Today's Learning Goal(s):

Date: _____

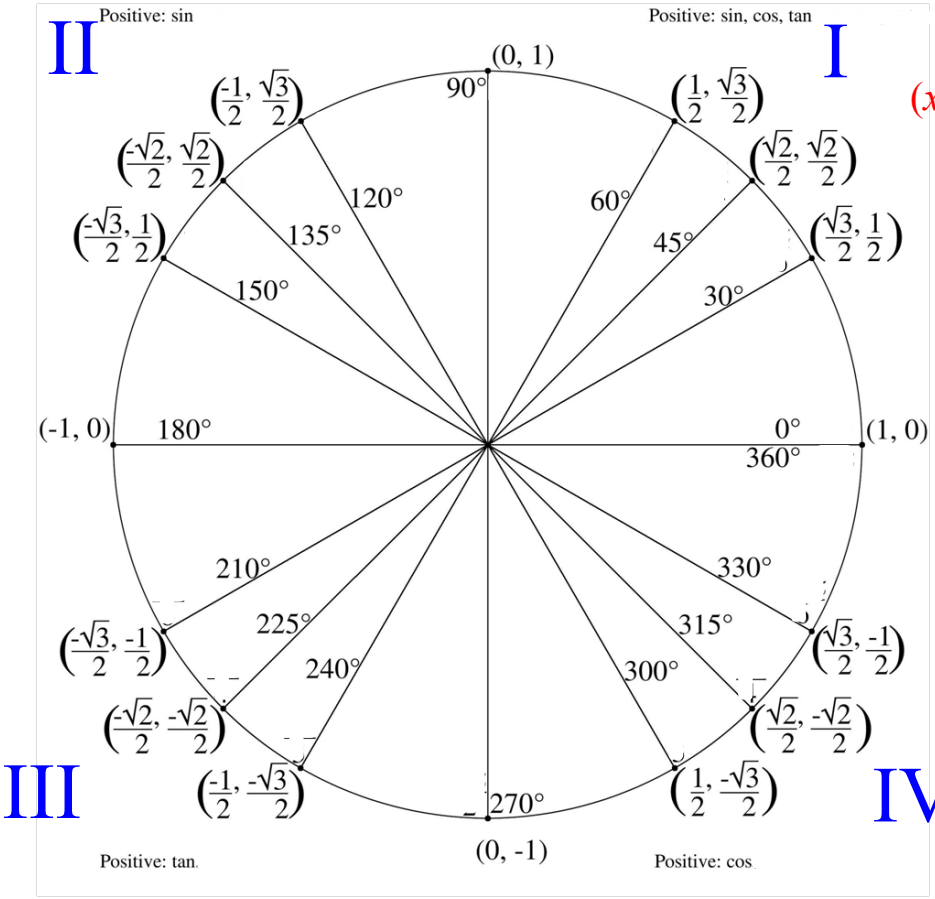
By the end of the class, I will be able to:

a) relate the properties of sinusoidal functions to real world situations.

Last day's work: pp. 352-355 #1 – 8
pp. 363-364 #1 – 4, 9 [15,16]

The Unit Circle

Date: _____



$(x,y) = (\cos\theta, \sin\theta)$

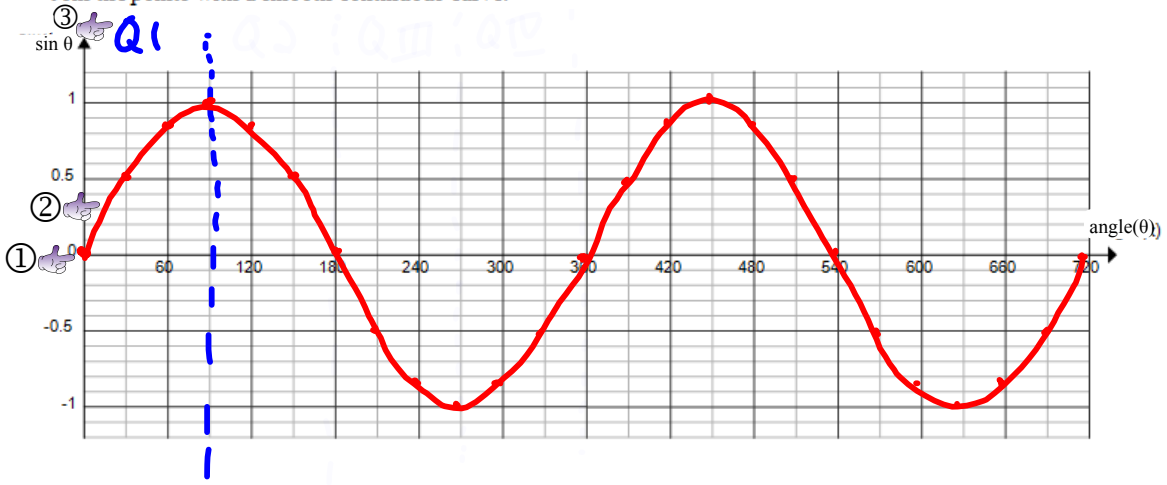
Developing the Sine Function: $y = \sin\theta$ (or $y = \sin x$)

1. Complete the table.

Angle θ (°)	0	30	60	90	120	150	180	210	240	270	300	330
Exact value of *y* (sinθ)	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$
Decimal value of *y* (2 decimal places)	0	0.5	0.86	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5

	360	390	420	450	480	510	540	570	600	630	660	690	720
Exact value of *y* (sinθ)	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0
Decimal value of *y* (2 decimal places)	0	0.5	0.86	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	0

2. Use the decimal values of sinθ, and plot the ordered pairs (θ, sinθ) on the grid below. **[same as graphing (*x*, sin *x*)]** Join the points with a smooth continuous curve.



For 1 period $0^o \le \theta \le 360^o$

Increasing Interval: $0^o \le \theta \le 90^o$, $270^o \le \theta \le 360^o$

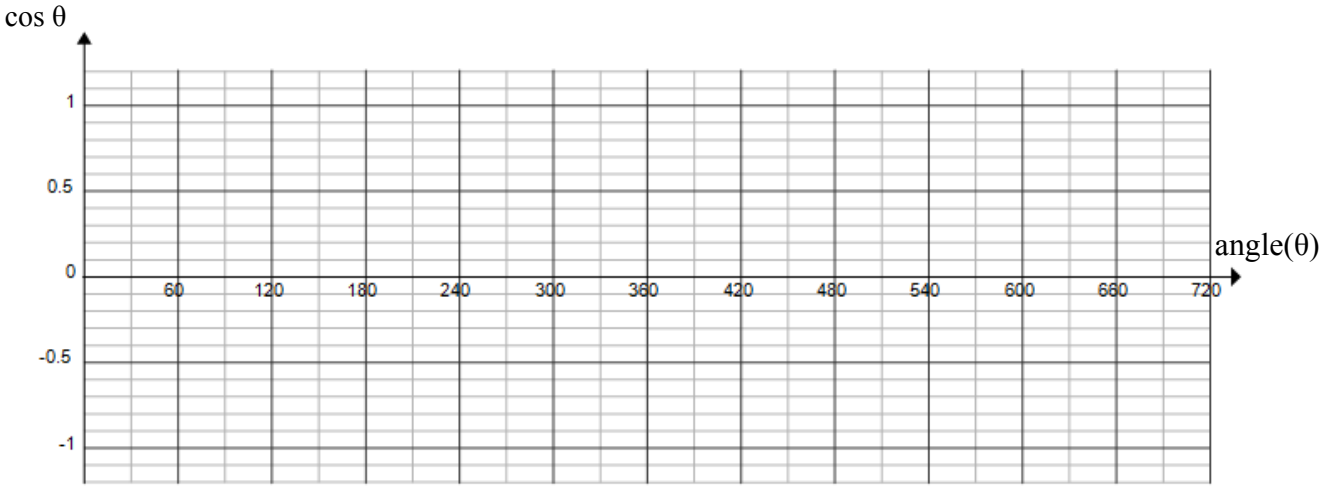
Decreasing Interval: $90^o \le \theta \le 270^o$

Developing the Cosine Function: $y = \cos\theta$ (or $y = \cos x$)

1. Complete the table.

Angle θ (°)	0	30	60	90	120	150	180	210	240	270	300	330	
Exact value of *y* (cosθ)													
Decimal value of *y* (2 decimal places)													
	360	390	420	450	480	510	540	570	600	630	660	690	720
Exact value of *y* (cosθ)													
Decimal value of *y* (2 decimal places)													

2. Use the decimal values of cosθ, and plot the ordered pairs (θ, cosθ) on the grid below. Join the points with a smooth continuous curve.

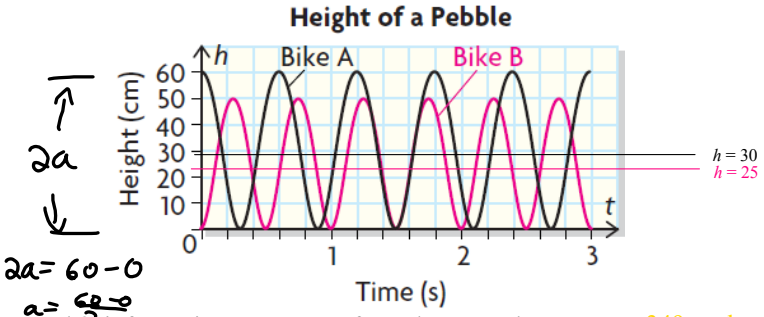


6.3 Interpreting Sinusoidal Functions

Date: Dec. 3/15

Ex. 1

Two students are riding their bikes. A pebble is stuck in the tire of each bike. The two graphs show the heights of the pebbles above the ground (in terms of time).



2a

2a = 60 − 0

a = 60/2

1. What information can we get from these graphs? p.349 peak vs. trough
2. How are the graphs the same/different?
   Are both wheels the same diameter?
   Bike A: diameter = 60 cm Bike B: diameter = 50 cm
3. Calculate and compare:

a) the amplitude Bike A: amplitude = 30 cm Bike B: amplitude = 25 cm

$a = \frac{60-0}{2} = 30$ $a = \frac{50-0}{2} = 25$

b) the period

Bike A: period = 0.6 sec
The pebble takes 0.6 s to complete 1 revolution.

Bike B: period = 0.5 sec
The pebble takes 0.5 s to complete 1 revolution.

Note: This is NOT the speed of the wheel!
We will compare speeds in part d)

c) the equation of the axis

Bike A: $\frac{60 + 0}{2} = 30$

The equation of the axis for Bike A is $h = 30$.

Bike A's wheel axle is 30 cm above the ground.

Bike B: $\frac{50 + 0}{2} = 25$

The equation of the axis for Bike B is $h = 25$.

Bike B's wheel axle is 25 cm above the ground.

d) the speed of each bike

Speed is equal to distance divided by time, so we first have to figure out how far each bike travels when the wheel completes one revolution. This distance is the circumference.

Circumference:

Bike A

$C_A = 2\pi r_A$

$C_A = 2\pi(30)$

$C_A = 60\pi$

$C_A \doteq 188.5$ cm

$C_A \doteq 1.885$ m

Speed:

$s_A = \frac{d}{t}$

$s_A = \frac{1.885}{0.6}$

$s_A \doteq 3.14$ m/s

Circumference:

Bike B

$C_B = 2\pi r_B$

$C_B = 2\pi(25)$

$C_B = 50\pi$

$C_B \doteq 157.1$ cm

$C_B \doteq 1.571$ m

Speed:

$s_B = \frac{d}{t}$

$s_B = \frac{1.571}{0.5}$

$s_B \doteq 3.14$ m/s

What does the amplitudes being different for these two graphs mean?
That the diameters for the two bike wheels are different

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 352-355 #1 – 8
pp. 363-364 #1 – 4, 9 [15,16]

(If time: ***Demo p.363 8a on TI-84*****)**

Today's Homework Practice includes:
p. 363 #8
pp. 370-372 #1 – 8, 13 [15]

6.2 SineTracer.gsp