FST Name ______________________

4-3 Basic Trigonometric Identities Date ____________________ **A#5**

Goal: Know and use basic theorems relating values of the sine and cosine functions.

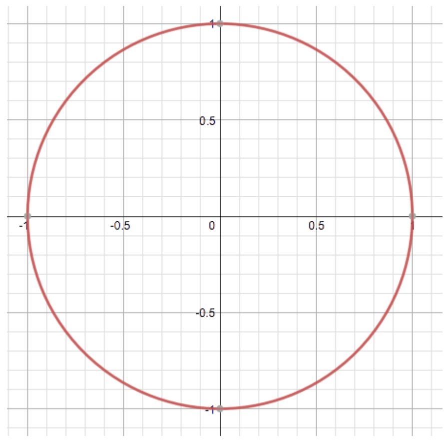
Warm Up: One coordinate of a point on the unit circle is given. Find all the possible values of the other coordinate.

a. $(0,a)$ ____________________

b. $\left(\frac{1}{2},b\right)$ ____________________

c. $\left(c,-\frac{\sqrt{3}}{2}\right)$ ____________________

d. $(d,0.28)$ ____________________



How can you find these answers using your calculator? ______________

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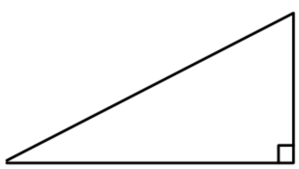
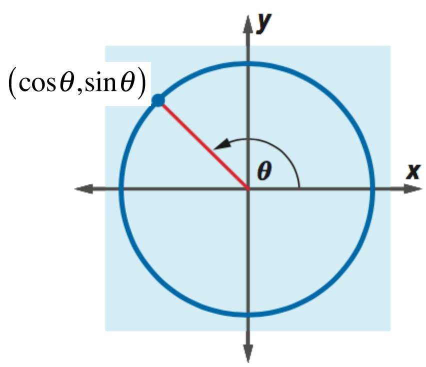
Questions

Introduction

If you know $\cos\theta$, then you can easily find $\cos(-\theta)$, $\sin\theta$ and much, much more. We can do so by using trigonometric identities, which are equations that are __________ for all values of variables for which the expressions on each side are ____________________.

Pythagorean Identity





Pythagorean Identity Theorem

For every θ, $\cos^2\theta + \sin^2\theta = 1$.

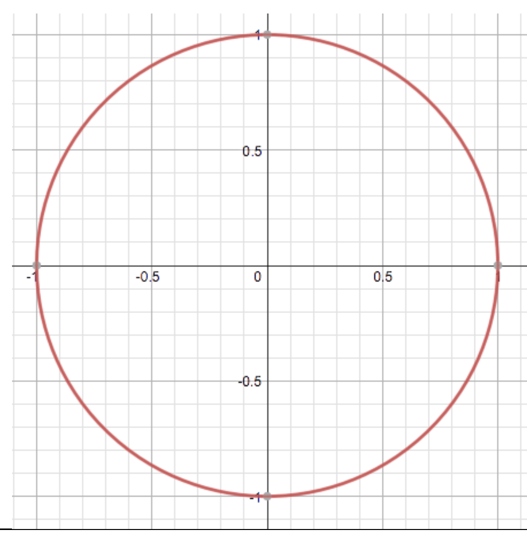
Questions

Example 1: If $\cos\theta = \frac{3}{5}$, find $\sin\theta$.

Example 2: If $\sin\theta = \frac{8}{17}$, find $\cos\theta$.

Activity: Deriving Other Identities

1. Label $A(1,0)$.
2. Choose an acute θ and use a protractor to perform the rotation R_θ on the unit circle; label it P_1.
3. Use a calculator to find the coordinates of P_1 (________, ________)
4. Use a protractor to label P_2 and a calculator to find $R_{-\theta} \rightarrow P_2$ (_________,__________)
5. Conjecture: Taking the opposite of θ __________________ to $\cos\theta$, but ___________________________ of $\sin\theta$.
6. Use a protractor to label P_3 and a calculator to find $R_{180°+\theta} \rightarrow P_3$ (__________,__________)
7. Conjecture:



	Questions
Opposites Theorem For all θ, $\cos(-\theta) =$ ______________, $\sin(-\theta) =$ __________________ and $\tan(-\theta) =$ ____________________	
Half-Turn Theorem For all θ, $\cos(180^\circ + \theta) =$ ________________ = _____________________, $\sin(180^\circ + \theta) =$ ________________ = _____________________ and $\tan(180^\circ + \theta) =$ ________________ = _____________________	
Supplements Theorem For all θ, $\cos(180^\circ - \theta) =$ ________________ = _____________________, $\sin(180^\circ - \theta) =$ ________________ = _____________________ and $\tan(180^\circ - \theta) =$ ________________ = _____________________	
Example 3: Given that $\sin 10^\circ \approx 0.1736$, find a value of x other than 10º and between 0º and 360º for which $\sin x = 0.1736$.	
Example 4: Given that $\sin 172^\circ \approx 0.1392$, find a value of x other than 172º and between 0º and 360º for which $\sin x = 0.1392$.	
Complements Theorem For all θ, $\cos(90^\circ - \theta) =$ ________________ = _____________________, $\sin(90^\circ - \theta) =$ ________________ = _____________________	

Questions

Example 5: Given that $\sin 30° = \frac{1}{2}$, compute the exact value of each function below.

a. $\cos 60°$ b. $\cos 30°$ c. $\sin 150°$

d. $\cos 210°$ $\sin(-30°)$

Example 6: Given that $\sin x = 0.681$, compute the exact value of each function below.

a. $\cos x$ b. $\tan x$ c. $\cos(\pi + x)$

d. $\sin(\pi - x)$ $\sin(-x)$

Summary: