

## Welcome Back MYP Math 9!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
<b>Monday</b> Date: <u>1 - 8</u> Topic: <u>No homework over break :)</u>	0   1   2	Please have your homework out on your desk for Ms. Paulson to check.
<b>Tuesday</b> Date: <u>1 - 9</u> Topic: <u>Sin, cos, tan, (&amp; recipricals) Table</u>	0   1   2	
<b>Wednesday</b> Date: _____ Topic: _____	0   1   2	
<b>Thursday</b> Date: _____ Topic: _____	0   1   2	
<b>Friday</b> Date: _____ Topic: _____	0   1   2	

## Class Plan:

1. Warm-up

2. Check/edit unit circle table

3. Graph: Unit circle table

4. Mathematician...Tuesday!

Which "**waves**" are mentioned in the video?

Islamic Golden Age of science

Narrator: Neal Degrasse Tyson  
(From "**Cosmos**" series)



## Unit Table Completed

### Approximated

Angle Measure	SINE	COSINE	TANGENT
0° 360° $2\pi$	0	1	0
30° $\frac{\pi}{6}$	.5	.866	.577
45° $\frac{\pi}{4}$	.707	.707	1
60° $\frac{\pi}{3}$	.866	.5	1.73
90° $\frac{\pi}{2}$	1	0	Undef.
120° $\frac{2\pi}{3}$	.866	-.5	-1.73
135° $\frac{3\pi}{4}$	.707	-.707	-1
150°	.5	-.866	-.577
180°	0	-1	0

### Exact

Angle Measure	SINE	COSINE	TANGENT
0° 360°	0	1	$\frac{0}{1} = 0$
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$
90°	1	0	$\frac{1}{0} = \text{undef.}$
120°	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = -\sqrt{3}$
135°	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	-1
150°	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = -\frac{\sqrt{3}}{3}$
180°	0	-1	$\frac{0}{-1} = 0$

## Unit Table Completed

### Approximated

Angle Measure	SINE	COSINE	TANGENT
	X	X	
210°	-0.5	-0.866	0.577
225°	-0.707	-0.707	1
240°	-0.866	-0.5	1.73
270° <sup>3π/2</sup>	-1	0	Undefined
300°	-0.866	0.5	-1.73
315°	-0.707	0.707	-1
330°	-0.5	0.866	-0.577

### Exact

Angle Measure	SINE	COSINE	TANGENT
210°	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{\sqrt{3}}{3}$
225°	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	1
240°	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \sqrt{3}$
270°	-1	0	$\frac{-1}{0} = \text{undefined}$
300°	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$
315°	$-\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	-1
330°	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{\sqrt{3}}{3}$



Warm-up: Table completed last night...

1) What are the domain and range of the table?

(x-values)  $-\infty \leq x \leq \infty$   
**Domain:**  $\{0 \leq x \leq 360^\circ\}$

(y-values)  
**Range:**  $\{-1 \leq y \leq 1\}$

2) What would be a consistent **x-scale** and **y-scale** for a graph?

X:

Y: 0.1, .5

Angle Measure	SINE		
0° 360°	0		
30°	.5	210°	-.5
45°	.707	225°	-.707
60°	.866	240°	-.866
90°	1	270°	-1
120°	.866	300°	-.866
135°	.707	315°	-.707
150°	.5	330°	-.5
180°	0		

## Investigation: Graph Sine & Cosine

**Task:** Graph the sine and cosine waves.

\*\*Use two colors to show sine vs. cosine

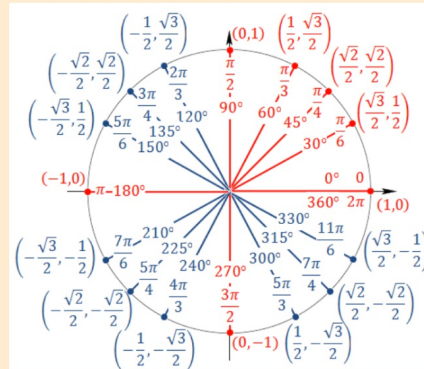
OR: Use *dashed* (---) and **solid** (—)

**Goal:** Using **DEGREES** & **RADIANS**

1) Sine wave

2) Cosine wave

(label radian measure  
below degrees)

