Lesson 8-6: Pythag Thm. and Trig Ratios

AGENDA:

- Check HW 8-5
- Notes 8.6 with Applications and Guided Practice

HOMEWORK:8-6

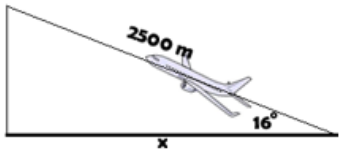
- Quiz - Next Quiz
- Worksheet 8-6

CR#7 is Due ~~Friday 3/17~~ WED

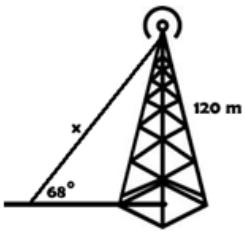
FINISH 8-5 WORKSHEET IN NOTES
DO #1 8-6 WORKSHEET

PROBLEM SET 8-5 Geometry + LAB

1) An airplane climbs at an angle of 16° with the ground. Find the ground distance the plane travels as it moves 2500 m through the air to the nearest meter.



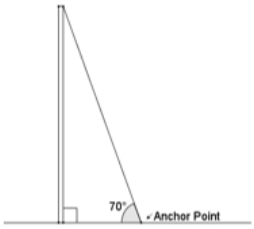
2) A guy wire reaches from the top of a 120 m television transmitter tower to the ground. The wire makes a 68° angle with the ground. Find the length of the guy wire to the nearest tenth of a meter.



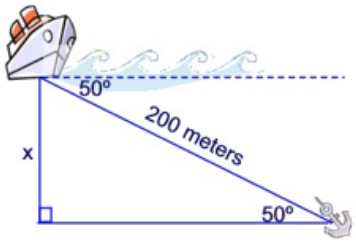
3) Draw a diagram and solve the following: A man casts a 3 ft long shadow. If the sun's rays strike the ground at an angle of 62°, what is the height of the man to the nearest tenth of a foot?

4) A kite with a string 150 feet long makes an angle of 45° with the ground. What is the height of the kite to the nearest tenth of a foot? Be sure to draw a diagram first.

5) (Module 2 Lesson 25): A cable anchors a utility pole to the ground as shown in the picture. The cable forms an angle of 70° with the ground. The distance from the base of the utility pole to the anchor point on the ground is 3.8 meters. Approximately how many meters will be needed to replace the support cable? (Answer to the nearest tenth).



6) A ship drops an anchor at an angle of depression of 50° and waits for it to sink to the bottom of the ocean. Knowing that 200 meters of line have been uncoiled, how deep is the ocean beneath the ship?



Name _____ Date _____

Geometry 8-6 LAB Pythagorean Theorem with Trig Ratios; Mixed Review

Solving for a Missing Side Using Pythagorean Theorem with a Given Trig Ratio

When you want another trig ratio directly from a given sin, cos, or tan ratio, use the Pythagorean Theorem to solve for the missing side of the triangle. Then write the appropriate trig ratio. You do not need to evaluate the trig ratio.

For each of the following examples, first draw a diagram of the right triangle, label an acute angle as θ, and label the appropriate sides as OPP, ADJ, HYP.

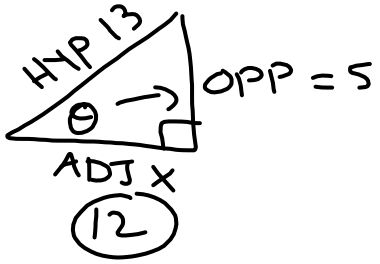
Example 1:

Given $n\theta = \frac{5}{13}$, find the ratio $cos\theta$.

SINθ

$\sin\theta = \frac{5}{13}$ SOH

$\cos\theta = \frac{A}{H}$



OPP = 5
HYP = 13
ADJ = x

$a^2 + b^2 = c^2$
$5^2 + x^2 = 13^2$
$25 + x^2 = 169$
$\sqrt{x^2} = \sqrt{144}$ $x = 12$
$\pm$

$\cos\theta = \frac{12}{13}$

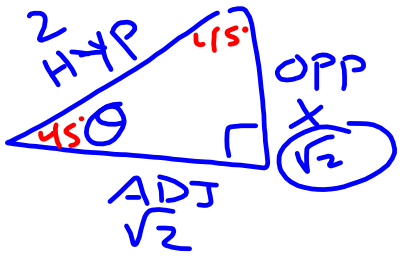
Example 2:

Given $cos\theta = \frac{\sqrt{2}}{2}$, find the ratio $tan\theta$. What kind of right triangle do you think this is? Why?

$\cos\theta = \frac{\sqrt{2}}{2}$ = ADJ
2 = HYP
x = OPP

SOH CAH TOA

$\tan\theta = \frac{x}{\sqrt{2}}$



$a^2 + b^2 = c^2$
$(\sqrt{2})^2 + x^2 = 2^2$
$2 + x^2 = 4$
$x^2 = 2$
$x = \pm\sqrt{2}$

$\tan\theta = \frac{\sqrt{2}}{\sqrt{2}}$

$\tan\theta = 1$

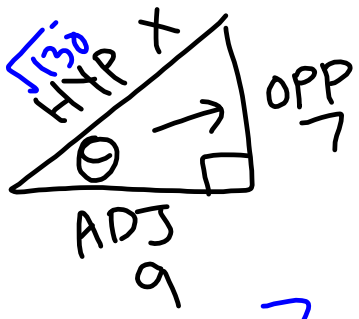
Example 3:

Given $tan\theta = \frac{7}{9}$, find the ratio $sin\theta$.

SOH CAH TOA

TANθ = $\frac{7}{9}$ OPP / ADJ

X HYP



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

$9^2 + 7^2 = c^2$

$81 + 49 = c^2$

$\pm\sqrt{130} = c$

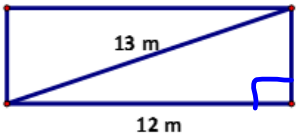
SINθ = $\frac{7}{\sqrt{130}}$

MIXED REVIEW

To solve for a missing side length/dimension, consider which solving method to apply:

- Pythagorean Theorem (including triplets)
- Geometric Mean (remember, the largest triangle must be a right triangle and have an altitude)
- Trigonometric Ratios
- A combination of the above methods

Example 1: A rectangular field has a length of 12 m and diagonal of 13 m. Find the width of the field to the nearest meter.



WIDTH = X

5 m

{5-12-13}

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

$x^2 + 12^2 = 13^2$

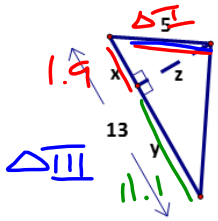
$x^2 + 144 = 169$

$x^2 = 25$

$x = \pm\sqrt{25}$

TENTH

Example 2: Solve for x, y, and z in simplest radical form.



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

$5^2+b^2=13^2$

$25+b^2=169$

$b^2=144$

$b=\pm\sqrt{144}$

$b=12$

△I : △II : $\frac{x}{5}=\frac{5}{13}$ SHORT HYP

$13x=25$

$x=\frac{25}{13}$

$x=1.9230\ldots$

$x=1.9$

$13=x+y$

$13=1.9230+y$

$11.0769\ldots$

$11.1=y$

△I: $a^2+b^2=c^2$

$x^2+z^2=5^2$

$1.9230^2+z^2=25$

$z^2=25-1.9230$

$z^2=23.0770$

$z=\pm\sqrt{23.0770}$

$4.8038\ldots$

$z=4.8$

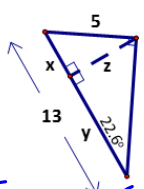
DON'T ROUND EARLY!

$1.9^2+z^2=25$

$z=4.6249\ldots$

$\neq 4.8$

Example 3: Solve for x, y, and z to the nearest tenth.



{5-12-13}

△II: OPP z, ADJ y, 22.6°, 12 HYP

SOH CAH TOA

z: $\sin 22.6^\circ=\frac{z}{12}$

$12(\sin 22.6^\circ)=z$

$4.6115\ldots=z$

$4.6\text{ cm}=z$

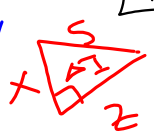
△II: SOH CAH TOA

$\cos 22.6^\circ=\frac{y}{12}$

$12(\cos 22.6^\circ)=y$

$11.0785\ldots$

$11.1\text{ cm}=y$



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

$x^2+4.6115^2=5^2$

$x^2+21.2659=25$

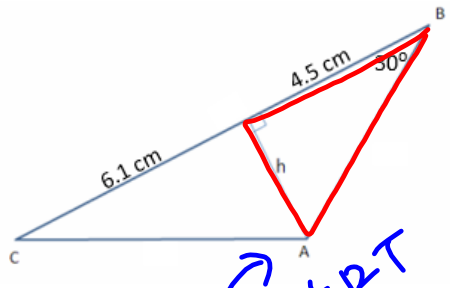
$x^2=3.7340$

$x=\pm\sqrt{3.7340}$

$x=1.9323\ldots$

$x=1.9$ cm

Example 4: Find the length of h to the nearest hundredth of a centimeter.



ADJ 4.5 cm, 30°, h, HYP, OPP

SOH CAH TOA

$\tan 30^\circ = \frac{h}{4.5}$

$4.5(\tan 30^\circ) = h$

$2.5980\ldots = h$

$2.60 \text{ cm} = h$

ΔA ≠ PT

NO GEOM MEAN

$\cos 30^\circ = \frac{x}{8} \rightarrow 8(\cos 30^\circ)$

$\cos 30^\circ = \frac{8}{x} \rightarrow \frac{8}{\cos 30^\circ}$

1. Given $an\theta = \frac{24}{7}$, find the ratio $cos\theta$.

2. Given $sin\theta = \frac{5}{6}$, find the ratio $cos\theta$.

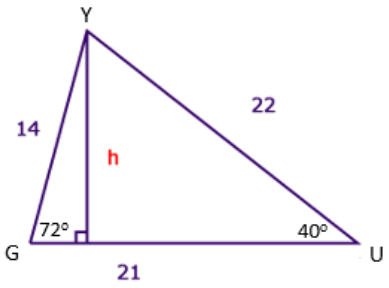
3. Given $cos\theta = \frac{\sqrt{3}}{2}$, find the ratios $sin\theta$ and $tan\theta$.

→Think back to earlier lessons – what do you think the measure of θ is for example 3? _____

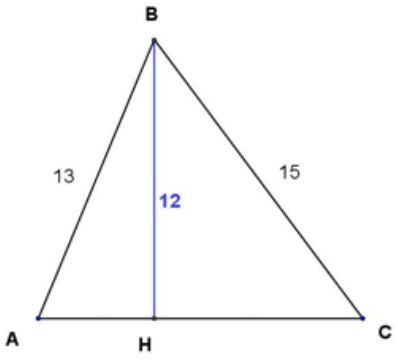
Why? _____

For questions 4-7, consider which solving method(s) to apply: Pythagorean Theorem (plus triplets), Geometric Mean, or Trig.

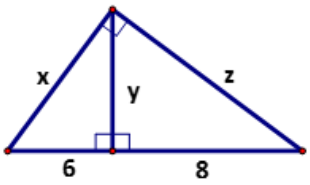
4. Determine the height of triangle GUY where GU=21.



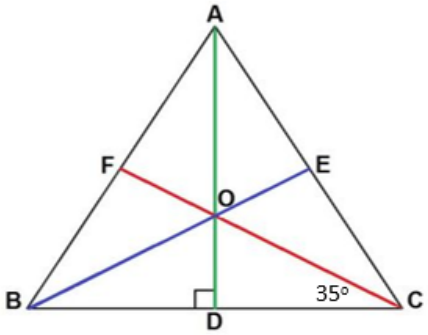
5. Determine the area of the triangle ABC with the altitude $\overline{BH}$.



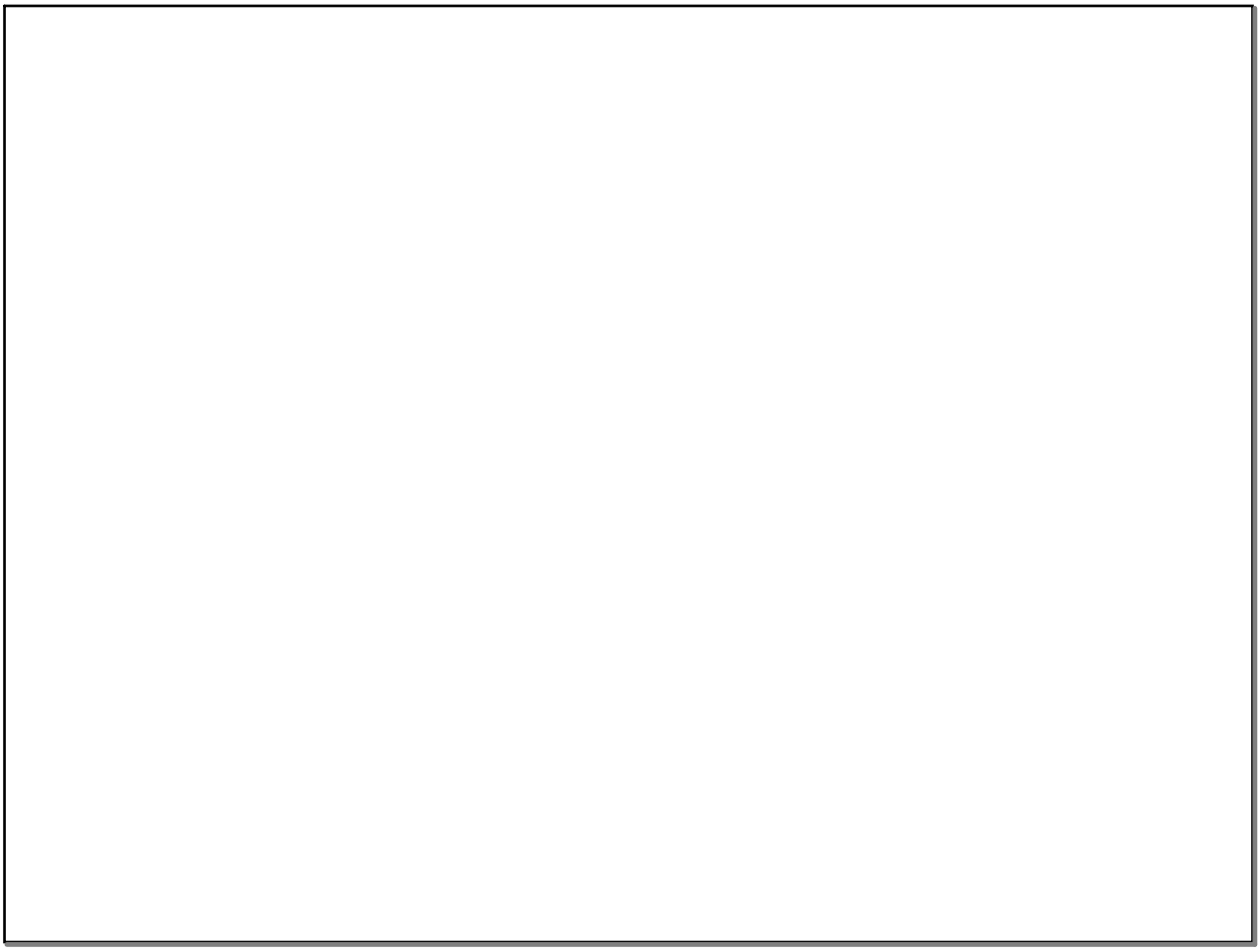
6. Solve for x, y, and z to the nearest tenth.



7. O is the centroid of isosceles ΔABC with base BC=12 inches. If $m\angle OCD = 35°$, determine OD, to the nearest hundredth of an inch.



Extra credit: determine AO to the nearest tenth of an inch.



Attachments

Bridge to 8.docx