

4.3 - Graphing Sin/Cos Trig. Functions - Day 1

A **periodic function** is a function that repeats a pattern of y -values (outputs) at regular intervals. One complete pattern is a **cycle**. A cycle may begin at any point on the graph of the function. The **period** of a function is the horizontal length—the distance along the x -axis—of one cycle. The x -value in a periodic function often represents time.

Begin at any point on the graph. Trace one complete cycle.



The beginning and ending x -values of each cycle determine the period of the function.

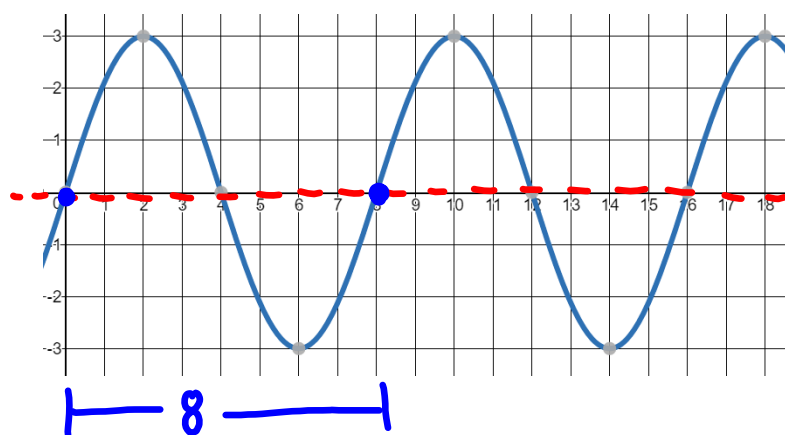
Vocabulary

Midline: a horizontal ($y =$) line that passes through the middle of a periodic function graph.

Amplitude: the vertical height from the midline to the peaks. Or we can measure the height from highest to lowest points and divide that by 2.

Period: the horizontal length of one cycle.

Ex. Find the equation of the midline, the amplitude and the period length of the periodic graph below.



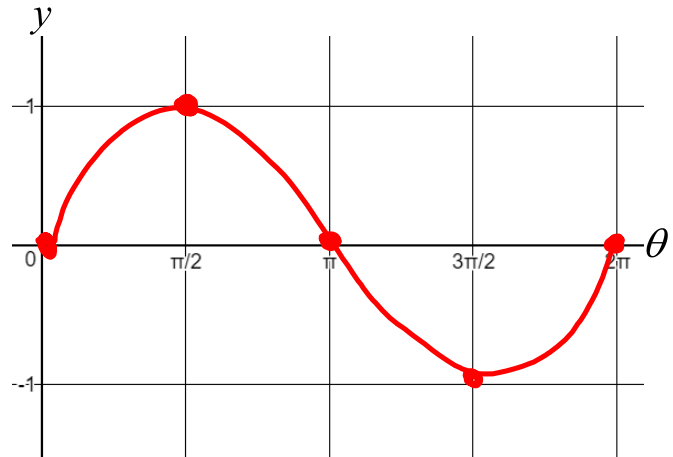
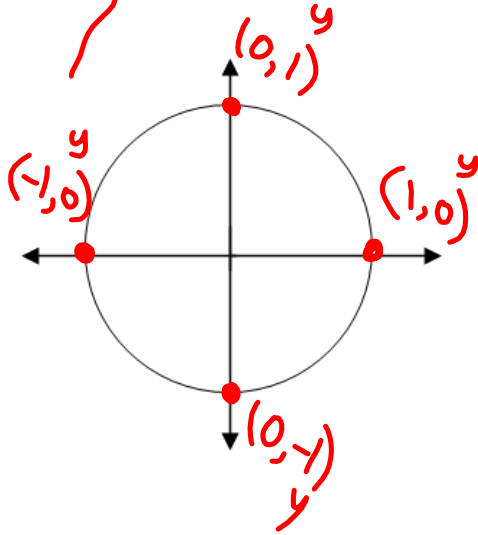
Midline: $y = 0$

Amplitude: 3

Period Length: 8

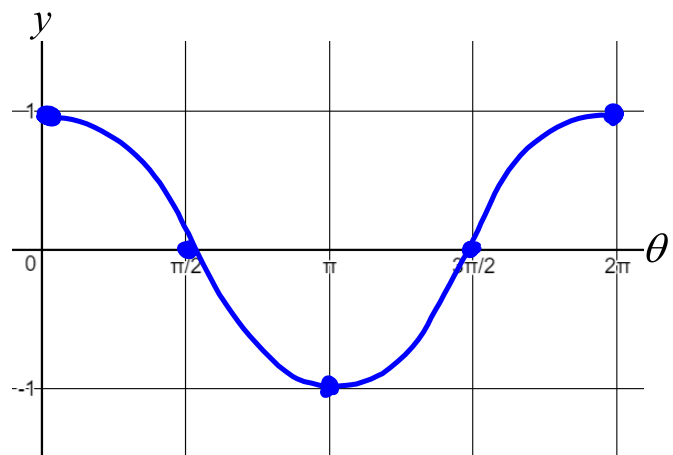
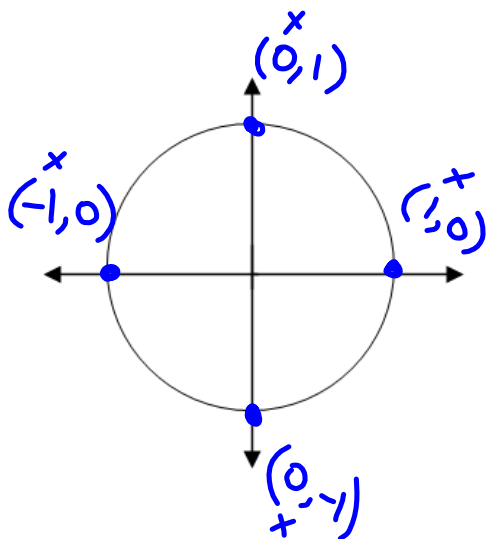
$$y = \sin \theta$$

The **sine function**, $y = \sin \theta$, matches the measure θ of an angle in standard position with the y -coordinate of a point on the unit circle. This point is where the terminal side of the angle intersects the unit circle.



$$y = \cos \theta$$

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.



take note

Concept Summary Properties of Sine Functions

Suppose $y = a \sin b\theta$, 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.

You can use five points equally spaced through one cycle to sketch a sine curve. For $a > 0$, this five-point pattern is *zero-max-zero-min-zero*.

take note

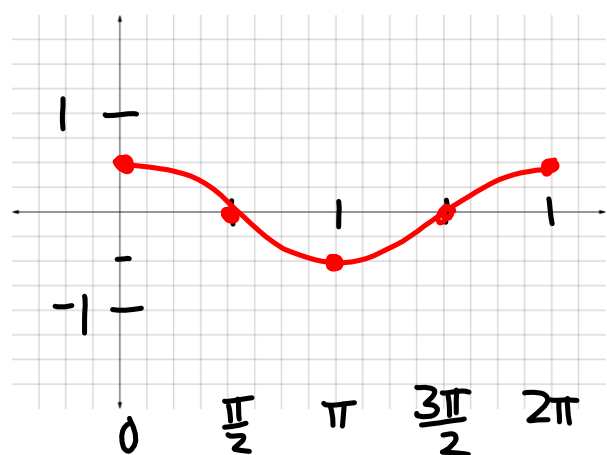
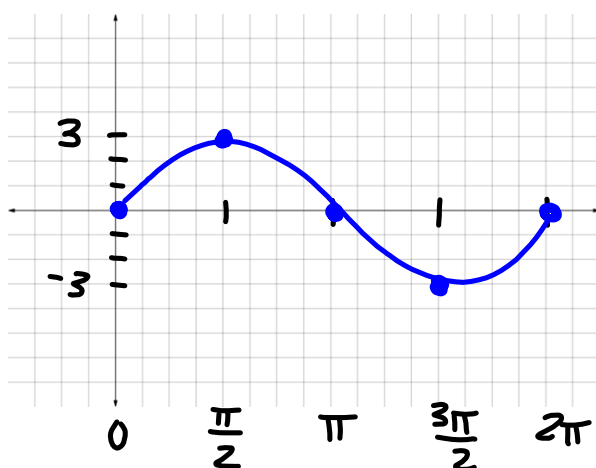
Concept Summary Properties of Cosine Functions

