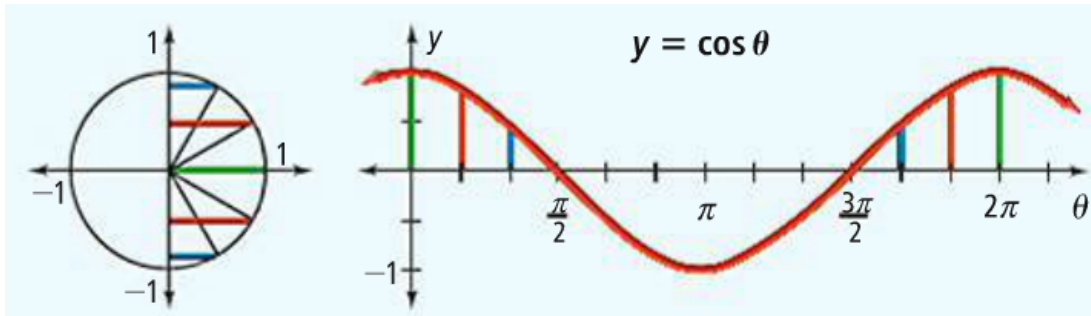


13.5 - The Cosine Function

The **cosine function**, $y = \cos \theta$, matches θ with the x-coordinate of the point on the unit circle where the terminal side of angle θ intersects the unit circle. The symmetry of the set of points $(x, y) = (\cos \theta, \sin \theta)$ on the unit circle guarantees that the graphs of sine and cosine are congruent translations of each other.

Essential Understanding For each and every point along the unit circle the radian measure of the arc has a corresponding cosine value. The colored bars represent the cosine values of the points on the circle translated onto the cosine graph. So as the terminal side of an angle rotates about the origin (beginning at 0°), its cosine value on the unit circle decreases from 1 to -1 , and then increases back to 1.



Apr 15-8:53 AM

Pretty much same as Sine!!!

Take note

Concept Summary Properties of Cosine Functions

Suppose $y = a \cos b\theta$, with $a \neq 0$, $b > 0$, and θ in radians.

- $|a|$ is the amplitude of the function.
- b is the number of cycles in the interval from 0 to 2π .
- $\frac{2\pi}{b}$ is the period of the function.

To graph a cosine function, locate five points equally spaced through one cycle.

For $a > 0$, this five-point pattern is *max-zero-min-zero-max*.

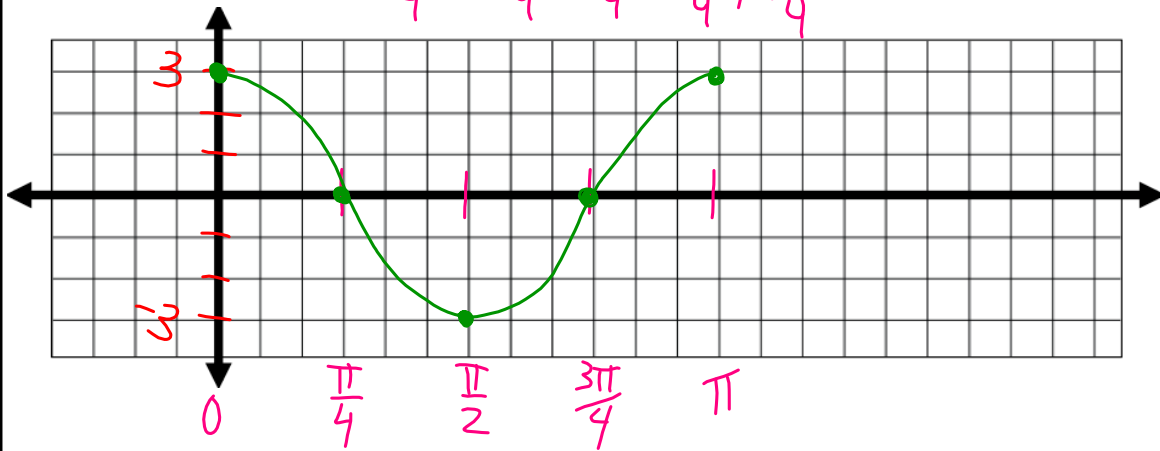
different for cosine!

