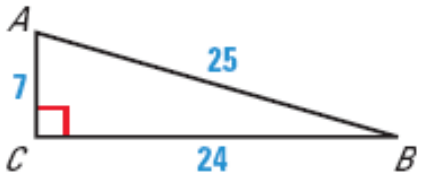
Name: _____ Period: _____ 9.1 Introduction to Trig

GETTIN' TRIGGY WIT IT

Find the following ratios using the given right triangles.

1.

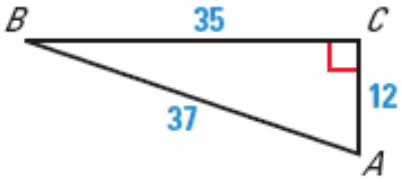


Sin A = _____ Sin B = _____

Cos A = _____ Cos B = _____

Tan A = _____ Tan B = _____

2.



Sin A = _____ Sin B = _____

Cos A = _____ Cos B = _____

Tan A = _____ Tan B = _____

Use your calculator to evaluate each of the following. Round each to four decimal places.

3. $\sin 63°$

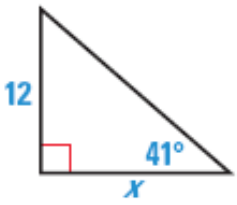
4. $\cos 24°$

5. $\tan 86°$

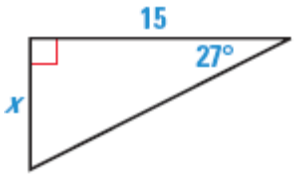
6. $\tan 42°$

Use the tangent ratio to find the variable.

7.



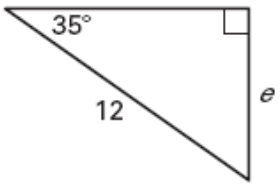
8.



9.

Use the sine ratio to find the variable.

10.



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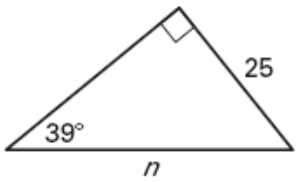
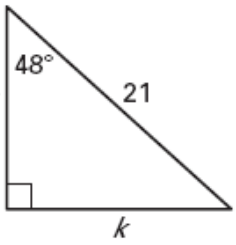
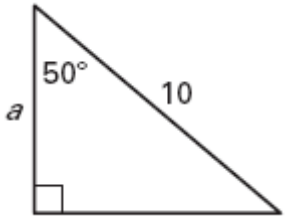


12.



Use the cosine ratio to find the variable.

13.



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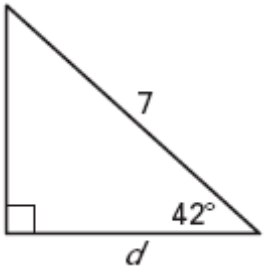
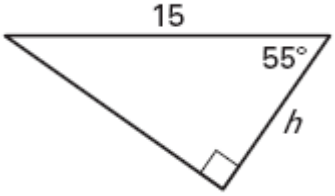
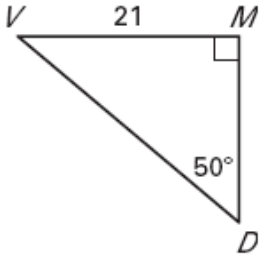


15.

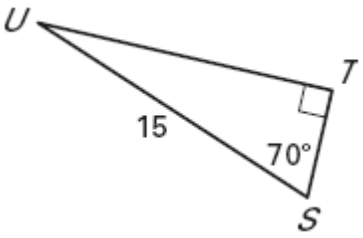


Solve the following right triangles. (Find all of the missing sides and angles.)

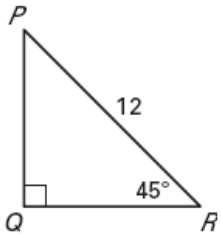
16.



17.



18.



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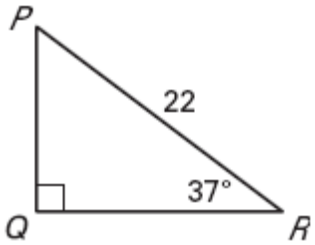
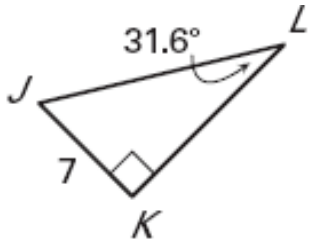
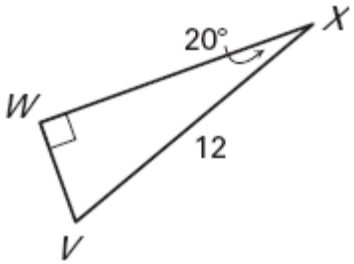


20.



21.



Name: _____ Period: _____ 9.2 Trig Ratios in Dilations

Trig Ratios In Dilations

1. Use the diagram below as two legs of a right triangle
a) Draw a hypotenuse- make it different than any student around you.
b) Measure & label the two other angles A, B in <u>your</u> diagram. Use your angles to complete this table A:

A

Use your calculator to calculate each ratio using the ANGLE of A and B. **Make sure you are in degree mode.**	
sin A =	sin B =
cos A =	cos B =
tan A =	tan B =

How are $\angle A \text{ and } \angle B$ related to each other?

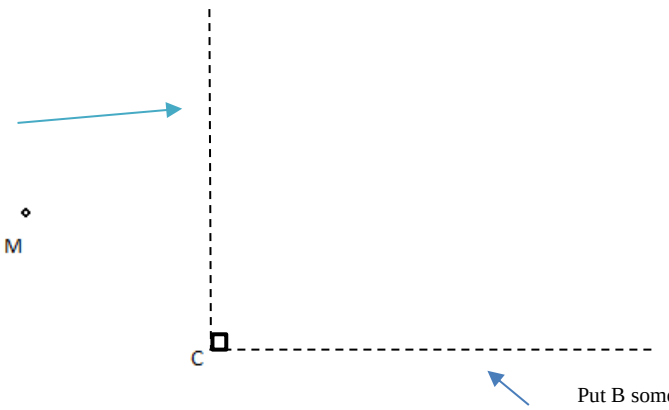
_____

c) Measure all 3 sides of the triangle in cm to the tenths place. Label triangle with measurements.
d) Use your measured side lengths to find the ratios for sine, cosine and tangent. Record in the table B.

B

Use your fractions to calculate each ratio using the ratios (SOH CAH TOA) that define each trig function. Round to three decimals places	
sin A =	sin B =
cos A =	cos B =
tan A =	tan B =

Put A some where on this line



Put B somewhere on this line

2. DILATE. Using point M as the center of dilation, dilate ΔABC above. The dilation will cover the words, it's ok.
What is your scale factor? _____
Draw the dilation

C

Use your calculator to calculate each ratio using the ANGLE of A' and B'.	
sin A' =	sin B' =
cos A' =	cos B' =
tan A' =	tan B' =

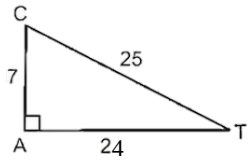
b) Measure & label $\angle A' \text{ and } \angle B'$ in your dilation. Use your angles to complete the table C:
How are $\angle A' \text{ and } \angle B'$ related to the angles in ΔABC?

c) Measure all 3 sides of the dilated triangle in cm to the tenths place. Label dilated triangle with measurements.
d) Use your measured side lengths to find the ratios for sine, cosine and tangent table D.

D

Use your calculator to calculate each ratio using the ratios (SOH CAH TOA) that define each trig function for your dilated triangle.	
sin A' =	sin B' =
cos A' =	cos B' =
tan A' =	tan B' =

How did your tables compare to each other and to the original table?



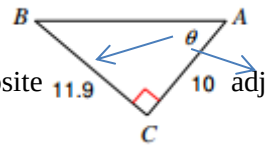
sin C = cos T =

3. In ΔCAT, find the ratio for sin C, and the cos T. What do you notice?_____

Find another angle pair whose trig functions are equal _____ = _____
Why does that happen?

4. You can use the $\sin^{-1}$ $\cos^{-1}$ and $\tan^{-1}$ buttons on your calculator to find the unknown angle if sides of the triangles are known. Make sure you are in degree mode. Label the sides of the triangle with "hypotenuse opposite or adjacent" to help you determine which trig function to use.
Round to tenths place. Show your work.

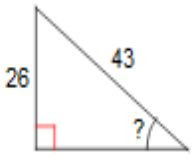
For example:



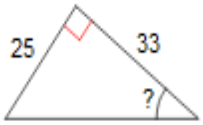
since $tangent\ \theta = \frac{opposite}{adjacent}$

opposite adjacent you can use $tan^{-1}(\frac{opposite}{adjacent}) = \theta\ and\ \theta = 50°$

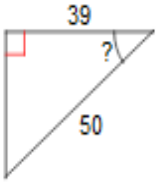
1)



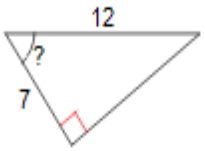
2)



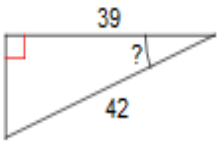
3)



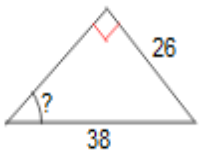
4)



5)

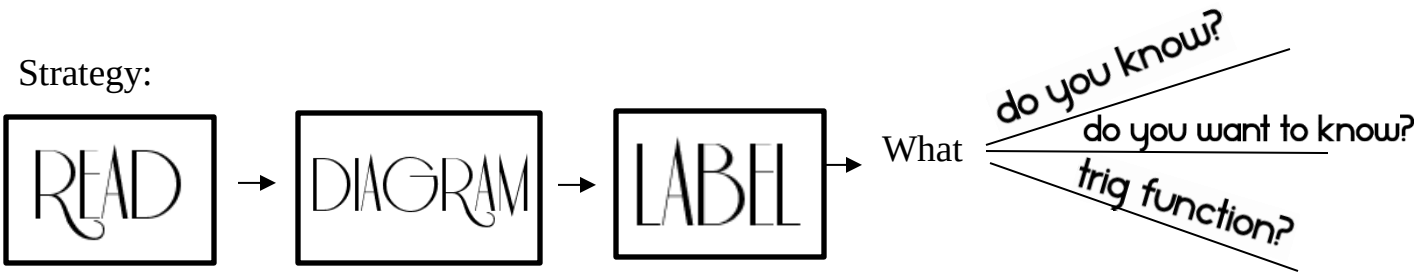


6)



Name _____ class ___ 9.3 Word Problems using Right Triangles

Strategy:



1. Suppose you have been assigned to measure the height of the local water tower. Climbing makes you dizzy, so you decide to do the whole job at ground level. From a point 47.3 meters from the base of the water tower, you find that you must look up at an angle of 53° to see the top of the tower. How tall is the tower? Draw the triangle.

2. A ship is passing through the Strait of Gibraltar. At its closest point of approach, Gibraltar radar determines that it is 2400 meters away. Later, the radar determines that it is 2650 meters away. By what angle did the ship's bearing from Gibraltar change? How far did the ship travel during the two observations?

3. You lean a ladder 6.7 meters long against the wall. It makes an angle of 63° with the level ground. How high up is the top of the ladder?

4. You must order a new rope for the flagpole. To find out what length of rope is needed, you observe that pole casts a shadow 11.6 meters long on the ground. The angle between the sun's rays and the ground is 36.8°. How tall is the pole?

5. Your cat is trapped on a tree branch 6.5 meters above the ground. Your ladder is only 6.7 meters long. If you place the ladder's tip on the branch, what angle will the ladder make with the ground?

6. The tallest free standing structure in the world is the 553 meter tall CN tower in Toronto, Ontario. Suppose that at a certain time of day it casts a shadow1100 meters long on the ground. What is the angle of elevation of the sun at that time of day?

7. Scientists estimate the heights of features on the moon by measuring the lengths of the shadows they cast on the moon's surface. From a photograph, you find that the shadow cast on the inside of a crater by its rim is 325 meters long. At the time the photograph was taken, the sun's angle to the horizontal surface was 23.6°. How high does the rim rise above the inside of the crater?

8. A beam of gamma rays is to be used to treat a tumor known to be 5.7 cm beneath the patient's skin. To avoid damaging a vital organ, the radiologist moves the source over 8.3 cm. At what angle to the patient's skin must the radiologist aim the gamma ray source to hit the tumor? _____How far will the gamma rays have to pass through the body to hit the tumor?_____

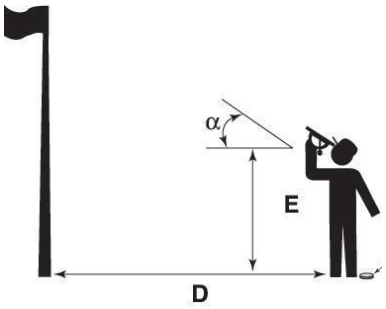
Name: _____ Period: _____ 9.4 Clinometer measurement activity

Clinometers and Trigonometry

Introduction:

In this activity you will use trigonometry to make indirect measurements to determine the heights of tall objects. At the end of the lab, we will use the entire class' data to come up with a reasonably accurate measurement of the flagpole.

The diagram on the right is to be used as a template. The distance D should be measured (along the ground) to your tall object. The clinometer should be used to measure the angle α. The length E, the height to your eyes, should be measured as well.



Part 1: Measuring your first object – Pick any tall object on campus and determine its height.

Object being measured: _____

Draw a diagram of the right triangle, labeling the angle, and length *clearly*. Please show all calculations.

Diagram + Work

Part 2: Measuring your second object – Pick any tall object on campus and determine its height.

Object being measured: _____

Draw a diagram of the right triangle, labeling the angle, and length *clearly*. Please show all calculations.

Diagram + Work

Understanding check: Explain why you must always use the tangent for these measurements:

_____

Please double check your work with the teacher or your classmates before proceeding to part 3

Part 3: Measuring the flag pole

For this measurement we want to be more precise than parts 1 and 2. To make sure you are more accurate, you will take two measurements. You will measure in feet and inches. Make sure you properly convert inches to decimals ($5'8" \neq 5.8$)

Measurement 1:

Measure the angle from some distance away.

Distance: _____ Angle: _____

Diagram + Work

Measurement 2:

Measure the angle from a distance further away.

Distance: _____ Angle: _____

Diagram + Work

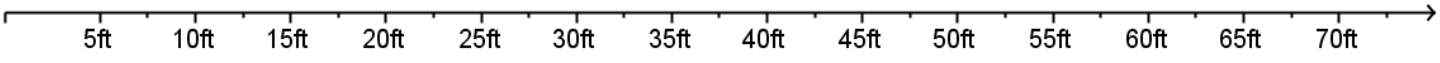
Use the average of your 2 values to determine the height of the flagpole:

Flagpole height (averaged): _____

Now, let's use statistics to get an average of the class' data. Get data from your classmates and put their *averaged* flagpole height in the table below.

Q1. What is the average (arithmetic mean) of the class' data? _____

Q2. Construct a box and whisker plot of the data. How does your measurement compare to the class' data?

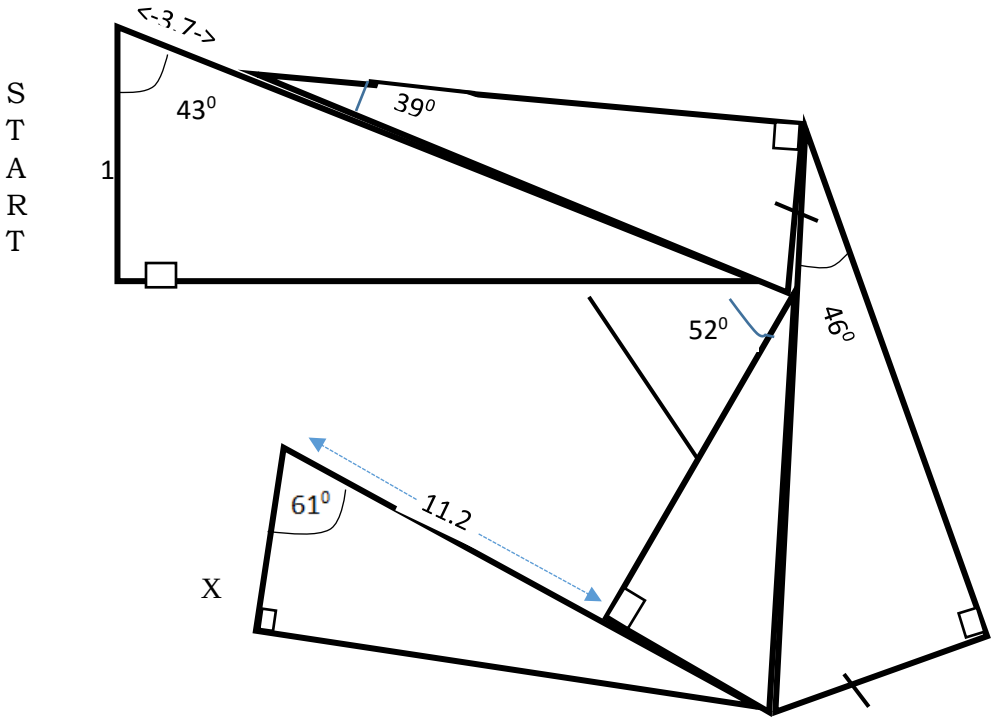


Name: _____ Period: _____ 9.5 Three Trig Towers!

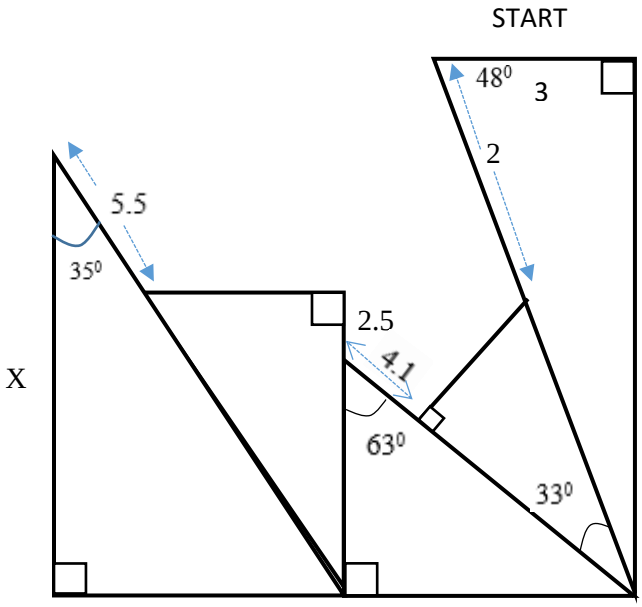
THREE TRIG TOWERS

Round to the tenths place at each step. Figures not drawn to scale (do not measure).
Use trig ratios to solve for lengths of the triangles as needed to end up solving for X. **Show your work**.

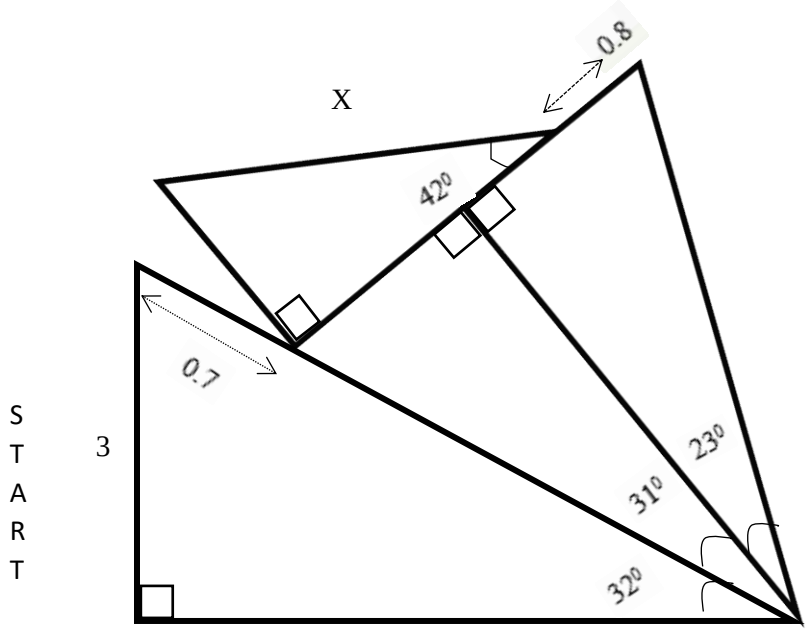
#1



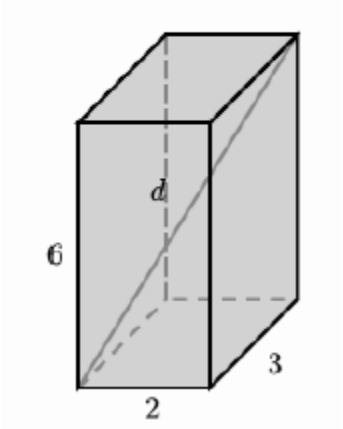
#2



#3



#4 What is the length of the diagonal d of the rectangular prism? Carefully consider triangles involved.



Name_____ class ___

9.6 Review Unit 9

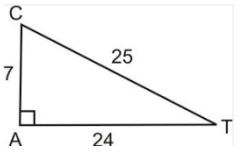
REVIEW TRIG UNIT

SOH-CAH-TOA

Use the diagram at the right. Find each of the following. Leave answers as fractions.

1) sin C = _____ 2) cos C = _____

3) sin T= _____ 4) tan T= _____



For questions 5 & 6, give your answer to the nearest 0.001.

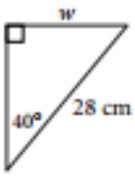
5) sin T = _____ 6) cos T = _____

Solve, round to the nearest hundredth.

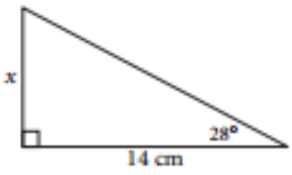
7) $\cos 64^0 = \frac{x}{28}$ x = _____

8) $\tan 51^0 = \frac{14.8}{x}$ $x =$ _____

9) find w = _____

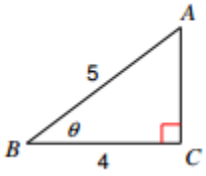


10) Find x =_____

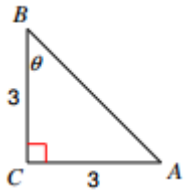


11. Solve for Θ= _____

And $\overline{AC}$ = _____



12) Solve for Θ= _____ and $\overline{AB}$ _____



SOH-CAH-TOA

For each question draw & label a picture, solve for the missing part.

13. A ladder 7 m long stands on level ground and makes a 73^0 angle with the ground and rests against a wall. How far from the wall is the base of the ladder?	14. To see the top of a building 1000 feet away, you look up to 24^0 from the horizontal. What is the height of the building?	15. A guy wire is anchored 12 feet from the base of a pole. The wire makes a 58^o angle with the ground. How long is the wire?
16. A submersible traveling at a depth of 250 feet dives at an angle of 15^o with respect to a line parallel to the water's surface. It travels a horizontal distance of 1500 feet during the dive. What is the depth of the submersible after the dive?	17. Brothers Bob and Tom Katz buy a tent that has a center pole 6.25 feet high. If the sides of the tent are supposed to make a 50° angle with the ground, how wide is the tent?	18. A swimming pool is 30 meters long and 12 meters wide. The bottom of the pool is slanted so that the water depth is 1.3 meters at the shallow end and 4 meters at the deep end. Find the angle of depression of the bottom of the pool.