Trig 6.3

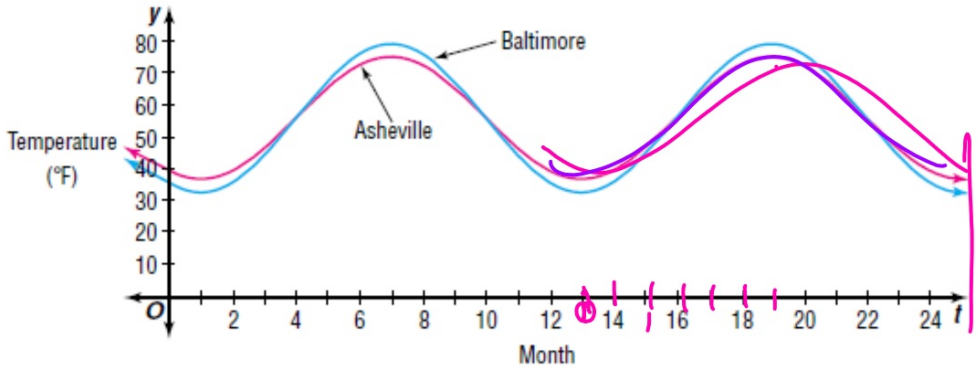
Spaghetti graphs:gallery walk
Identify periodic functions repeat
Use the graphs of sine and cosine functions

sine

cosine

periodic functions repeating unit (horizontal)

METEOROLOGY The average monthly temperatures for a city demonstrate a repetitious behavior. For cities in the Northern Hemisphere, the average monthly temperatures are usually lowest in January and highest in July. The graph below shows the average monthly temperatures (°F) for Baltimore, Maryland, and Asheville, North Carolina, with January represented by 1.



Does it repeat horizontally? How long does it take?

Periodic Function and Period

A function is *periodic* if, for some real number α, $f(x + \alpha) = f(x)$ for each x in the domain of f.

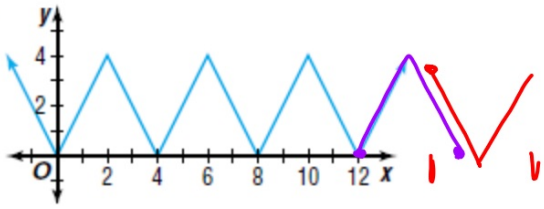
The least positive value of α for which $f(x) = f(x + \alpha)$ is the *period* of the function.

Can it "slide over"?

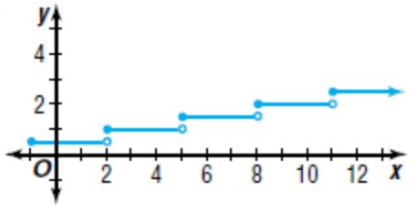
What is the length of the repeating unit?

1 Determine if each function is periodic. If so, state the period.

a.



b.



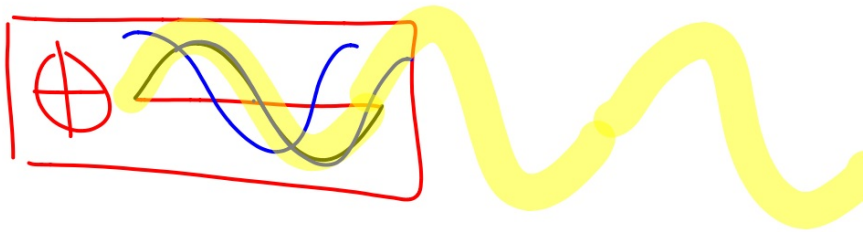
360° periodic function

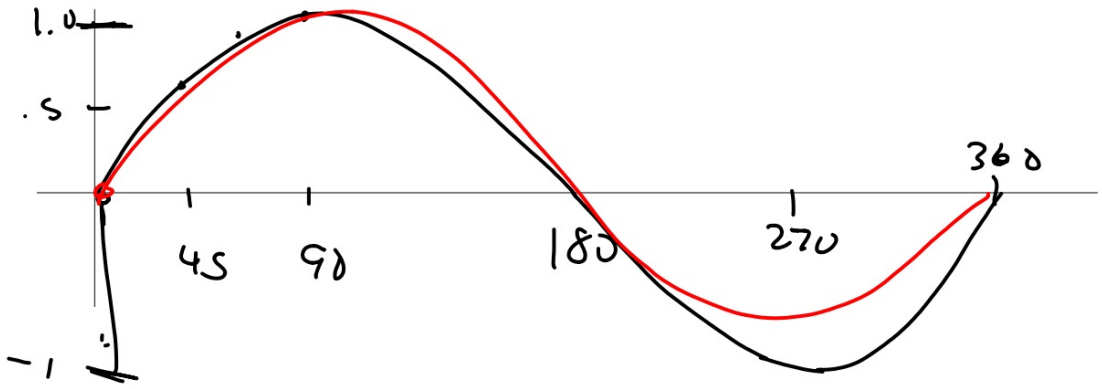
Graphing calculator — D/h y=sinx — a/h y=cosx

set mode to degrees (today) or radians (usually)

Make sure you know where you are...

x	sinx



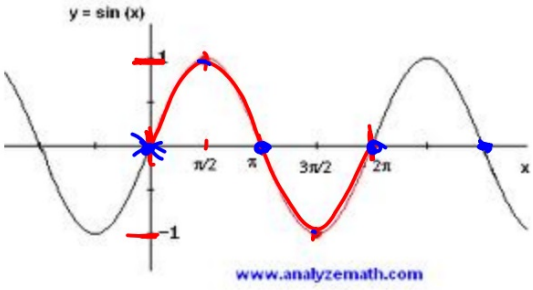


Now fill in with radians

p 360

Properties of the Graph of $y = \sin x$

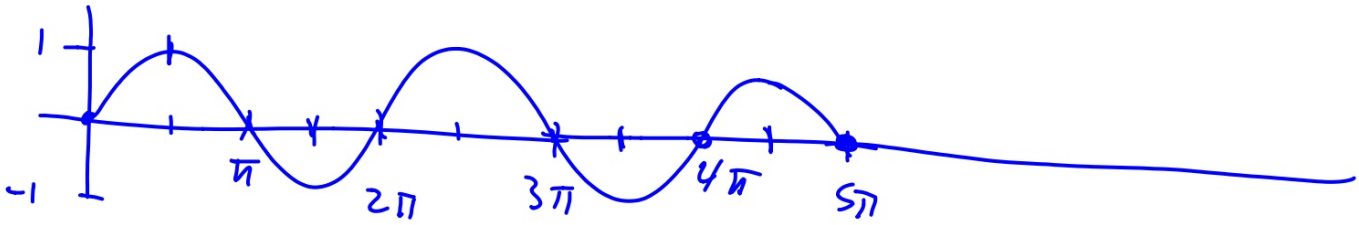
1. The period is 2π. (360°)
2. The domain is the set of real numbers.
3. The range is the set of real numbers between -1 and 1, inclusive.
4. The x-intercepts are located at πn, where n is an integer.
5. The y-intercept is 0.
6. The maximum values are $y = 1$ and occur when $x = \frac{\pi}{2} + 2\pi n$, where n is an integer.
7. The minimum values are $y = -1$ and occur when $x = \frac{3\pi}{2} + 2\pi n$, where n is an integer.



Why does the graph repeat every 2π radians?

$\frac{0}{h} = 1$ $\sin\left(\frac{13\pi}{2}\right) = 1$

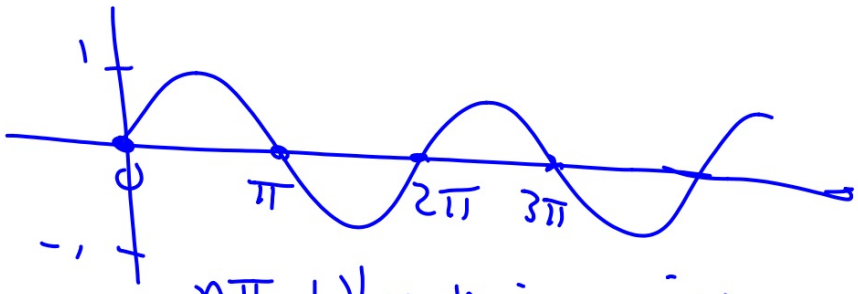
2 Find $\sin \frac{9\pi}{2}$ by referring to the graph of the sine function.



$\frac{\pi}{2} + 2\pi$ $\frac{5\pi}{2} + 2\pi$ $\frac{9\pi}{2} + 2\pi$ $\frac{13\pi}{2}$

Use the pattern(s) to extend as necessary.

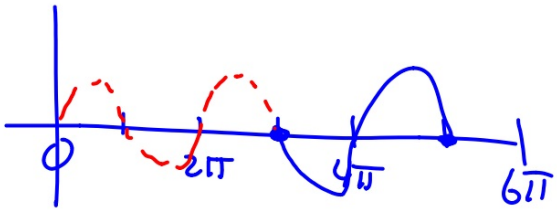
3 Find the values of θ for which $\sin \theta = 0$ is true.



$n\pi$ when n is an inter

$0 + \pi n$

4 Graph $y = \sin x$ for $3\pi \le x \le 5\pi$.



$y = \cos x$

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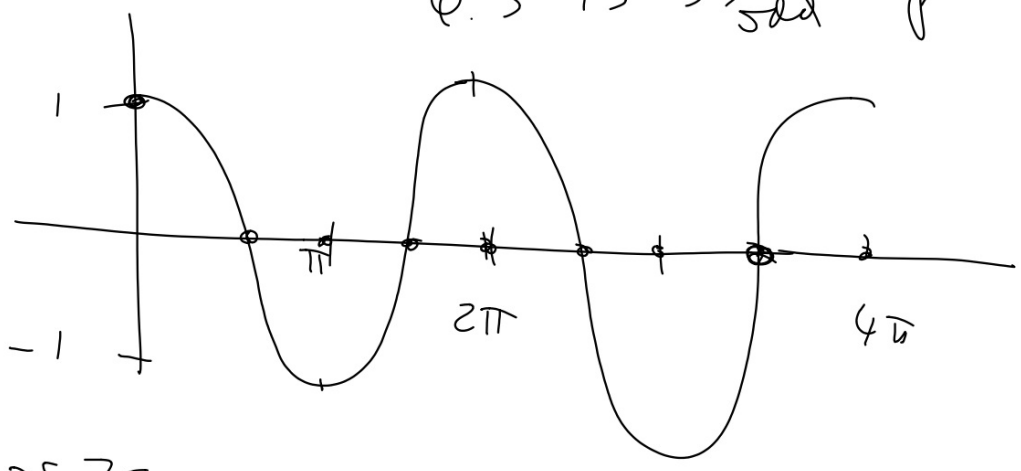

$\cos \frac{7\pi}{2} = 0$

$3\frac{1}{2}\pi$