Apr 15-8:59 AM

Ex.1 Sketch one cycle the graph of the cosine function.

$y = \underline{3} \cos \underline{2}\theta$ Amp: (3) Per: $\frac{2\pi}{2} = (\pi)$

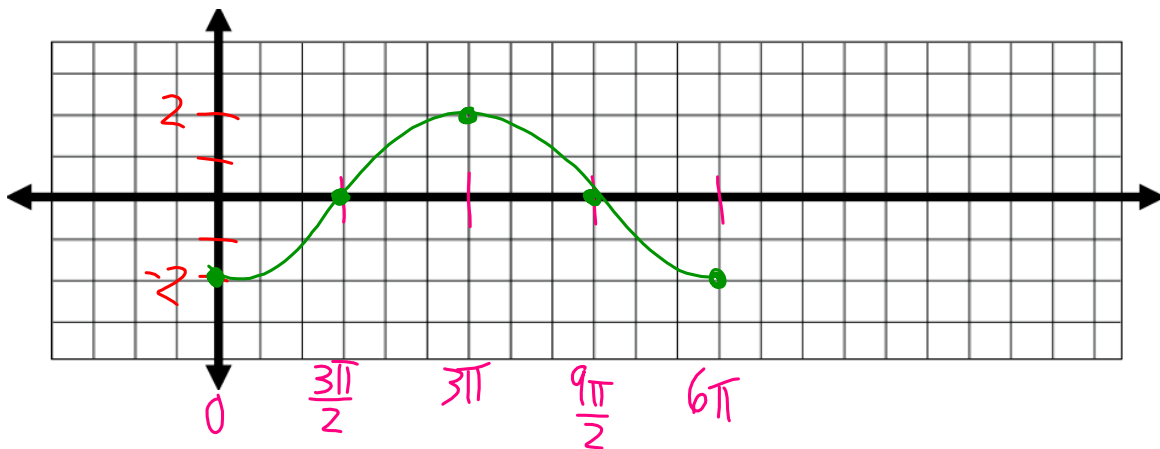
$\frac{\pi}{4} : \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \frac{4\pi}{4}$



Apr 15-9:01 AM

Ex.2 Sketch one cycle the graph of the cosine function.

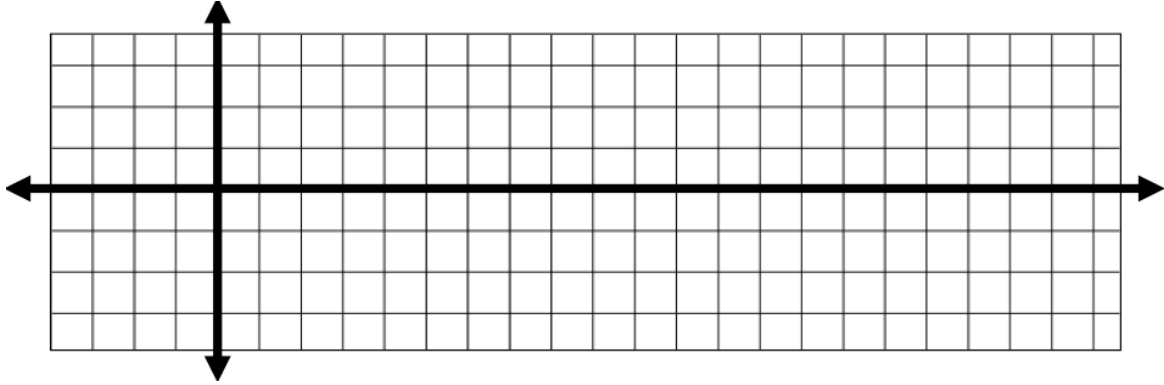
$y = -2 \cos \frac{1}{3}\theta$ Amp: (2) with reflection Per: $\frac{2\pi}{\frac{1}{3}} = (6\pi)$



Apr 15-9:01 AM

Ex.3 Sketch one cycle the graph of the cosine function.

$$y = \frac{1}{2} \cos 2\pi\theta$$



Apr 15-9:01 AM

Ex.4 Write a cosine function with the following descriptions:

a. Amplitude 2, Period 4π

$$4\pi = \frac{2\pi}{b}$$

$$\frac{4\pi \cdot b}{4\pi} = \frac{2\pi}{4\pi}$$

$$b = \frac{1}{2}$$

$$y = 2 \cos \frac{1}{2}\theta$$

b. Amplitude $\frac{1}{2}$, Period 8

$$8 = \frac{2\pi}{b}$$

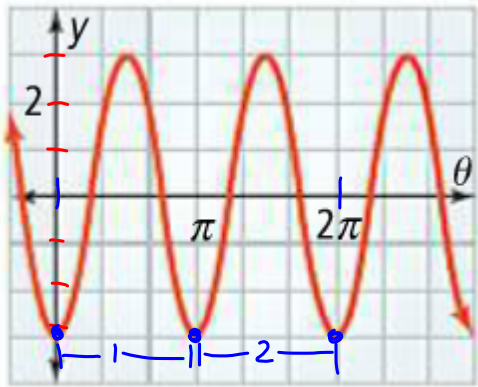
$$\frac{8b}{8} = \frac{2\pi}{8}$$

$$b = \frac{\pi}{4}$$

$$y = \frac{1}{2} \cos \frac{\pi}{4}\theta$$

Apr 15-9:04 AM

Ex.5 Write a cosine function with the following graph:



$a = -3$ $b = 2$

$y = -3 \cos 2\theta$

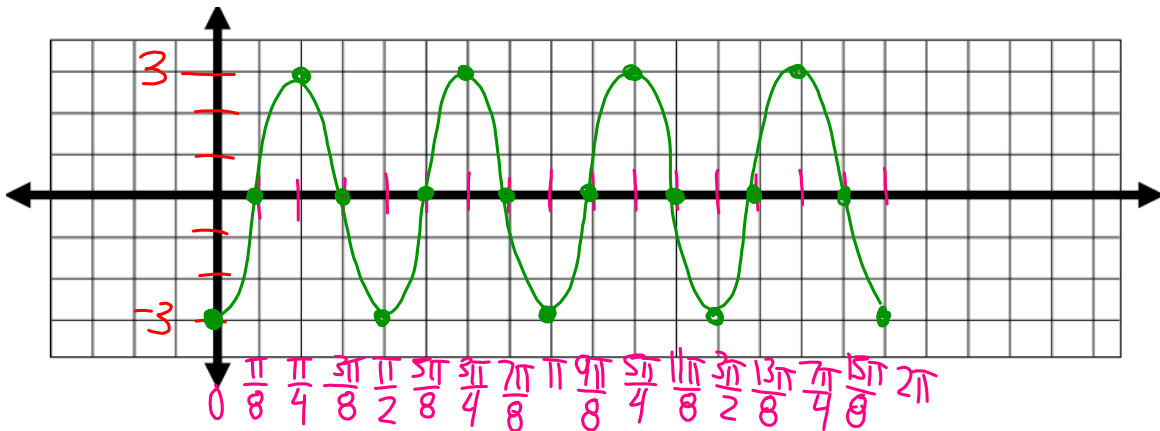
Apr 15-9:10 AM

Ex.6 Sketch from 0 to 2π the graph of the cosine function.

$y = -3 \cos 4\theta$

Amp: 3 (w/reflect.)

Per: $\frac{2\pi}{4} = \frac{\pi}{2}$



Apr 19-12:25 PM

HOMEWORK:

p.865:

11 - 20 all, 44,46,47,50

(#'s 11 - 15 are graphing)

Apr 15-9:18 AM