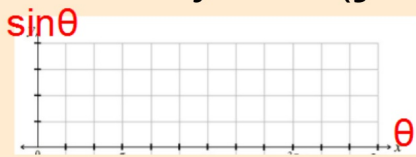


**Done? Graph Tangent!**

## What are the inputs & outputs?

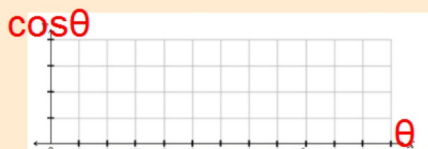
### 1) Sine Graph

Scale: x-axis (degree or radian measure)  $\theta$   
y-axis (**y-value** unit circle)  $\sin\theta$

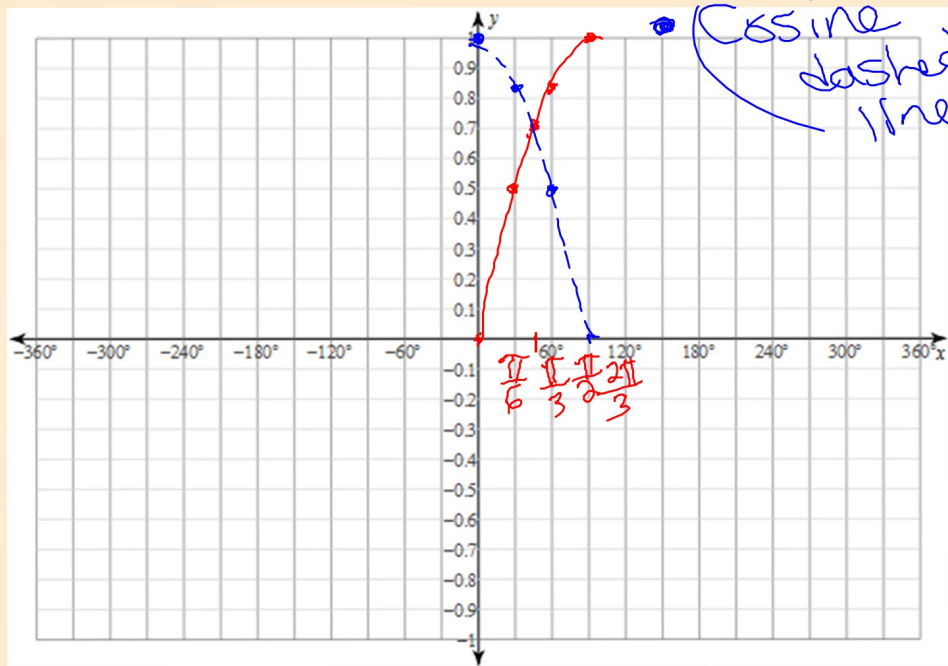


### 2) Cosine Graph

Scale: x-axis (degree or radian measure)  $\theta$   
y-axis (**x-value** unit circle)  $\cos\theta$

