WARM UP

1. Put the equation $q = r^s$ in logarithmic form.

2. Write the expression $\frac{1}{2} \log x + \frac{1}{3} \log y - 2 \log z$ as a single log statement.

3. Find the inverse of the function $y=7x+2$

4. Find the inverse of the function $y=7^x+2$

Objectives

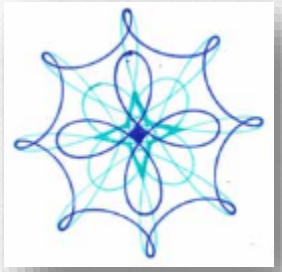
- Define the 6 Trigonometric Ratios
- Use Trigonometric ratios to find side lengths and angle measures.
- Use the properties of the special triangles to find side lengths and angle measures.

Homework

- Problems on handout, All problems
- WBP 379 – 1-23 odd

Homework Review

No homework last night!!!!



trig-o-nom-e-try [trig-*uh*-**nom**-i-tree] Show IPA

noun

the branch of mathematics that deals with the relations between the sides and angles of plane or spherical triangles, and the calculations based on them.

Origin:

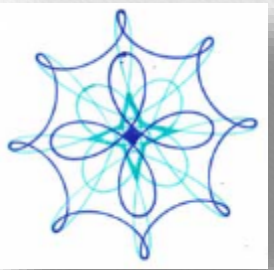
1605–15; < Neo-Latin *trigōnometria;* see trigon, -o-, -metry

But first, what could these equations possibly be?

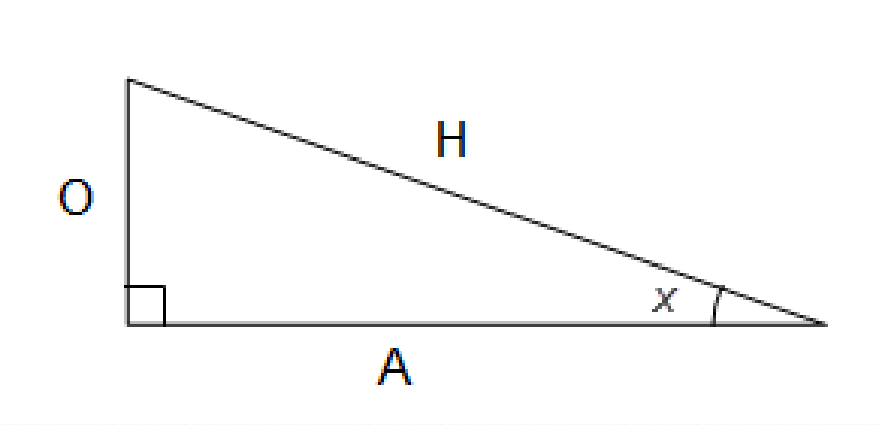
$$x(t) = (R + r)\cos(t) + p * \cos((R + r)t/r)$$
$$y(t) = (R + r)\sin(t) + p * \sin((R + r)t/r)$$

Click here for a hint...

Or here…

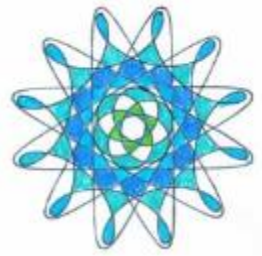


So what do you remember about **SohCahToa**

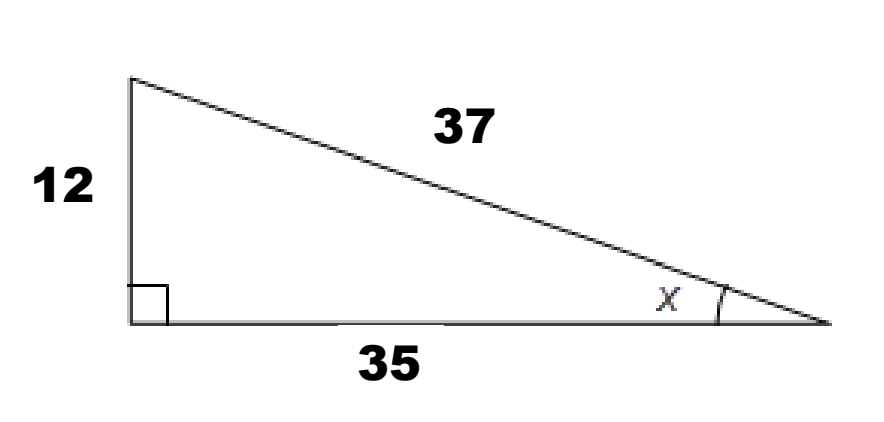


The Primary Trig Ratios

SOH	Sine = Opposite over Hypotenuse.	$\sin x = \frac{O}{H}$
CAH	Cosine = Adjacent over Hypotenuse.	$\cos x = \frac{A}{H}$
TOA	Tangent = Opposite over Adjacent.	$\tan x = \frac{O}{A}$



SohCahToa



Find each of the ratios listed below.

$$\sin x = \frac{12}{37}$$

$$\cos x = \frac{35}{37}$$

$$\tan x = \frac{12}{35}$$

We also have three more trig functions

The Reciprocal Identities

$$\sin x = \frac{opposite}{hypotenuse}$$

$$\mathbf{\csc x = \frac{hypotenuse}{opposite}}$$

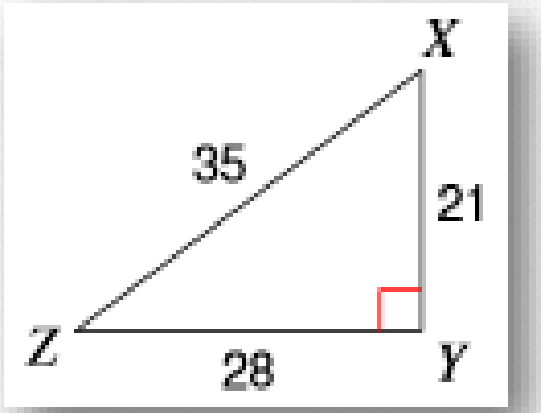
$$\cos x = \frac{adjacent}{hypotenuse}$$

$$\mathbf{\sec x = \frac{hypotenuse}{adjacent}}$$

$$\tan x = \frac{opposite}{adjacent}$$

$$\mathbf{\cot x = \frac{adjacent}{opposite}}$$

For the triangle pictured below. Find each six trigonometric ratios for angle z.



$$\sin z = \frac{21}{35} \qquad \csc z = \frac{35}{21}$$

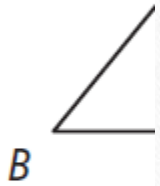
$$\cos z = \frac{28}{35} \qquad \sec z = \frac{35}{28}$$

$$\tan z = \frac{21}{28} \qquad \cot z = \frac{28}{21}$$

On page 25 of you hand out do problem number 4

4. In $\triangle ABC$, find each value as a fraction and as a decimal. Round to the nearest hundredth.

a. $\cos A$ $\cos A = \frac{\text{ADJ}}{\text{HYP}} = \frac{4}{5}$ $\frac{4}{5}$, 0.80



b. $\csc A$ $\frac{5}{3}$, 1.67

c. $\tan B$ $\frac{4}{3}$, 1.33

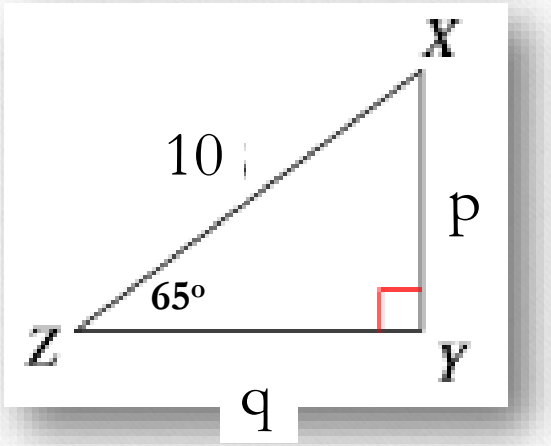
d. $\sec B$ $\frac{5}{3}$, 1.67

e. $\cot A$ $\frac{4}{3}$, 1.33

f. $\csc B$ $\frac{5}{4}$, 1.25

g. $\sin A$ $\frac{3}{5}$, 0.60

For the triangle pictured below angle Z is 65°. Find the length of the missing sides.



Set up an equation with what you know

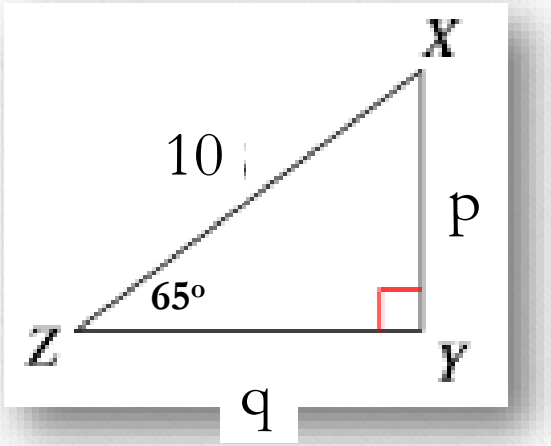
$$\sin(65) = \frac{p}{10}$$

$$10 \sin(65) = p$$

$$10\ (0.9063) = p$$

$$9.06 = p$$

For the triangle pictured below angle Z is 65°. Find the length of the missing sides.



Now you find the length of side q.

$$\cos(65) = \frac{q}{10}$$

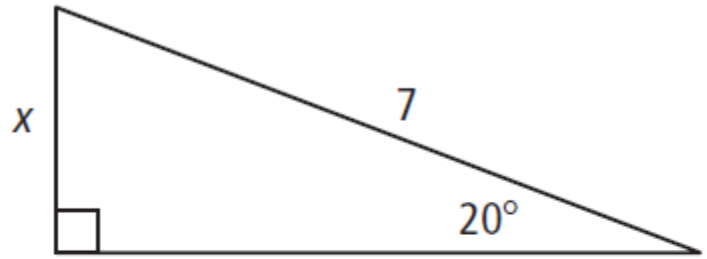
$$10\cos(65) = q$$

$$10\,(0.4226) = q$$

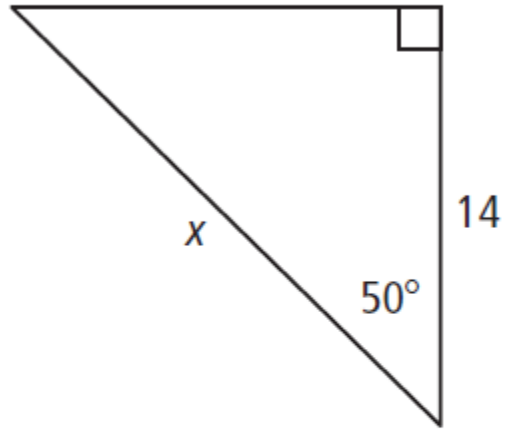
$$4.22 = q$$

On page 26 of your hand out do problems 6-8

Find each length x. Round to the nearest tenth.

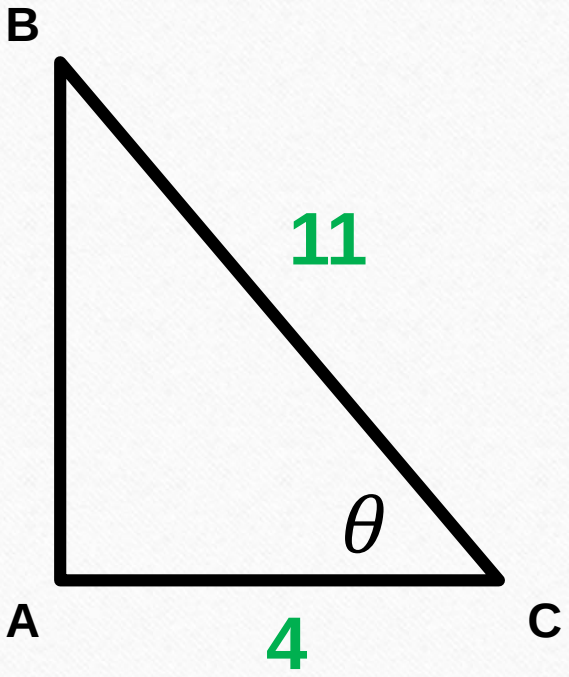
6. 

2.4

7. 

21.8

8. A weather balloon is attached to the ground by a 1000-ft cord. The cord makes an angle of 72° with the ground. How high is the weather balloon to the nearest foot? **951 ft**



Triangle ABC is a right triangle. Angle A is a 90 degree angle.

Given $\cos\theta = \frac{4}{11}$. Find the other five trigonometric ratios.

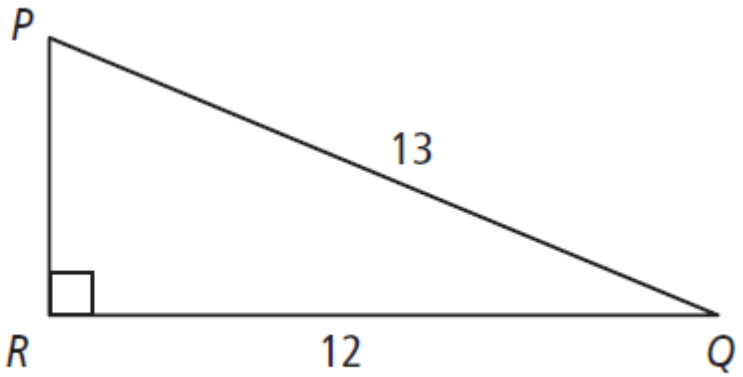
Use the Pythagorean Theorem to find the other side!

