Lesson 8-3: Geometric Mean - Hypotenuse-Leg Rule

AGENDA:

- Check HW 8.2
- Finish Notes from 8.2
- Notes 8.3 with Applications and Guided Practice

HOMEWORK:

- Text p. 521 #13 (solve for z, (w/o x) ,
  15 Find MQ(w/ MP =10 and MN = 21) 24, 29, 41
- Mini Quiz - Next Class
- CR#7 is Due Monday 3/20

$(6\sqrt{2})(6\sqrt{2}) = (6\cdot 6)(\sqrt{2}\sqrt{2})$

$36 \cdot 2$

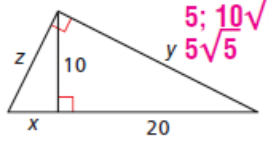
72

$\sqrt{3}\sqrt{3} = \sqrt{9} = 3$

$(\sqrt{3})^2 = 3$

Find the geometric mean of each pair of numbers. If necessary, give the answer in simplest radical form.

9. 16 and 25 20

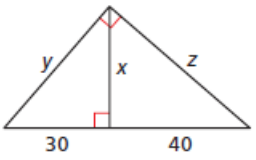
12. 

5; $10\sqrt{5}$; 13. $5\sqrt{5}$

Write a similarity statement comparing the three triangles in each diagram.

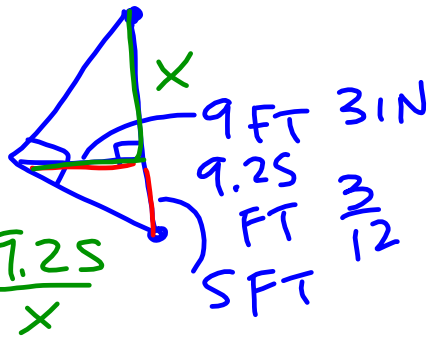
15. 

$\triangle MPN \sim \triangle PQN \sim \triangle MQP$

25. 

$20\sqrt{3}$; $10\sqrt{21}$; $20\sqrt{7}$

27. **Measurement** To estimate the height of the Taipei 101 tower, Andrew stands so that his lines of sight to the top and bottom of the tower form a 90° angle. What is the height of the tower to the nearest foot? 1670 ft



28. The geometric mean of two numbers is 8. One of the numbers is 2. Find the other number. 32

$\frac{5}{9.25} = \frac{9.25}{x}$

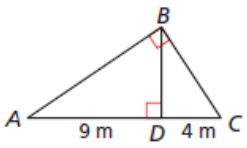
$5x = (9.25)^2$ $+5 =$ HEIGHT

42. The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments that are 2 cm long and 5 cm long. Find the length of the altitude to the nearest tenth of a centimeter. 3.2 cm

48. What is the area of $\triangle ABC$?

Ⓕ 18 square meters Ⓗ 39 square meters

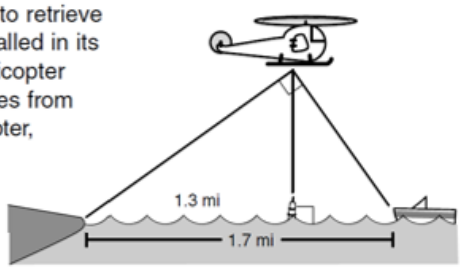
Ⓖ 36 square meters Ⓙ 78 square meters



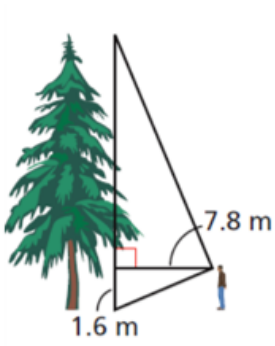
From Notes 8.2

Using the Geometric Mean in Word Problems

The Coast Guard has sent a rescue helicopter to retrieve passengers off a disabled ship. The ship has called in its position as 1.7 miles from shore. When the helicopter passes over a buoy that is known to be 1.3 miles from shore, the angle formed by the shore, the helicopter, and the disabled ship is 90°. Determine what the altimeter would read to the nearest foot when the helicopter is directly above the buoy.



From Notes 8.2



To estimate the height of a Douglas fir, Jan positions herself so that her lines of sight to the top and bottom of the tree form a 90° angle. Her eyes are about 1.6 m above the ground, and she is standing 7.8 m from the tree. What is the height of the tree to the nearest meter?

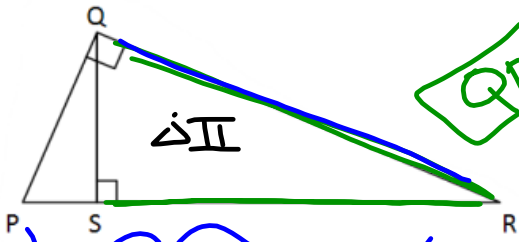
Geometry LAB Name: _____ Section: _____ Date: _____

Lesson 8-3 Notes: Similarity in Right Triangles and the Geometric Mean – Hypotenuse-Leg Rule

My Legend
- ❑Short Leg
- ❑Long Leg
- ❑Hypotenuse

Relationship 2 – Hypotenuse-Leg

ΔIII



QR

ΔII

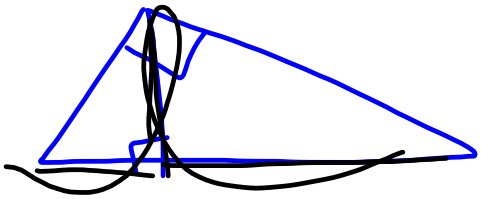
ΔIII

Which is the one side that plays a role in two different triangles? LONG LEG What roles does it play?

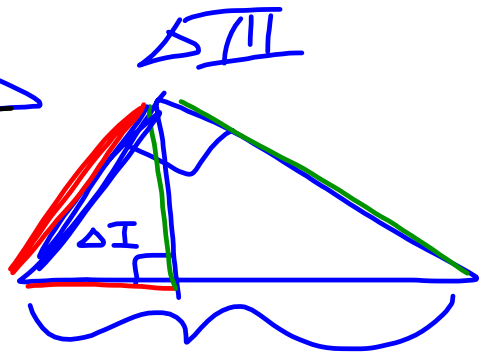
LONG / HYP

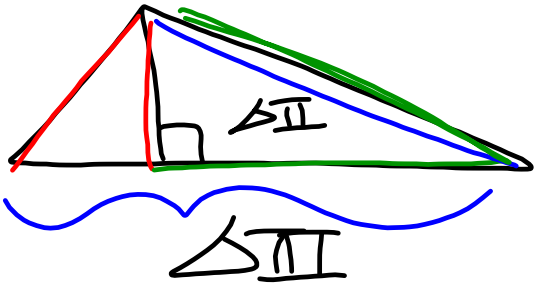
The significant proportion between the triangles is

$\frac{\Delta II}{\Delta III}$ $\frac{LONG}{LONG} = \frac{HYP}{HYP}$

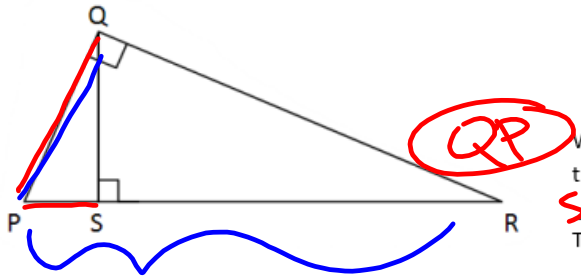


ΔIII

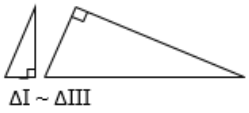




ΔIII



QP



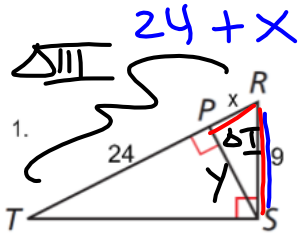
Which is the one side that plays a role in two different triangles? SHORT What roles does it play? SHORT/HYP LEG ΔIII

The significant proportion between the triangles is

$\frac{\Delta I}{\Delta III}$ $\frac{\text{SHORT}}{\text{SHORT}} = \frac{\text{HYP}}{\text{HYP}}$

A **LEG** of the original right triangle is the geometric mean between its **HYPOTENUSE** and the corresponding leg of the similar smaller triangle. (The proportion is produced from one of the smaller triangles I or II with the large triangle III hypotenuse and a leg of the original right triangle).

Practice: Use the hypotenuse-leg rule (relationship 2) to find x.



Word description: The SHORT LEG is the geometric mean between SHORT ΔI and HYP ΔIII.