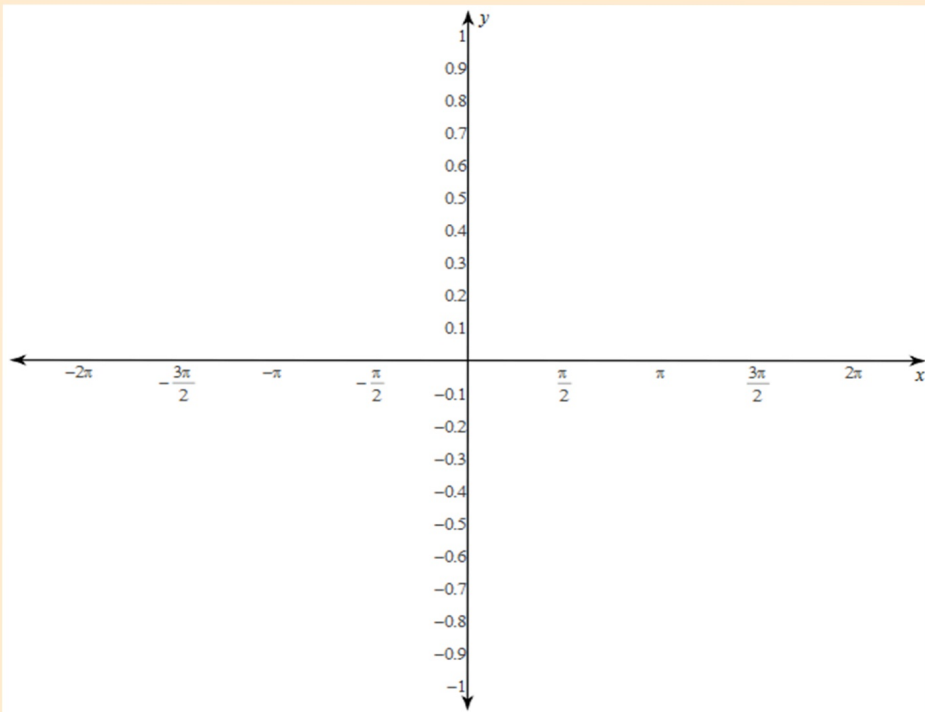


# Graph with degrees ● Sine Wave





## Graph with radians



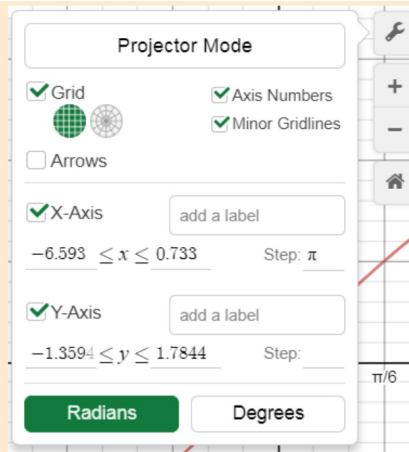
# Desmos

## Help: Changing to Radians

How to change X axis on Desmos?

To add Pi labels to your **x** and **y axes**, click the Graph Settings wrench. Click Step and enter "pi" as the step to label that **axis** with multiples of  $\pi$ . Sep 27, 2017

1. Wrench
2. Step: pi



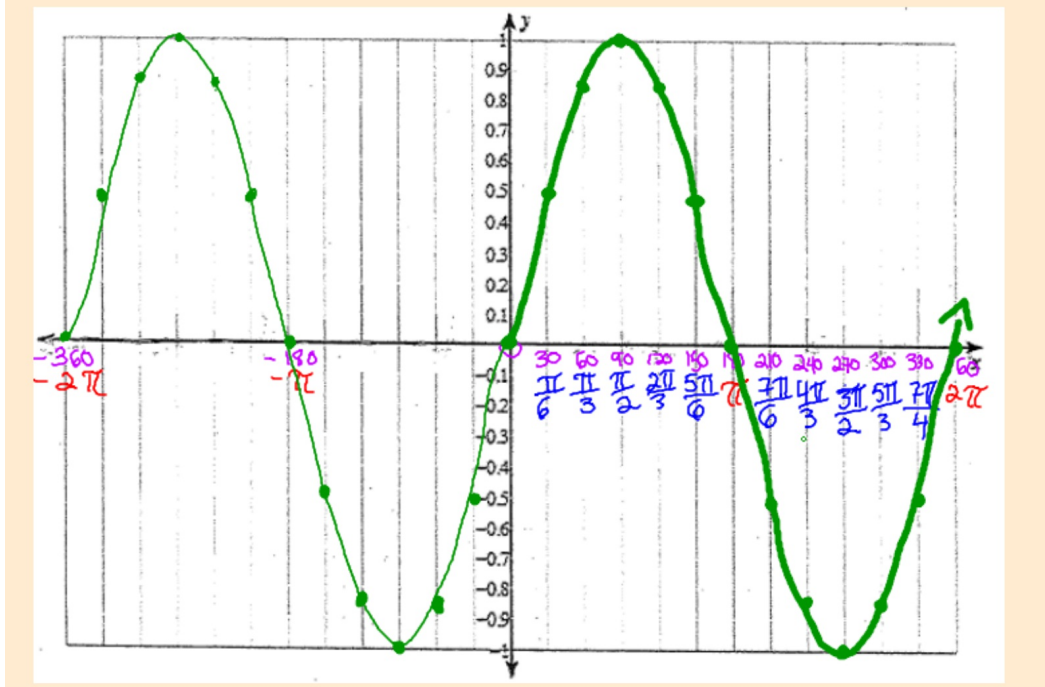
# Graph of Sine

Desmos

Radians (positive x-axis)



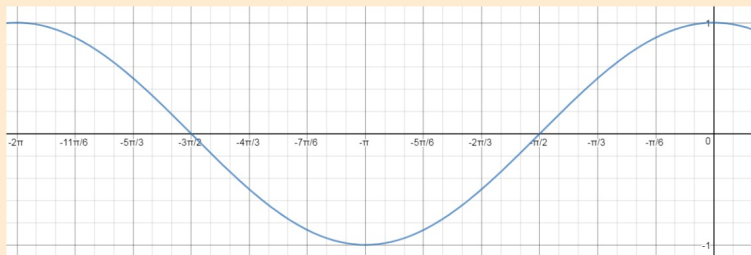
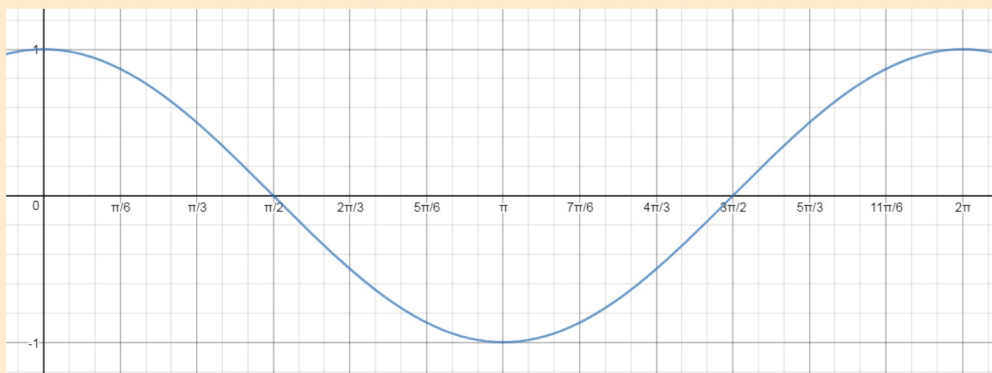
# Graph of Sine



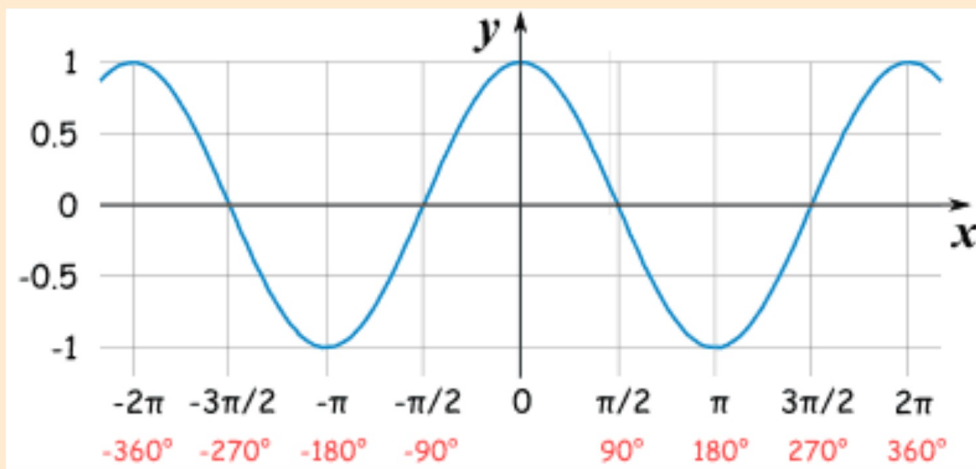
# Graph of Cosine

Desmos

Radians (positive x-axis)

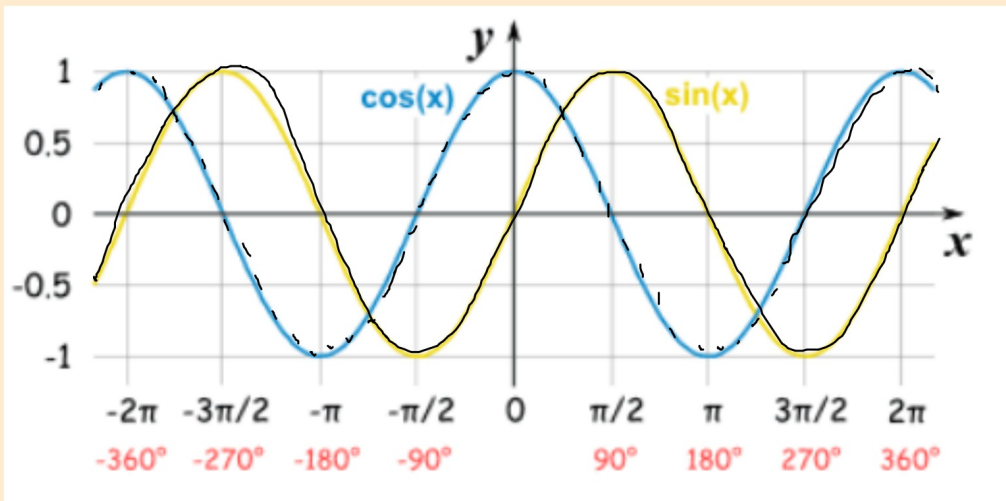


## Graph of Cosine



## Compare Sine & Cosine

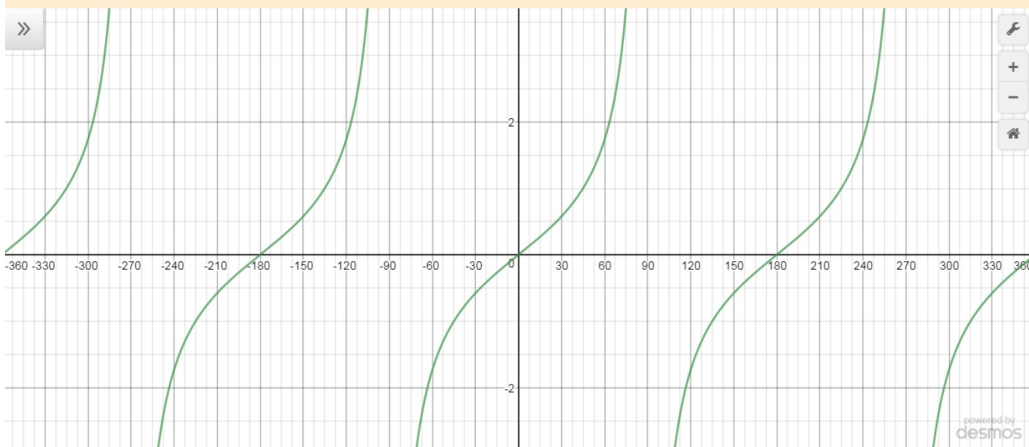
... What did you notice about the graphs?



<https://www.mathsisfun.com/algebra/images/sine-cosine-graph.gif>

# Graph of Tangent Degrees

Desmos

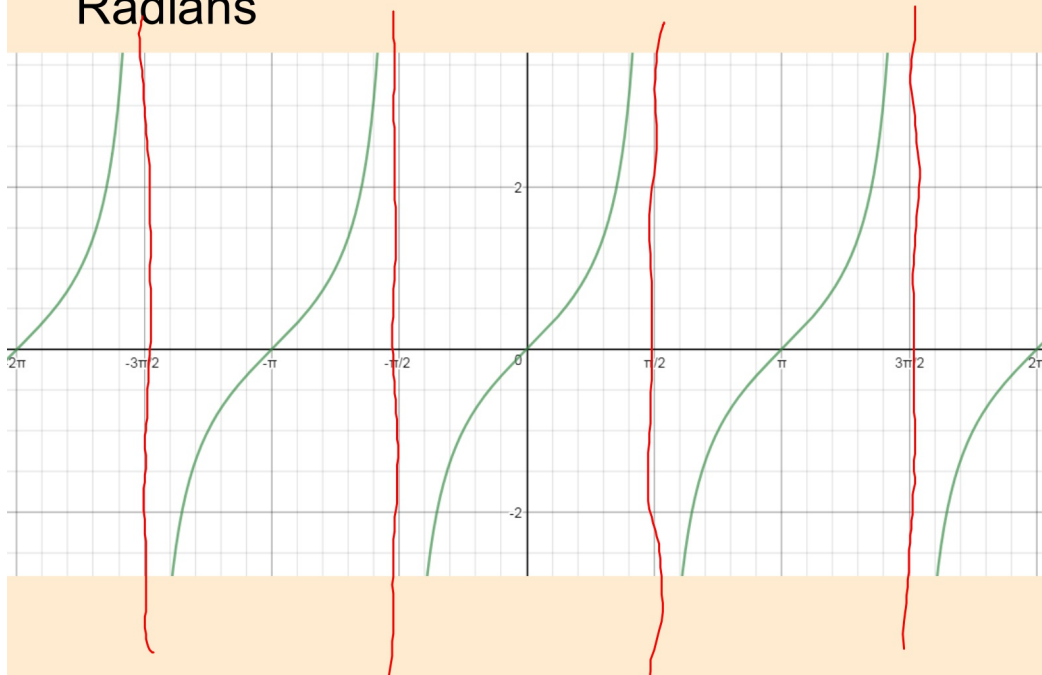




# Graph of Tangent

Desmos

Radians



Exercises...

Complete your graphs of Sine  
and Cosine (Using radians and  
degrees)

from  $-360^\circ$  to  $360^\circ$

Challenge... Tangent!