Lesson 14-1: Graphs of Sine and Cosine

Apr 14-11:39 AM

Review: Converting Degrees to Radians

$45^\circ \cdot \frac{\pi}{180} = \frac{45\pi}{180} = \frac{\pi}{4}$

90° $\frac{\pi}{2}$

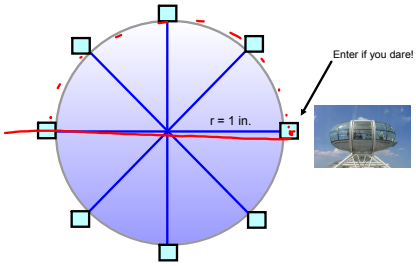
180° π

270° $\frac{3\pi}{2}$

360° 2π

Apr 17-11:44 AM

The flea fair has a new ride this year. The **Amphibious Flea Eye** ferris wheel! The top half of the ride is above water and the bottom half is under water. Freddy flea is scared of heights, while Freeda flea is afraid of water. Let's give them more information about the ferris wheel so they aren't so scared.

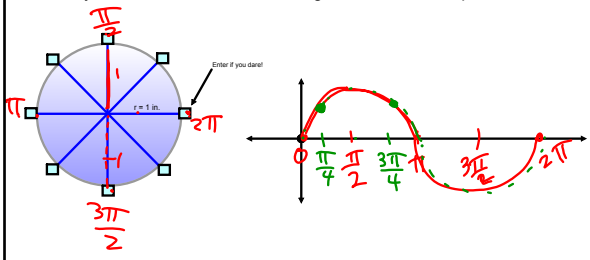


Apr 14-10:30 AM

What is the maximum height above water of the ferris wheel?
How many radians do the fleas travel to get to the maximum point?

How many radians do the fleas travel to get back to water level for the first time?

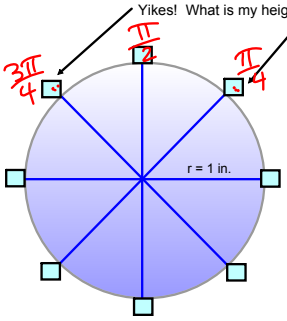
What is the minimum height below water of the ferris wheel?
How many radians do the fleas travel to get to the minimum point?



Apr 14-11:31 AM

Yikes! What is my height above the water?

(Graph your answers on the previous slide)



Apr 14-11:35 AM

Use the following website to make predictions about the equations and graphs of ferris wheels with radii of 5 cm and 10 cm.

http://www.univie.ac.at/future.media/moe/galerie/fun2/fun2.html

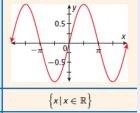
height

Amplitude | a | Vertical Shift

$y = a \sin bx + c$

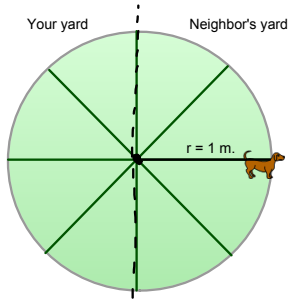
Number of cycles between 0 and 2π

$Period = \frac{2\pi}{|b|}$ $\frac{2\pi}{1}$ 2π

FUNCTION	$y = \sin x$
GRAPH	
DOMAIN	$\{x \mid x \in \mathbb{R}\}$
RANGE	$\{y \mid -1 \le y \le 1\}$
PERIOD	2π
AMPLITUDE	1

Apr 18-9:54 AM

Your neighbors decide to put their dog on a leash in the backyard.
They put the stake on the property line between your yard and their yard.



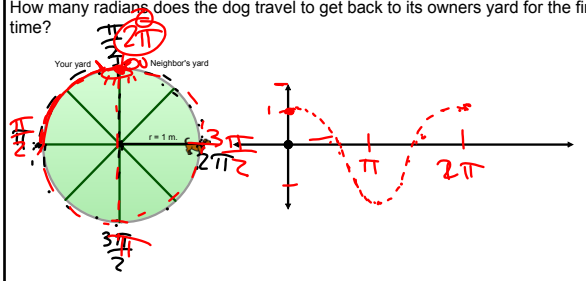
Apr 18-9:58 AM

What is the farthest distance the dog can travel into its owner's yard?

How many radians does the dog walk to get to your yard?
What is the dogs distance from its owner's yard at that time?