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

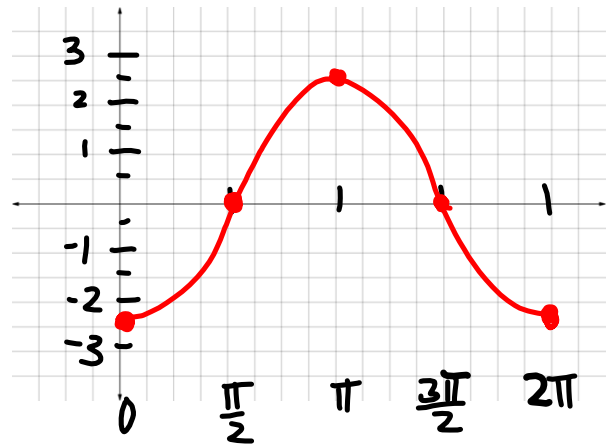
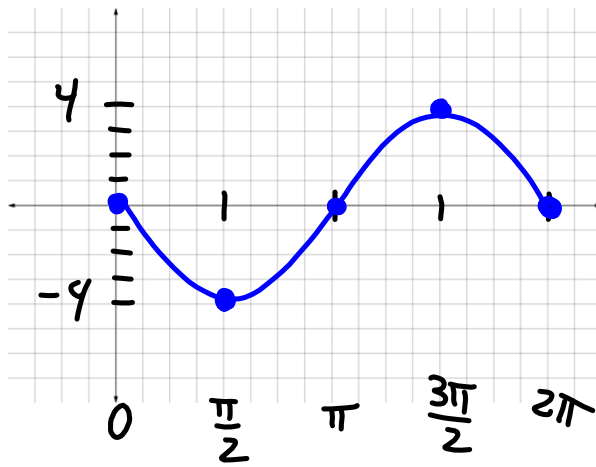
- $|a|$ is the amplitude of the function.
- b is the number of cycles in the interval from 0 to 2π .
- $\frac{2\pi}{b}$ is the period of the function.

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*.

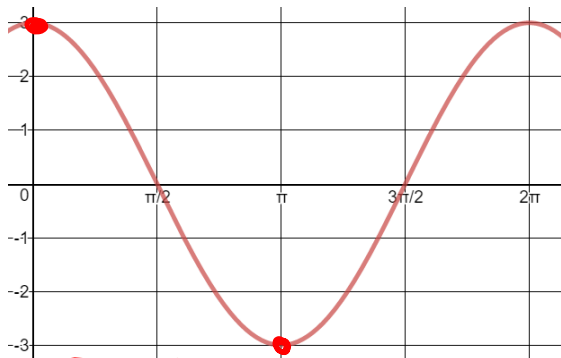
Graph $y = 3 \sin \theta$ and $y = \frac{1}{2} \cos \theta$. First find the period and amplitudes of each, then graph in radians.



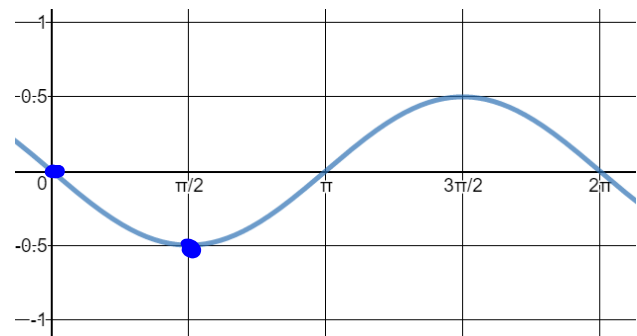
Graph $y = -4 \sin \theta$ and $y = -\frac{5}{2} \cos \theta$. First find the period and amplitudes of each, then graph in radians.



Given the graphs... Write the function.



$$y = 3 \cos \theta$$



$$y = -\frac{1}{2} \sin \theta$$