

Unit: Trigonometry and Unit Circle

NAME _____ Per _____

		5/21 SR Finals – 2 nd , 5 th , 7 th Unit Circle HW: Part 1 <div style="border: 1px solid black; padding: 2px; display: inline-block;">1st, 2nd, 5th, 7th</div>	5/21 SR Finals – 3 rd , 4 th , 6 th Unit Circle HW: Part 1 <div style="border: 1px solid black; padding: 2px; display: inline-block;">3rd, 4th, 6th</div>	5/23 SR Finals – 1 st No Advisory Quiz: Unit Circle Trig – sin, cos, tan HW: Part 2 <div style="border: 1px solid black; padding: 2px; display: inline-block;">1st – 7th</div>
5/26 HOLIDAY	5/27 Quiz: Unit Circle Applications of Trig HW: Part 3	5/28-29 Quiz: Unit Circle Trig – sec, csc, cot HW: Part 4 & Review		5/30 TEST: Trig Test
6/2 Final Exam Review	6/3 Final Exam Review Will sign exemptions!	6/4 Finals 1 st , 2 nd , 5 th	6/5 Finals 3 rd , 6 th	6/6 Finals 4 th , 7 th

Objectives:

- To fill in the unit circle correctly.
- To solve for missing parts of a right triangle using trigonometry.
- To solve real world problems using trigonometry.
- To know the 3 reciprocal ratios of trig.

Pre-AP: To use the unit circle to solve problems with exact answers.

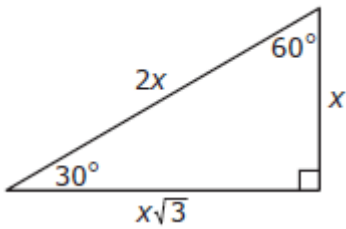
Essential Questions:

- How do you know which trigonometric ratio to use?
- What patterns can you use to build the unit circle??
- How do the 6 trig ratios relate to each other?

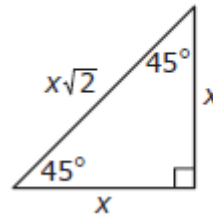
Part 1 – Unit Circle

The Special Right Triangles

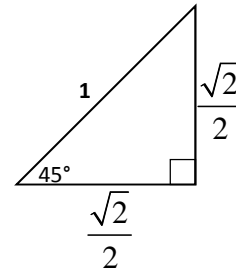
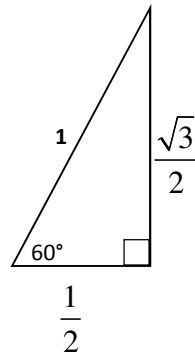
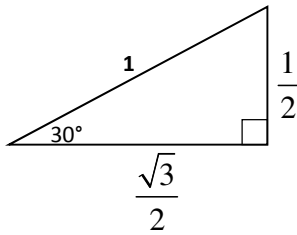
30° – 60° – 90° triangle



45° – 45° – 90° triangle

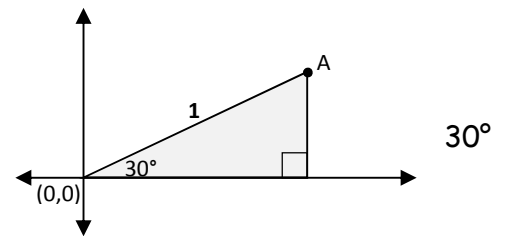


If we make the hypotenuse 1:

