Geometry – Mr. Bo
Unit 7 – Day 4 Notes

Name______________________

Proportions in Triangles

Geometric Mean: a number, x, between a and b such that $\frac{a}{x} = \frac{x}{b}$.

exs 3 and 10

$\frac{3}{x} = \frac{x}{10}$

$x^2 = 30$

$\boxed{x = \sqrt{30}}$ ← Geometric mean.

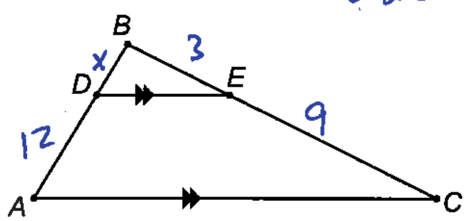
exs 12 is geo. mean between 8 and ?

$\frac{8}{12} = \frac{12}{b}$

$8b = 144$

$\boxed{b = 18}$

Triangle "Side Splitter" Theorem: a line parallel to one side of a Δ, cuts the other 2 sides proportionally.



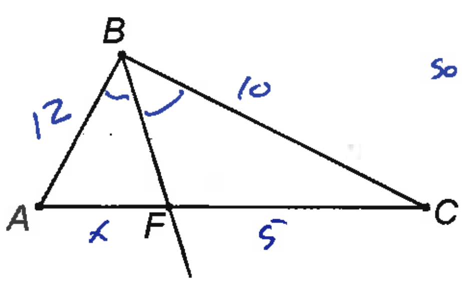
So: $\boxed{\frac{BD}{DA} = \frac{BE}{EC}}$ or $\boxed{\frac{BD}{BA} = \frac{BE}{BC}}$ or $\boxed{\frac{DA}{BA} = \frac{EC}{BC}}$

exs $\frac{x}{12} = \frac{3}{9}$

$9x = 36$

$\boxed{x = 4}$

Triangle "Angle Splitter" Theorem: If an angle of a Δ is bisected then the opposite side is cut proportionally to the other 2 sides.



So: $\boxed{\frac{AF}{AB} = \frac{FC}{BC}}$

exs find x

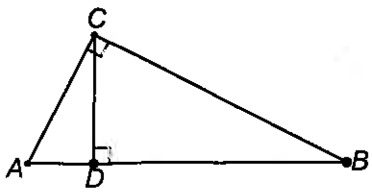
$\frac{x}{12} = \frac{5}{10}$

$10x = 60$

$\boxed{x = 6}$

Proportions in Right Triangles

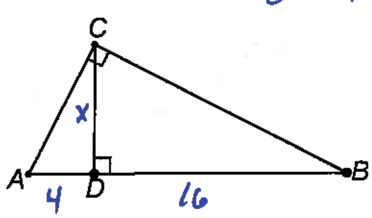
"Right Triangle Splitter" Theorem: the altitude to the hypotenuse of Right Δ splits the Δ into 2 Right Δ's each similar to the original Δ.



so: $\underset{\text{small}}{\triangle ADC} \sim \underset{\text{large}}{\triangle ACB}$

$\underset{\text{medium}}{\triangle CDB} \sim \underset{\text{large}}{\triangle ACB}$

"Altitude Rule": Altitude is the geometric mean between the 2 parts of the hypotenuse of the Right Δ.



So, part → $\dfrac{AD}{CD} = \dfrac{CD}{DB}$ ← altitude = mean; DB ← part

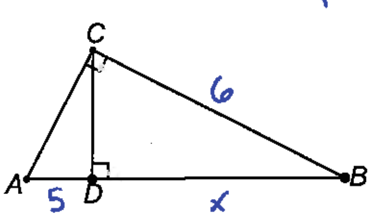
ex) find x.

$\dfrac{4}{x} = \dfrac{x}{16}$ ← mean

$64 = x^2$

$\boxed{x = 8}$

"Leg Rule": Leg is the geometric mean between the whole hypotenuse and the part of the hypotenuse touching the leg of the Right Δ.



So, part → $\dfrac{DB}{CB} = \dfrac{CB}{AB}$ ← leg = mean; AB ← whole hypot.

ex) Find x:

part → $\dfrac{x}{6} = \dfrac{6}{5+x}$ ← mean; 5+x ← whole

$36 = x(5+x)$
$36 = x^2 + 5x$
$0 = x^2 + 5x - 36$
$0 = (x+9)(x-4)$
$x = -9$ or $\boxed{x = 4}$

36, 1
18, 2
12, 3
9, 4 = 5
6, 6