$\frac{\Delta I}{\Delta III}$ $\frac{\text{SHORT}}{\text{SHORT}} = \frac{\text{HYP}}{\text{HYP}}$

$\frac{x}{9} = \frac{9}{24+x}$

$x(24+x) = 81$

$24x + x^2 = 81$

$-81 \quad -81$

$x^2 + 24x - 81 = 0$

$(x + 27)(x - 3) = 0$

$x + 27 = 0$ | $x - 3 = 0$

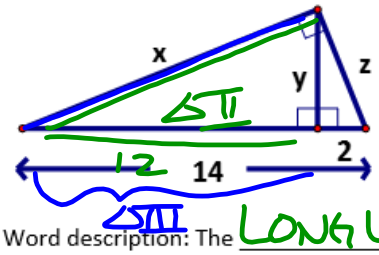
$x = -27$ | $x = 3$

81_2

7.

3.27

2.



$\frac{\Delta II}{\Delta III} : \frac{L}{L} = \frac{H}{H}$

$\frac{12}{x} = \frac{x}{14}$

Word description: The LONG LEG of ΔII is the geometric mean between LONG LEG of ΔII and HYP of ΔIII.

$x^2 = (12)(14)$

$x = \pm\sqrt{168}$

$x = \pm\sqrt{4}\sqrt{42}$

$x = 2\sqrt{42}$

168

2·84

64

49

36

25

16

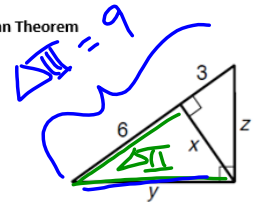
9

4

Selecting the Appropriate Geometric Mean / Combining with Pythagorean Theorem

1) Solve for y by using each method:

a. Solve for y directly without solving for x first.



$\frac{\Delta II}{\Delta III} : \frac{L}{L} = \frac{H}{H}$

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

$y^2 = 9(6)_3$

$y = \pm\sqrt{9}\sqrt{6}$

$y = 3\sqrt{6}$

b. Solve first for x and then for y.

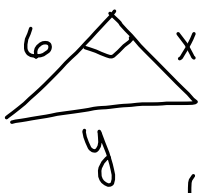
$\frac{\Delta I}{\Delta II}$ $\frac{3}{x} = \frac{x}{6}$

$x^2 = 18$

$x = \pm\sqrt{18}$

$= \pm\sqrt{9}\sqrt{2}$

$x = 3\sqrt{2}$



$x = \sqrt{18}$

$a^2 + b^2 = c^2$

$6^2 + \sqrt{18}^2 = y^2$

$36 + 18 = y^2$

$54 = y^2$

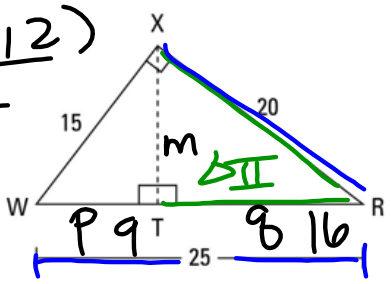
$\sqrt{9}\sqrt{6} = y$

$3\sqrt{6} = y$

2) Find XT and the area of ΔWXR.

$A = \frac{bh}{2} = \frac{25(12)}{2}$

$A = 150$



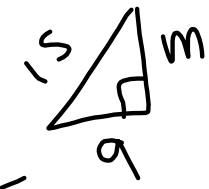
$\frac{\Delta II}{\Delta III} : \frac{L}{L} = \frac{H}{H}$

$\frac{9}{20} = \frac{20}{25}$

$25q = 400$

$q = \frac{400}{25}$

$q = 16$



$\{3-4-5\}$

$9 \quad m \quad 15$

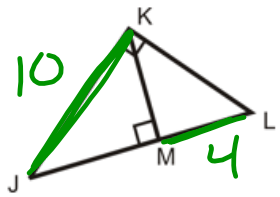
$k = 3 \qquad k = 3$

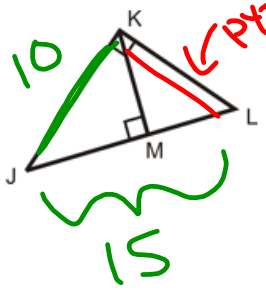
$m = 3(4)$

$= 12$

$XT = 12$

Draw the two scenarios in which you must use the hypotenuse-leg rule and summarize your findings:





IF YOU DON'T KNOW BOTH PIECES OF ΔIII'S HYPOTENUSE

Attachments

Bridge to 8.docx