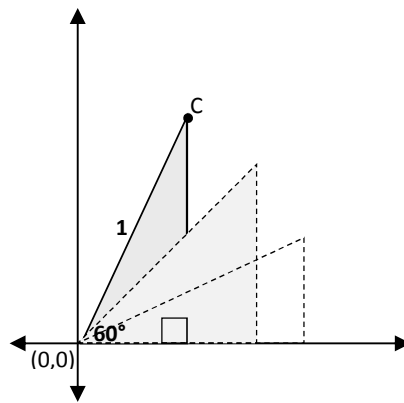
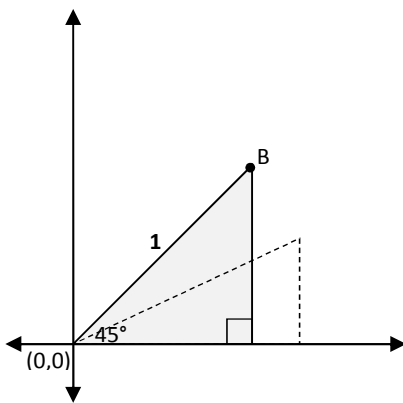


►► Next we'll take one of those triangles and put it on a coordinate plane:

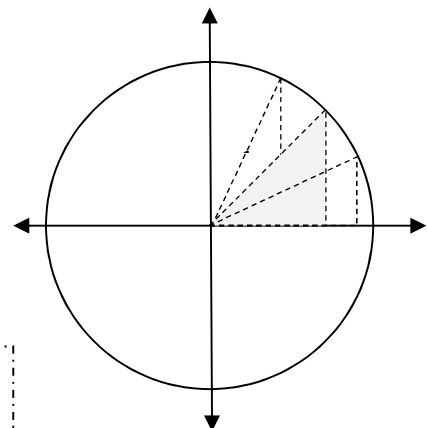
What would the x - and y - coordinates of point A (formed by an angle) be? (Hint: Use the lengths of the sides of the triangle.)



►► Do the same for a 45° angle and a 60° angle:



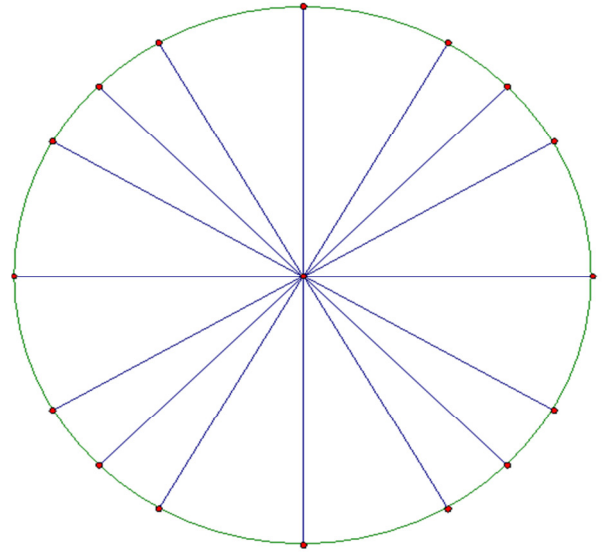
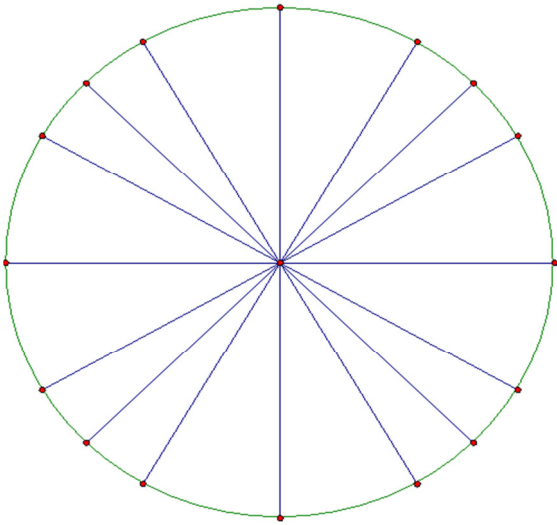
If you look at the three points we have traced out so far, they all lie on a circle centered at the origin.



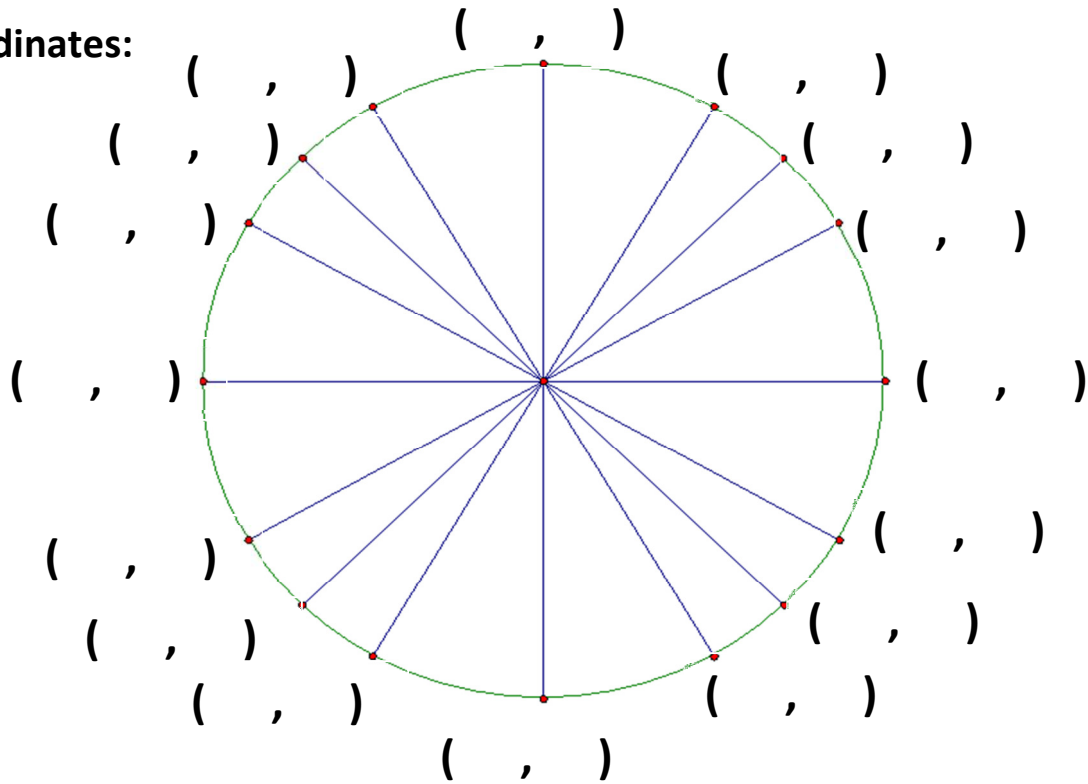
What is the radius of this circle?

DEGREES:

RADIANS: Another way to measure angles.

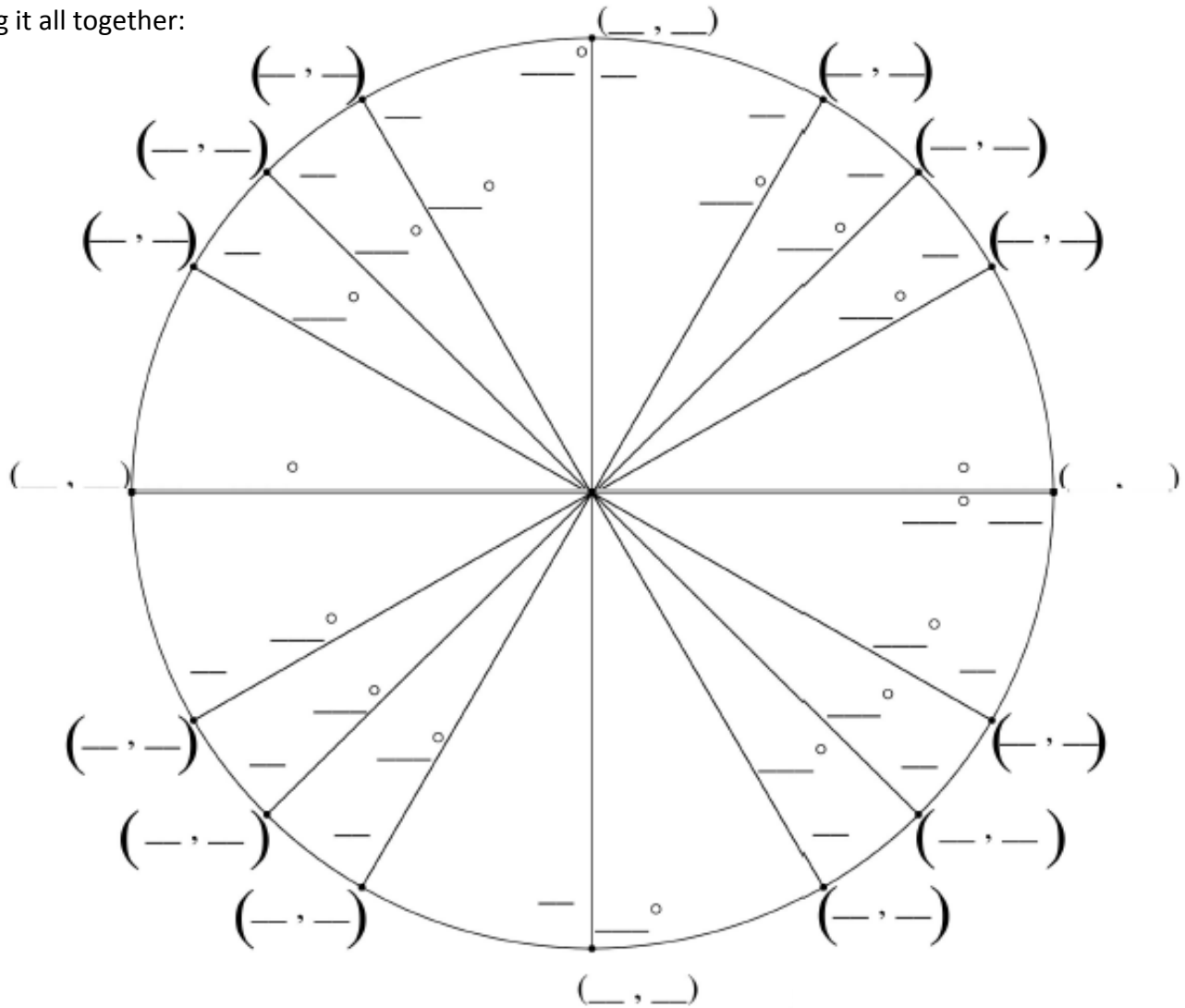


Coordinates:



Memory Tricks: The test is the blank Unit Circle: Be able to fill it in by memory!!!!

Putting it all together:



PRE-AP

► Use the work you did with the triangles on the front page to fill in the following table:

Angle measure	Coordinate on unit circle	Value of sine	Value of cosine	Value of tangent
30°				
45°				
60°				

What relationship do you notice between the coordinate on the unit circle and the values of **sine and cosine? Tangent?**

Working backwards on the unit circle: What is the location on the Unit Circle?

$$\frac{-3\pi}{4}$$

$$\frac{-5\pi}{6}$$

$$-120^\circ$$

Part 2 – Trig Ratio

1st – What MODE should your calculator be in? _____

Use your calculator to estimate the following values. **Round to the nearest hundredth.**

Ex 1. $\sin 35^\circ =$ _____ Ex 2. $\cos 18^\circ =$ _____ Ex 3. $\tan 87^\circ =$ _____

Use your calculator to estimate the following values. **Round to the nearest degree.**

Ex 7. $\sin \alpha^\circ = \frac{8}{17}$ $\alpha^\circ =$ _____ Ex 8. $\tan \beta^\circ = 1.875$ $\beta^\circ =$ _____ Ex 9. $\cos \theta^\circ = \frac{1}{2}$ $\theta^\circ =$ _____

There are 3 of trigonometric relationships that we study.

