Friday, March 07, 2014
9:13 AM

Sine Graphs

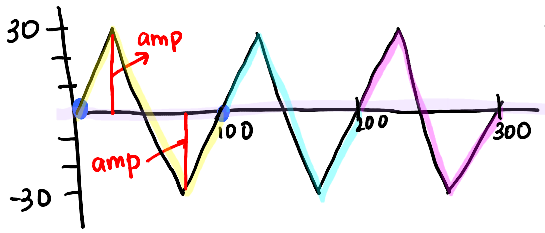
A sine graph is periodic - repeats itself in a horizontal direction

$$y = a \sin bx + c$$

- a: amplitude
- b: used to find period
- c: vertical shift

amplitude $= |a|$ or $\frac{\max - \min}{2}$ period $= \frac{2\pi}{b}$ or $\frac{360}{b}$

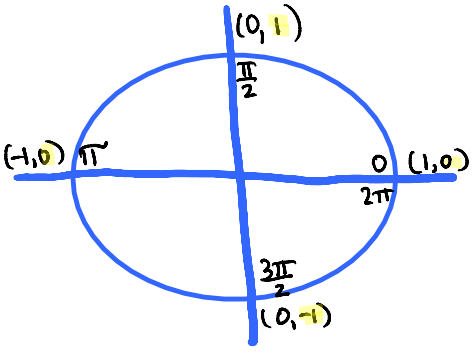
$+c \rightarrow$ up
$-c \rightarrow$ down

