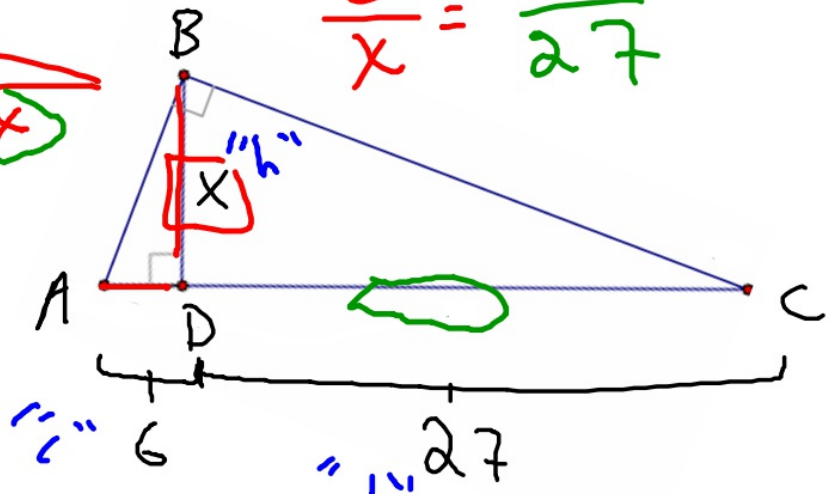




$$\frac{12}{24} = \frac{24}{x} \Rightarrow 12x = 576 \Rightarrow x = 48$$



$$\frac{6}{x} = \frac{x}{27}$$



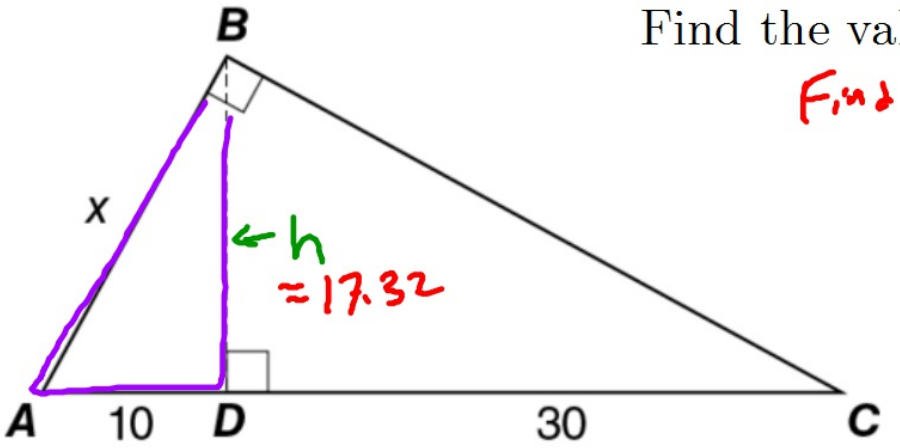
$$h = \sqrt{c \cdot d}$$

$$x = \sqrt{6 \cdot 27}$$

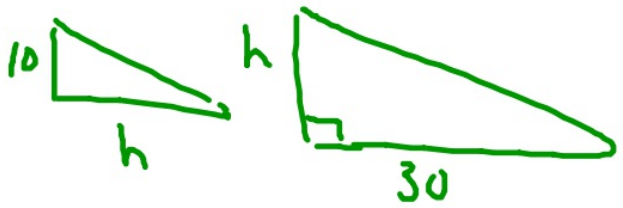
$$x = \sqrt{162} \approx 12.7$$

AB

Find the value of x



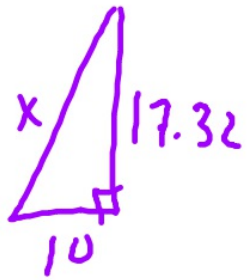
Find h first!



$h = \sqrt{c \cdot d}$ or, use $\frac{10}{h} = \frac{h}{30}$

$h = \sqrt{10 \cdot 30}$

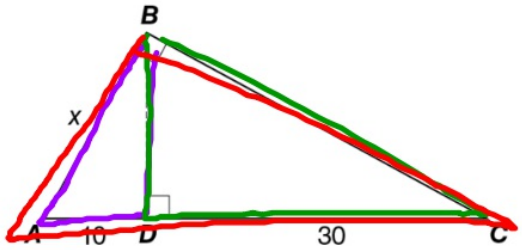
$h = \sqrt{300} \approx 17.32$



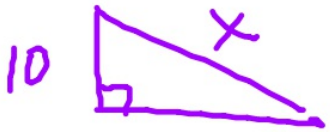
$10^2 + 17.32^2 = x^2$

$100 + 300 = x^2 \rightarrow \sqrt{400} = \sqrt{x^2} \rightarrow x = 20$

OR...

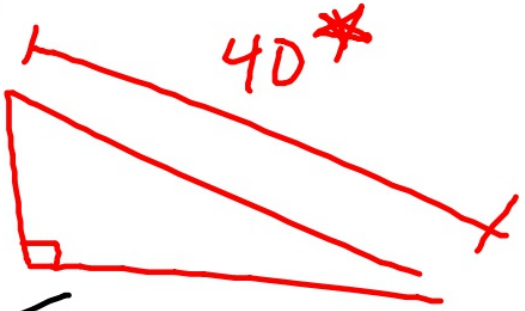


Small:



med:

Large



$$\frac{10}{x} = \frac{x}{40} \rightsquigarrow 400 = x^2$$

$$\sqrt{400} = x$$

$20 = x$

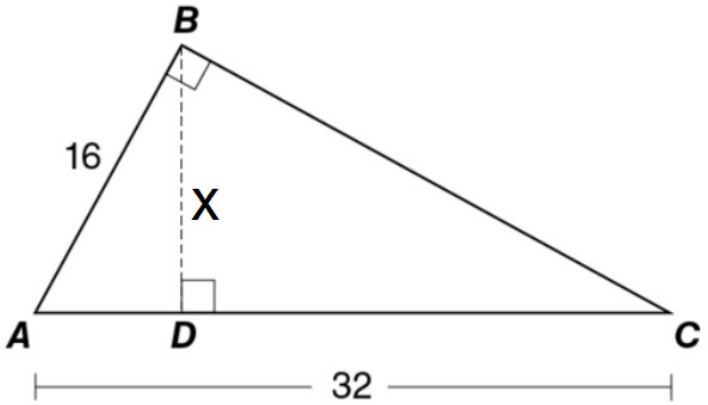
Whoa!

B

HW:

p. 281 #6-9

Bonus challenge for the intrepid :)



How can this work in the real world? Why is it called a "mean"?

A

You are shopping for your first car and find the following two used models for otherwise identical, identically priced Hondas. You want to balance attractiveness and reliability.

Cosmetic condition: 3/5
Mechanical condition:
passed 202 of 250 checks

Cosmetic condition: 4/5
Mechanical condition:
passed 183 of 250 checks.

Which one do you buy? How can you support your decision?

Cosmetic condition: 3/5
Mechanical condition:
passed 202 of 250 checks

Cosmetic condition: 4/5
Mechanical condition:
passed 183 of 250 checks.

Typical average (arithmetic mean)

$$\frac{202 + 3}{2} = 102.5$$

$$\frac{183+4}{2} = 93.5$$

But are mechanical and cosmetic treated equally??

Cosmetic condition: 3/5
Mechanical condition:
passed 202 of 250 checks

Cosmetic condition: **0**/5
Mechanical condition:
passed 202 of 250 checks

$$\frac{202 + 3}{2} = 102.5$$

$$\frac{202+0}{2} = 101$$

Very close! But one car SUCKS

Averaging two numbers that are on different scales gives one of them an unfair weight.

This is where geometric mean can help.

Cosmetic condition: 3/5
Mechanical condition:
passed 202 of 250 checks

Cosmetic condition: 4/5
Mechanical condition:
passed 183 of 250 checks.

Find the geometric mean for each car's scores.

$$h = \sqrt{c*d}$$

$$h = \sqrt{202*3}$$

24.6

$$h = \sqrt{c*d}$$

$$h = \sqrt{183*4}$$

27.1

HW:

p. 281 #6-9

Bonus challenge for the intrepid :)