- Sine is the ratio of the _____ side to the _____.
- Cosine is the ratio of the _____ side to the _____.
- Tangent is the ratio of the _____ side to the _____ side.

The _____ NEVER changes, but _____ and _____ are dependent on the _____ used. The _____ angle is NEVER used.

Memory Trick:

The trigonometric ratios are written in an equation form. (**Hint: Write these ratios at the top of EVERY page you are working on.)

Sine $\theta^\circ =$ _____

Cosine $\theta^\circ =$ _____

Tangent $\theta^\circ =$ _____

USE THE TRIANGLE AT THE RIGHT to determine the following trigonometric ratios.

Ex 4. $\sin \alpha =$

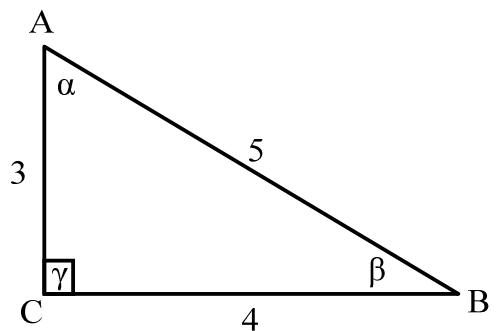
Ex 5. $\sin \beta =$

Ex 6. $\cos \alpha =$

Ex 7. $\cos \beta =$

Ex 8. $\tan \alpha =$

Ex 9. $\tan \beta =$



***PRE AP – Solve using the unit circle. No decimal answers allowed!**

$$\cos 30^\circ = \frac{x}{18}$$

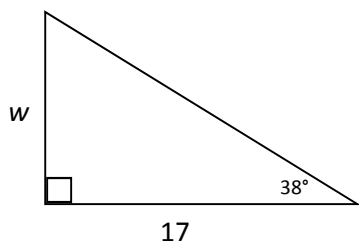
$$\sin 315^\circ = \frac{20}{n}$$

$$\cos 210^\circ = \frac{5}{m}$$

Use Trigonometric Ratios to Solve for Missing Sides and Angles

- 1) Determine which Trig Ratio will fit your information.
- 2) Set up the Trig Ratio
- 3) Round to the nearest degree if it is an angle and round to the nearest hundredth for sides.

Ex 1.

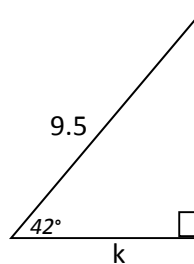


Which Ratio?

Equation:

$w =$ _____

Ex 2.

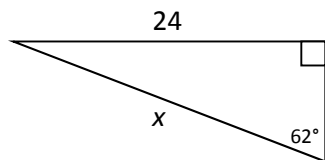


Which Ratio?

Equation:

$k =$ _____

Ex 3.

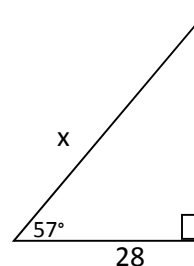


Which Ratio?

Equation:

$x =$ _____

Ex 4.

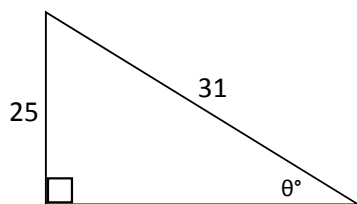


Which Ratio?

Equation:

$x =$ _____

Ex 5.

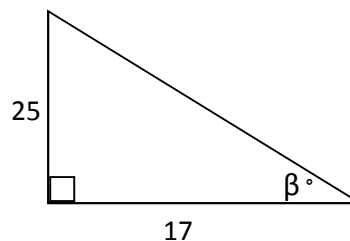


Which Ratio?

