

Precalculus – Transformations of Graphs and Trigonometry

Make sure your answers are clearly indicated. Show your work to be eligible for *possible* partial credit for incorrect answers.

Convert from degrees to radians (express fractions in simplest terms)

135°

765°

21°

Convert from radians to degrees

$\pi/6$

$\pi/20$

$-4\pi/5$

If the point $(-3, 5)$ is on the graph of $f(x)$, identify a point on the graph of $-2f(x-3) + 4$.

Determine in which quadrant the terminal side of the given angle in standard position lands and whether the indicated value would be positive or negative:

$\sin 576^\circ$

$\sec (-1010^\circ)$

$\csc 95\pi/7$

$\tan (-41\pi/7)$

Determine the following **EXACT** values:

$\sin 45^\circ$

$\sec -30^\circ$

$\csc 180^\circ$

$$\tan^{-1} 108000000060^\circ$$

$$(\cot^2 153.23567^\circ - \csc^2 153.23567^\circ)$$

$$\sec 165^\circ$$

Determine the following **EXACT** values:

$$\cos 3\pi/2$$

$$\sec 73\pi/6$$

$$\sin^4 \pi/3$$

Consider an angle θ , which is between 180 degrees and 270 degrees. If $\csc \theta = -9/5$, determine $\sin \theta$, $\cos \theta$, $\tan \theta$, $\sec \theta$, and $\cot \theta$. Draw a diagram, and remember that “Some old hippie Caught another hippie Tripping on acid.” (Don’t do drugs and stay in school!)

Determine the size of the angle θ in degrees, to the nearest tenth. (Yes, I know that degrees are for kids, but I don’t want you all to worry about switching back and forth with calculator modes during a quiz!)

Determine the two angles that have a measure between 0° and 360° that have the same:

Sine value as 768° _____

Tangent value as -31564° _____

(Hint: All Students Take Calculus and don’t forget to schedule your advising appointment if you haven’t already done so!)

Determine the two angles that have a measure between 0 and 2π that have the same:

Cosine value as $7\pi/3$ _____

Cosecant value as $-25654\pi/11$ _____

Rank the seven angle sizes from smallest to largest: (try doing it without a calculator first!)

110°

$2\pi/3$

-115°

$\pi/12$

13π

1200°

$-\pi/2$

For the next four questions, draw a diagram!

Two fire stations are located 38.7 miles apart, at points A and B. There is a forest fire at point C, creating a triangle with points A and B. If the angle at point A = 56° and the angle at point B = 62° , which fire station is closer to the conflagration? How much closer?

A surveyor studying the height of a building notices that the angle of elevation to the top of the building is forty-three degrees. She walks thirty feet away from the building and notes that the angle of elevation has decreased to thirty-four degrees. How tall is the structure?

A kite flyer wondered how high his kite was flying. Being an avid geometer, he obviously had a protractor with him and measures an angle of 47° between the kite string and the ground. If she used the full spool of eighty yards of string, how high is the kite? (Disregard the string sag and the height of the string reel above the ground.)

The towns of Appleton, Borden, and Calculusville form a triangle. The distance from Appleton to Calculusville is 43 miles. The distance from Borden to Calculusville is 22 miles. The angle at the city of Calculusville is 19° . What is the measure of the angle at the city of Borden?

Sketch the graph of $f(x) = \sqrt{x}$ and then use that to sketch the graph of $g(x) = -1/2 \sqrt{x + 4} + 6$. Since we know the point (4,2) is on the graph of $f(x)$, what would be a corresponding point on the graph of $g(x)$? What is the domain and range of $g(x)$?

Bonus – A UFO is first sighted at a point P_1 due east from an observer at an angle of elevation of $5\pi/36$ at an altitude (vertical distance above the ground) of 200 meters. A few minutes later, the UFO is again sighted at a point P_2 , also due east now at an angle of elevation of $5\pi/18$ at an altitude of 400 meters. What is the distance from P_1 to P_2 ?

Bonus – In class we determined that the $\cos 15^\circ$ can be determined using the subtraction identity of $\cos(45^\circ - 30^\circ)$ or using the half-angle identity of $\cos(30^\circ/2)$. While the results appear dissimilar, they must be the same value. Demonstrate algebraically by manipulating the equality shown below until the separate sides match.

$$\frac{\sqrt{6} + \sqrt{2}}{4} = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}}$$