$$x^2+4^2=11^2$$

$$x=10.25$$

On page 26 of your hand out do problem 5

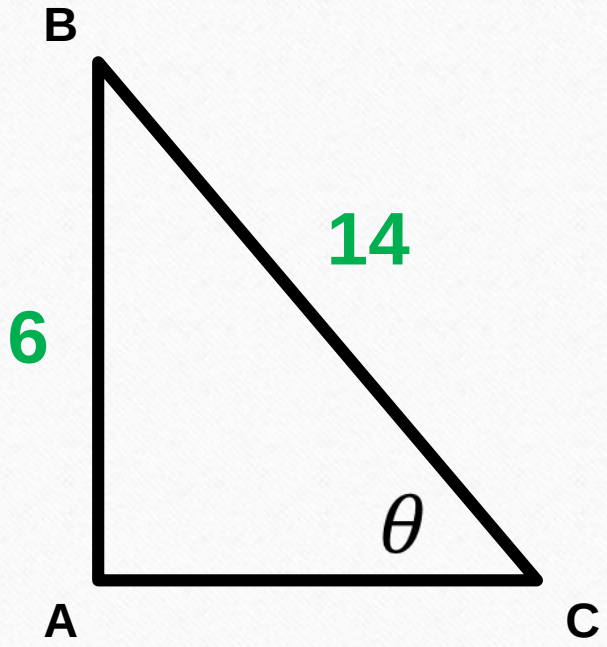
5. In $\triangle PQR$, $\angle R$ is a right angle and $\cos Q = \frac{12}{13}$. Find the values of the other five trigonometric functions of $\angle Q$ in fraction and in decimal form.



$\sin Q = \frac{5}{13} \approx 0.385$, $\tan Q = \frac{5}{12} \approx 0.417$, $\csc Q = \frac{13}{5} = 2.6$,

$\sec Q = \frac{13}{12} \approx 1.08$, $\cot Q = \frac{12}{5} = 2.4$

Sketch a right triangle with θ as the measure of one acute angle. Find the other five trigonometric ratios of θ.



$\csc \Theta = {}^{14}/_{6}$

Use the Pythagorean Theorem to find the other side!

$$x^2+6^2=14^2$$

$$x=12.25$$

Now create the other 5 ratios

On page 26 of your hand out do problems 12-15

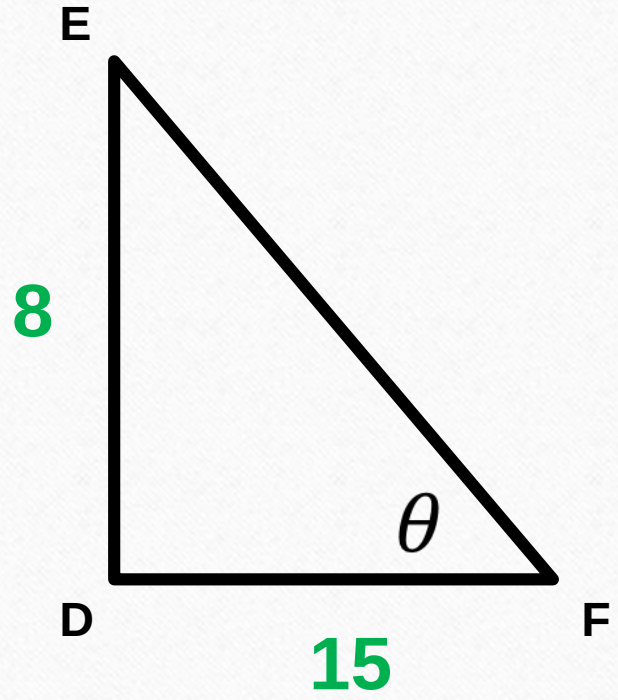
12. $\tan\theta = \frac{15}{8}$ $\sin\theta = \frac{15}{17}$, $\cos\theta = \frac{8}{17}$, $\cot\theta = \frac{8}{15}$, $\csc\theta = \frac{17}{15}$, $\sec\theta = \frac{17}{8}$

13. $\cos\theta = \frac{1}{4}$ $\sin\theta = \frac{\sqrt{15}}{4}$, $\tan\theta = \sqrt{15}$, $\cot\theta = \frac{\sqrt{15}}{15}$, $\csc\theta = \frac{4\sqrt{15}}{15}$, $\sec\theta = 4$

14. $\sec\theta = 5$ $\sin\theta = \frac{2\sqrt{6}}{5}$, $\cos\theta = \frac{1}{5}$, $\tan\theta = 2\sqrt{6}$, $\cot\theta = \frac{\sqrt{6}}{12}$, $\csc\theta = \frac{5\sqrt{6}}{12}$