Equation:

$\theta^\circ =$ _____

Ex 6.



Which Ratio?

Equation:

$\beta^\circ =$ _____

Part 3 – Applications

Angle of depression - _____

Angle of elevation - _____

Ex 1. Angie looks up at 25 degrees to see an airplane flying toward her. If the plane is flying at an altitude of 3.5 miles, how far is it from being directly above Angie?

Picture:

Equation/Solution:

Answer:

Ex 2. A six foot vertical pole casts a shadow of 11 feet. What is the angle, β , of elevation with the ground?

Picture:

Equation/Solution:

Answer:

Ex 3. A 30 foot tree broke from its base and fell against a house. If the tree touches the house at 21 feet, what angle is the tree forming with the house?

Picture:

Equation/Solution:

Answer:

Ex 3. Lauren is at the top of a 15 m lookout tower. From an angle of depression of 25° , she sees Evan coming toward her. How far is Evan from the base of the tower?

Picture:

Equation/Solution:

Answer:

Ex 4. Christian is shooting a toy rocket off at an angle of 50° with the ground. He is 45 ft from his house and his house is 36 ft high. Will the rocket clear the house?

Picture:

Equation/Solution:

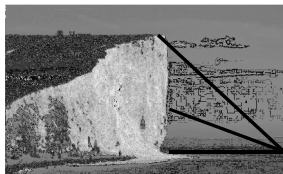
Answer:

Ex 5. At a point 75 ft from the base of a cliff, the angle of elevation to the first ridge is 30° and to the top of the cliff the angle of elevation is 60° . How much higher is the top of the cliff as compared to the first ridge?

Picture:

Equation/Solution:

Answer:



Part 4 – Reciprocal Trig Functions

You can also take the reciprocal of each trigonometric function.

The Reciprocal Trigonometric Ratios are as follows:

- Reciprocal of Sine Function:

Cosecant (csc) is the ratio of the _____ side to the _____.

$$\text{Cosecant is also: } \csc \theta = \frac{1}{\sin \theta} \qquad \csc \theta = \frac{H}{O}$$

- Reciprocal of Cosine Function:

Secant (sec) is the ratio of the _____ side to the _____.

$$\text{Secant is also: } \sec \theta = \frac{1}{\cos \theta} \qquad \sec \theta = \frac{H}{A}$$

- Reciprocal of Tangent Function:

Cotangent (cot) is the ratio of the _____ side to the _____.

$$\text{Cotangent is also: } \cot \theta = \frac{1}{\tan \theta} \qquad \cot \theta = \frac{A}{O}$$

Use the triangle at the right to determine the following ratios. Be sure to simplify your answers!

Ex 1. $\csc \vartheta =$ _____

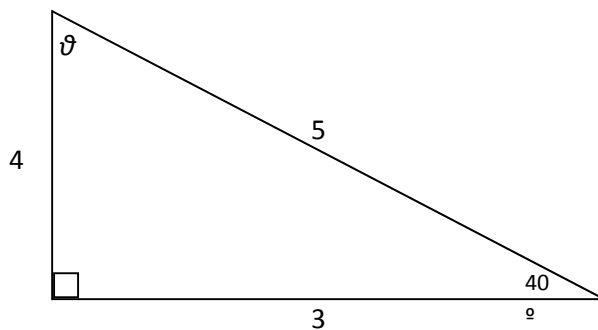
2. $\csc 40^\circ =$ _____

Ex 3. $\sec \vartheta =$ _____

4. $\sec 40^\circ =$ _____

Ex 5. $\cot \vartheta =$ _____

6. $\cot 40^\circ =$ _____



PRE-AP

Use the Unit Circle to solve for x. No decimal answers!!!

18. $\csc \frac{3\pi}{2} = x$

19. $\cot \frac{-5\pi}{6} = x$

20. $\tan(-210)^\circ = x$

Memory Trick: