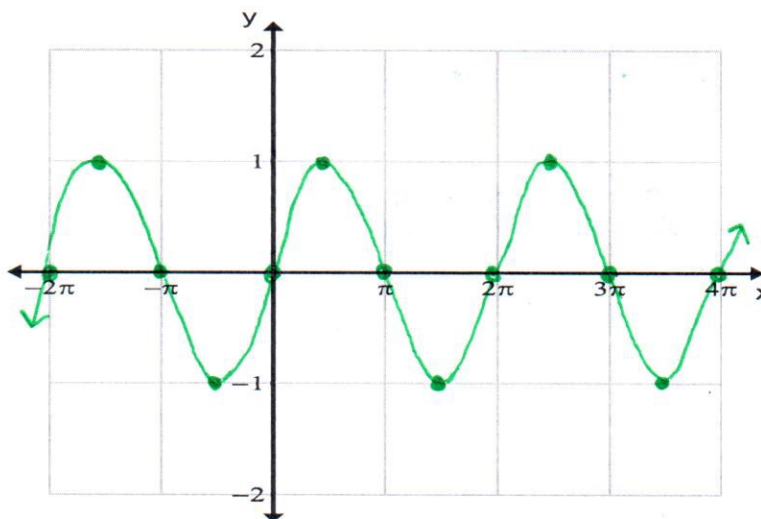
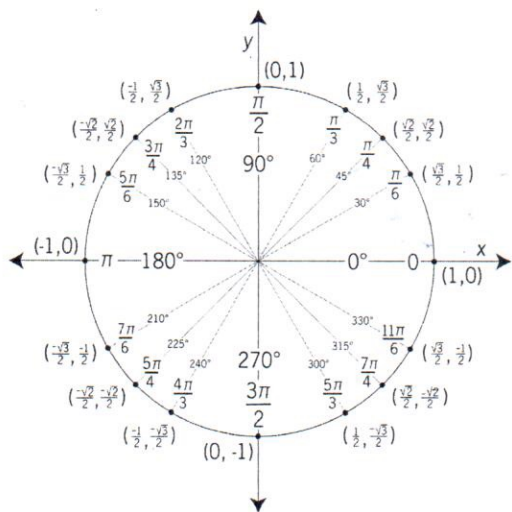


Lesson 8-4: Graphing Sine Notes

Today we will learn:

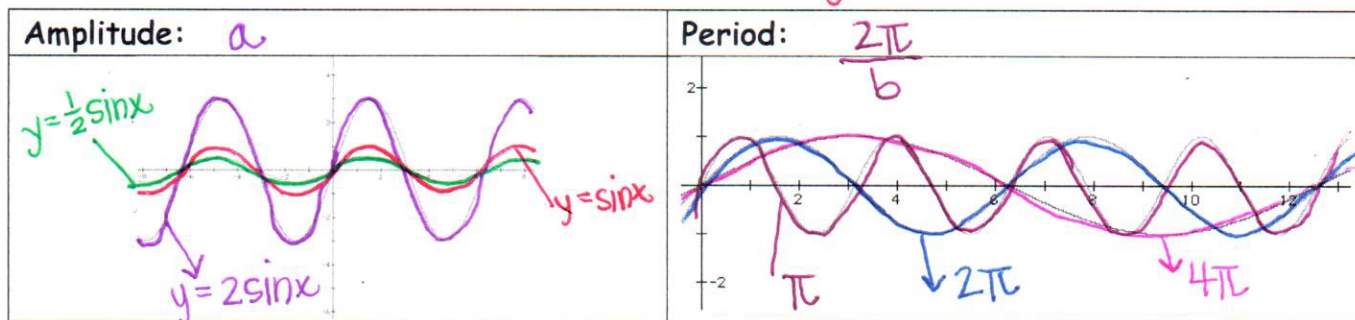
- To identify domain, range, amplitude, period, and graph sine.
- That period functions regularly repeat themselves.
- That trig functions model periodic behavior.