15. $\cot\theta = \frac{2}{3}$ $\sin\theta = \frac{3\sqrt{13}}{13}$, $\tan\theta = \frac{3}{2}$, $\cos\theta = \frac{2\sqrt{13}}{13}$, $\csc\theta = \frac{\sqrt{13}}{3}$, $\sec\theta = \frac{\sqrt{13}}{2}$

In $\triangle DEF$, $\angle D$ is a right angle. Find the remaining sides and angles. Round answers to the nearest tenth.



f=8 and e=15

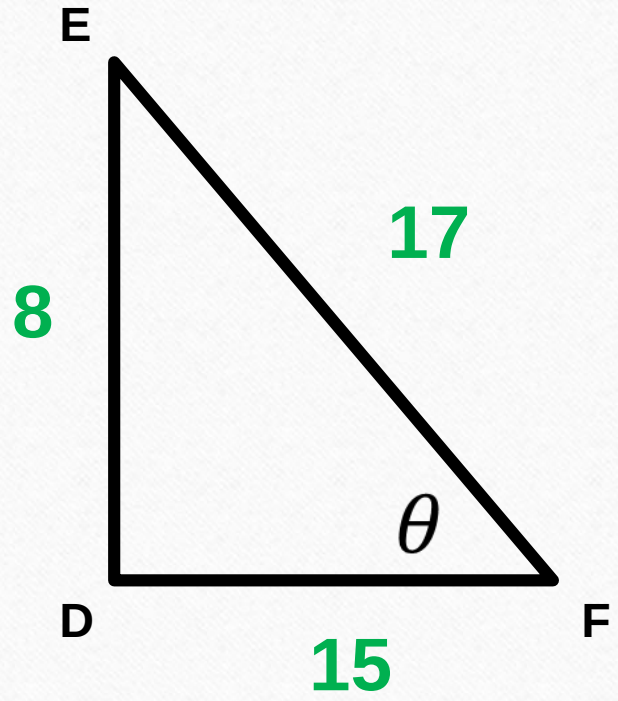
Use the Pythagorean Theorem to find the other side!

$$8^2+15^2=x^2$$

$$x=17$$

Now what? How can we find the angles?

In $\triangle DEF$, $\angle D$ is a right angle. Find the remaining sides and angles. Round answers to the nearest tenth.



We'll use the inverse trig functions.

$\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$

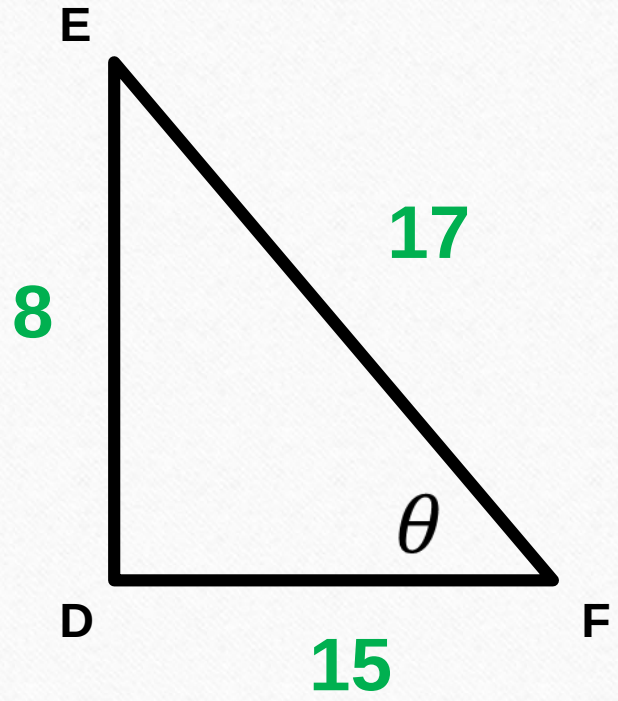
These functions return an angle measure given a corresponding ratio.

$$\sin^{-1}(8/17) = \Theta$$

$$\Theta = 28.07$$

Make sure you are in Degree Mode!

In $\triangle DEF$, $\angle D$ is a right angle. Find the remaining sides and angles. Round answers to the nearest tenth.



$\Theta = 28.07$

Angle E is just 180 – 90 - 28.07 = 61.93

On page 26 of your hand out do problems 9 and 10

9. $f = 1, d = 2$

$e = 1.7; m\angle F = 30°; m\angle E = 60°$

10. $e = 6, d = 12$

$f = 10.4; m\angle F = 60°; m\angle E = 30°$

Work on your homework