Right Triangles – Geometric Mean

Notes Section 8.3 Name_____

Geometric Mean: The geometric mean between two positive numbers, *a* and *b*, is the positive number *x* where $\frac{x}{a} = \frac{b}{x}$.

By multiplying both sides by the denominators, we can see that $x^2 = ab$.

Example of why $x^2 = ab$: Find geometric mean of 5 and 20

$\frac{x}{5} = \frac{20}{x}$

$x^2 = 100$

$x = \pm\sqrt{100}$

$x = 10$ must be +

Find the geometric mean, x, for each of the following pairs of numbers.

#1) 6 and 27

$x^2 = 6(27)$

$x = \pm\sqrt{6(27)}$

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

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

$x = 9\sqrt{2}$

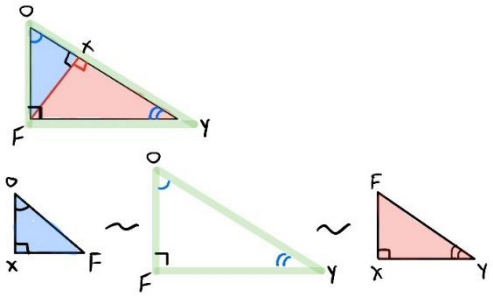
#2) $\frac{3}{2}$ and $\frac{2}{3}$

$x^2 = \frac{3}{2}\left(\frac{2}{3}\right)$

$x = \pm\sqrt{1}$

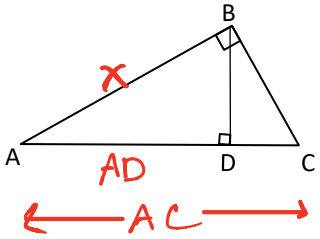
$x = 1$

Theorem 8-1: If the altitude is drawn from the vertex of the right angle of a right triangle to its hypotenuse, then the two triangles formed are similar to the given triangle and each other.



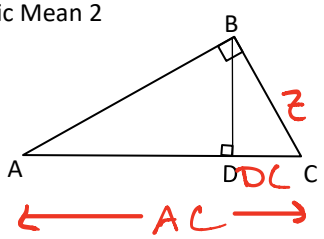
This theorem leads us to 3 specific geometric means.

Geometric Mean 1



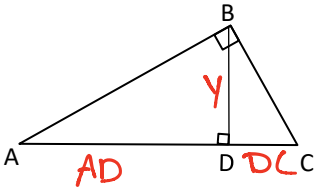
$x^2 = AD \cdot AC$

Geometric Mean 2



$z^2 = DC \cdot AC$

Geometric Mean 3



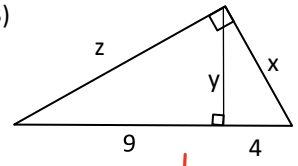
$y^2 = AD \cdot DC$

Right Triangles – Geometric Mean

Notes Section 8.3 Name_____

Find the values of x, y and z.

#3)



$z^2 = 9 \cdot 13$

$z^2 = 117$

$z = \sqrt{117}$

$y^2 = 4 \cdot 9$

$y^2 = 36$

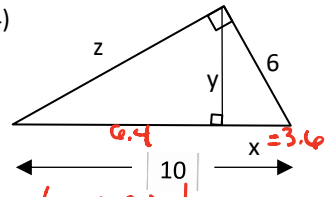
$y = 6$

$x^2 = 4 \cdot 13$

$x^2 = 52$

$x = \sqrt{52}$

#4)



$z^2 = (6.4)(10)$

$z^2 = 64$

$z^2 = 8$

$y^2 = 3.6(6.4)$

$y^2 = 23.04$

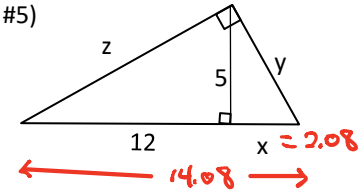
$y = \sqrt{23.04}$

① $6^2 = x \cdot 10$

$36 = 10x$

$3.6 = x$

#5)



$z^2 = 12(14.08)$

$z^2 = 168.96$

$z = \sqrt{168.96}$

① $5^2 = x(12)$

$25 = 12x$

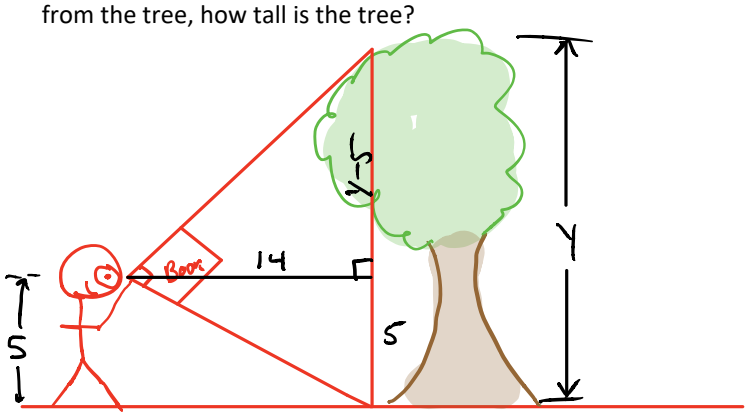
$2.08 = x$

$y^2 = 2.08(14.08)$

$y^2 = 29.29$

$y = \sqrt{29.29}$

#6) The find the height of the tree in his backyard, KK Slider held the corner of a book near his eye so that the top and bottom of the tree were in line with two edges of the book. If KK's eye is 5 feet off the ground and he is standing 14 feet from the tree, how tall is the tree?



$14^2 = (y-5)5$

$196 = 5y - 25$

$171 = 5y$

$\frac{171}{5} = y$

$34.2 = y$

The tree is 34.2 feet tall.