Graphing Sine: $y = a \sin bx$



Properties of graphing sine and cosine functions:

$y = a \sin bx$



Find the amplitude and period of each of the following:

$y = \frac{3}{a} \sin \frac{x}{b}$

amp: 3
per: $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

$y = \frac{1}{4} \sin x$

amp: $\frac{1}{4}$
per: $\frac{2\pi}{1} = 2\pi$

$y = \sin \frac{1}{2} x$

amp: 1
per: $\frac{2\pi}{1/2} = 4\pi$

Graph the following functions by hand. Find the amplitude, period, domain and range for each.

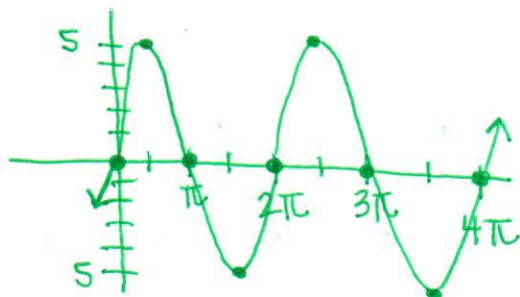
$$y = 5\sin x$$

$$\text{amp: } 5$$

$$\text{per: } 2\pi$$

$$D: (-\infty, \infty)$$

$$R: [-5, 5]$$



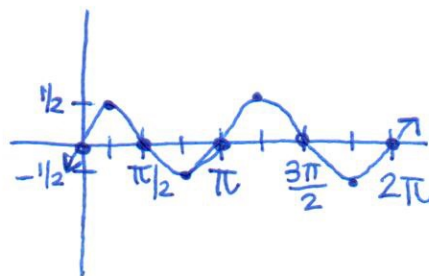
$$y = \frac{1}{2}\sin 2x$$

$$\text{amp: } \frac{1}{2}$$

$$\text{per: } \frac{2\pi}{2} = \pi$$

$$D: (-\infty, \infty)$$

$$R: \left[-\frac{1}{2}, \frac{1}{2}\right]$$



Let's see if we can identify transformations:

$y = 2 + \sin x$ up 2 vertical shift	$y = -3 + \cos x$ vertical shift down 3
$y = \cos \frac{1}{2}x$ $\frac{2\pi}{1/2} = 4\pi$ periodic stretch	$y = -\cos x$ reflect across x-axis
$y = \sin(x - \pi)$ phase shift $R\pi$	$y = \cos\left(x + \frac{\pi}{2}\right)$ phase shift $L\frac{\pi}{2}$
$y = 5 + \sin(x - \pi)$ vertical shift up 5 phase shift $R\pi$	$y = -5 + \cos(2x)$ $\frac{2\pi}{2} = \pi$ vertical shift down 5. periodic compression.
$y = 3 - 4\sin x$ phase shift up 3 Reflect amp. stretch of 4.	$y = -7 + 2\cos\left(x - \frac{\pi}{2}\right)$ phase shift down 7 amp stretch of 2 phase shift $R\pi/2$

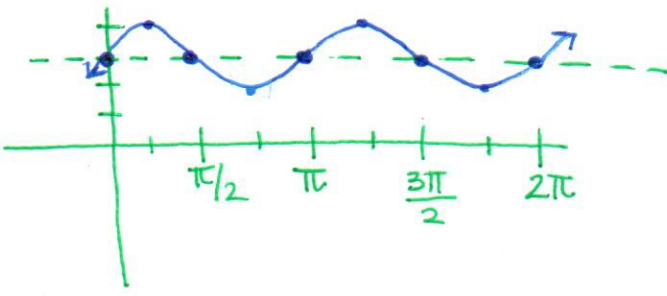

Summarization of Transformations:

$$y = k + a \sin b(x - h)$$

↑ ↓ reflect
← → opposite sign.

amplitude
period

Graph the following functions by hand. Find the amplitude, period, domain and range for each.

<p> $y = 3 + \sin(2x)$ amp: 1 per: $\frac{2\pi}{2} = \pi$ D: $(-\infty, \infty)$ R: $[2, 4]$ </p> <p style="color: green; font-size: 1.2em;"> { v.s. UP 3 per. comp } </p> 	<p> $y = -2 + \sin\left(x - \frac{\pi}{2}\right)$ amp: 1 per: 2π </p> <p style="color: red; font-size: 1.2em;"> { v.s. down 2 p.s. R $\frac{\pi}{2}$ } </p> 
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