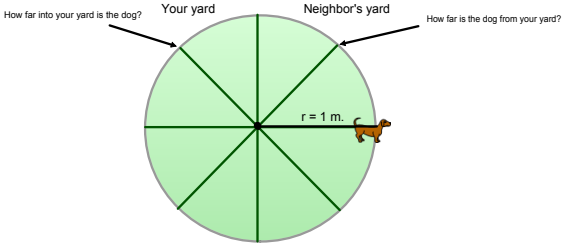
What is the farthest distance the dog can travel into your yard?
How many radians does the dog walk to get to that point?

How many radians does the dog travel to get back to its owners yard for the first time?



Apr 18-10:06 AM

(Graph your answers on the previous slide)



Apr 18-10:10 AM

Use the following website to make predictions about the equations and graphs of a leash with a lenght of 5 m and 10 m.

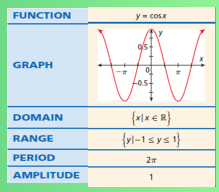
http://www.univie.ac.at/future.media/moe/galerie/fun2/fun2.html

Amplitude | a | Vertical Shift

$y = a \cos bx + c$

Number of cycles between 0 and 2π

$$Period = \frac{2\pi}{|b|}$$



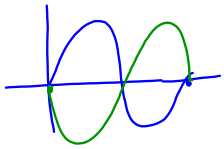
Apr 18-10:11 AM

a = neg.

The a indicates a vertical stretch or compression, which changes the amplitude. If a is less than 0, the graph is reflected across the x-axis.

#cycles

The value of b indicates a horizontal stretch or compression, which changes the period.



Apr 18-7:51 AM

Lesson 14-1: Graphs of Sine and Cosine

Periodic functions are functions that repeat exactly in regular intervals called cycles.

The length of the cycle is called its period.

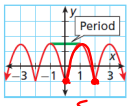
$$P = \frac{2\pi}{|b|}$$

A cycle may begin at any point on the graph of a function.

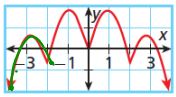
↳ full rotation ending where it began.

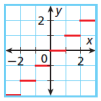
Apr 14-3:17 PM

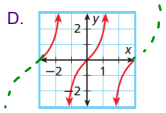
Identify whether each function is periodic.
If the function is periodic, give the period.

A. 

yes

B. 
no

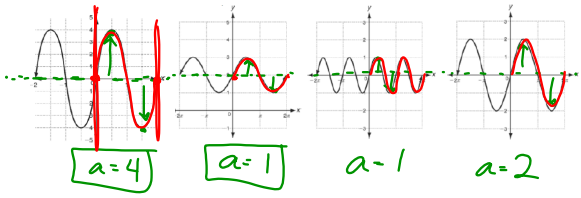
C. 
no

D. 
yes

Apr 18-10:48 AM

The amplitude of sine and cosine functions is half of the difference between the maximum and minimum values of the function. The amplitude is always positive.

Identify the amplitude of each function.


a=4 a=1 a=1 a=2

Apr 18-10:50 AM

Find the amplitude, maximum and minimum values, and the period.

1. $y = 3\sin x$

a = 3
max = 3
min = -3
period $\frac{2\pi}{1} = 2\pi$

2. $y = 2\sin x + 3$

a = 2
max = 5
min = 1
period $\frac{2\pi}{1} = 2\pi$

3. $y = 2\cos \pi x - 1$

a = 2
max = 1
min = -3
period $\frac{2\pi}{\pi} = 2$

4. $y = 4\sin \frac{\pi}{3} x$

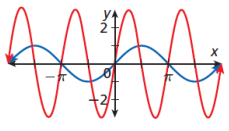
a = 4
max = 4
min = -4
period $\frac{2\pi}{\frac{\pi}{3}} = 2\pi \cdot \frac{3}{\pi} = 6$

Apr 22-10:43 AM

Assignment: Patterns of Periodic Change Worksheet

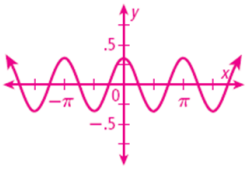
Apr 18-10:52 AM

Using f(x) = sin x as a guide, graph the function g(x) = 3 sin 2x.
Identify the amplitude and period.



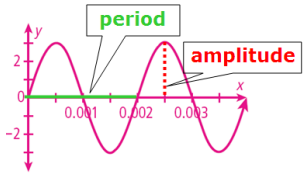
Apr 18-10:50 AM

Using f(x) = cos x as a guide, graph the function $h(x) = \frac{1}{3}\cos 2x$.
Identify the amplitude and period.



Apr 18-10:50 AM

Frequency is the number of cycles in a given unit of time, so it is the reciprocal of the period of a function.



Apr 18-10:51 AM