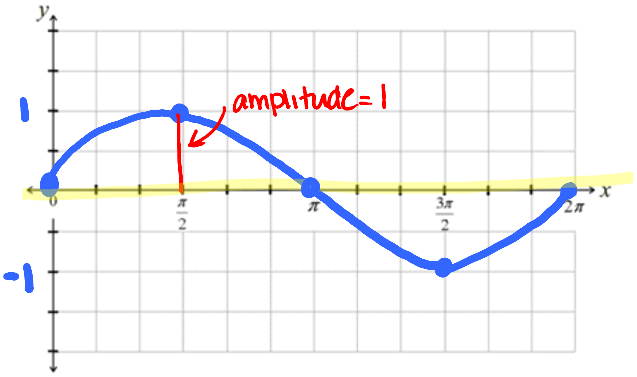


- cycles = 3
- period = 100
- amplitude = 30
- principal axis

Parent Function $y = \sin x$

amplitude = 1
period = 2π





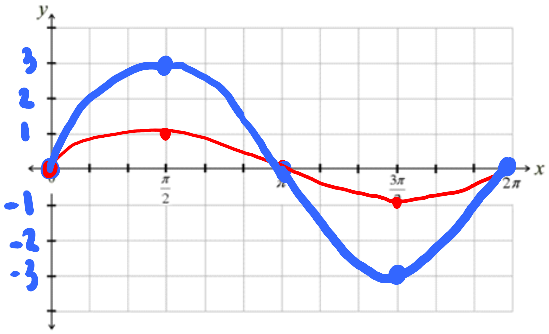
Example 1: Amplitude

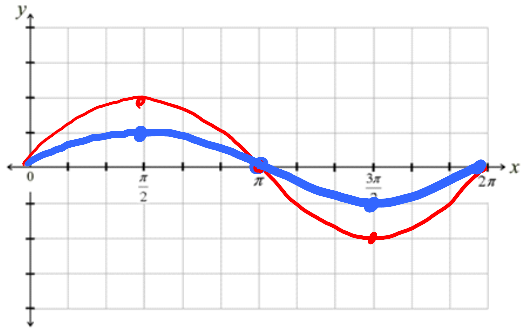
a) $y = 3 \sin x$ amp $= |3| = 3$

$y = \sin x$

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

$y = \sin x$

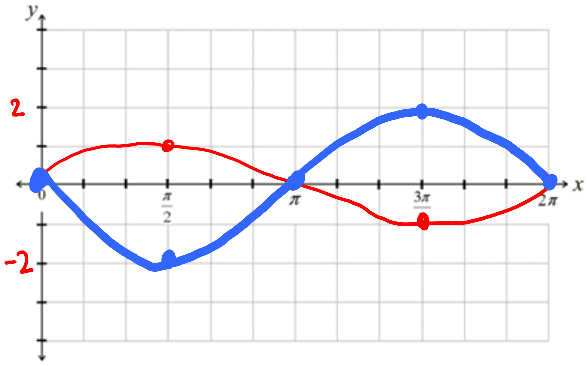




c) $y = -2\sin x$ $\quad y = \sin x$

amp $= |-2| = 2$

reflect over x-axis

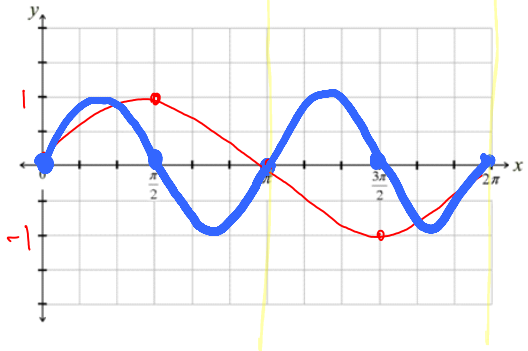


Example 2: Period Other than 2π $\quad y = \sin bx$

period $= \frac{2\pi}{b}$ $\quad$ period: length of one cycle

b: # of cycles between 0 and 2π

a) $y = \sin 2x$ $\quad y = \sin x$

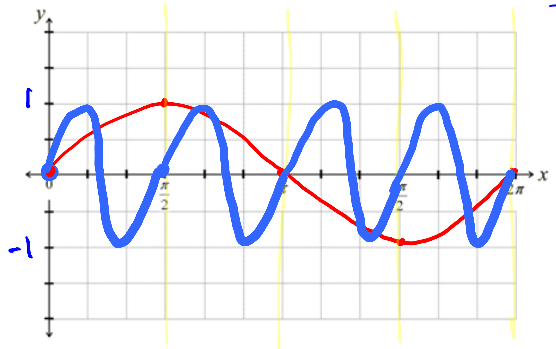


2 $\begin{cases} \frac{2\pi}{2} = \pi \rightarrow \text{graph repeats every } \pi \\ \text{two cycles between 0 and } 2\pi \end{cases}$

b) $y = \sin 4x$ $\quad y = \sin x$

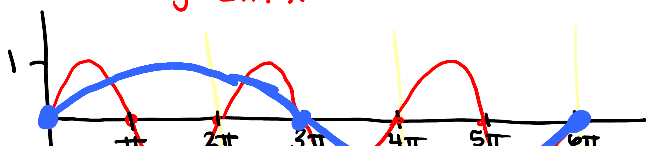
period: $\frac{2\pi}{4}$

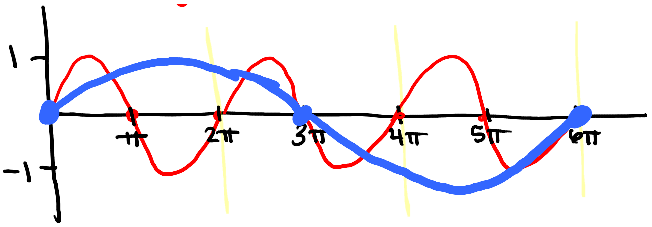
$\frac{\pi}{2}$ $\rightarrow$ starts over every $\frac{\pi}{2}$



$y = \sin \frac{1}{3}x$ $\quad y = \sin x$

period $= \frac{2\pi}{(1/3)} = 6\pi$ – graph repeats every 6π



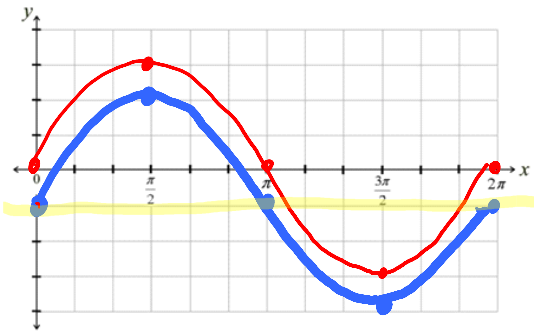


Example 3: Vertical Shift

+C up -C down

$y = 3\sin x - 1$

$y = 3\sin x$

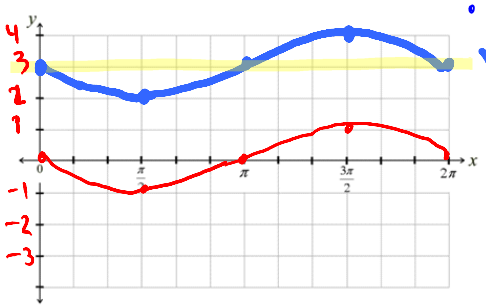


$y = -1$

$y = -\sin x + 3$

$y = -\sin x$

amp = |-1|
= 1
- reflect over x-axis
- up 3



$y = 3$

Practice: $y = 3\sin 2x - 1$

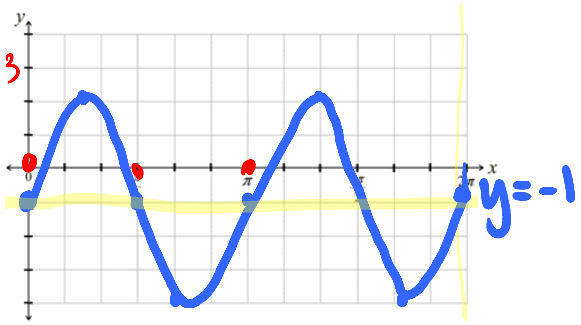
① $3\sin 2x$
② vertical shift

amp = |3|
= 3

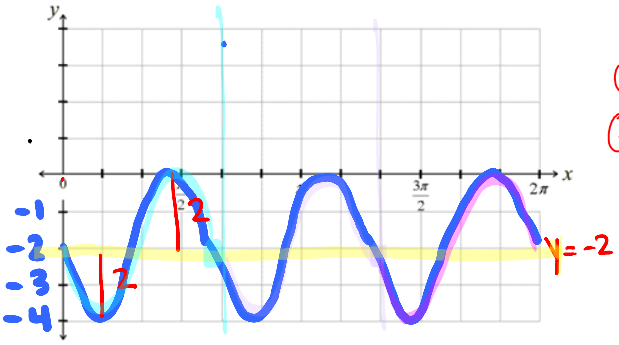
period = $\frac{2\pi}{2} = \pi$

vertical ↓ 1

=



Write function.



① find principal axis
- figure out vertical shift

② use vertical axis to find amplitude

③ count # of cycles between 0 and 2π

$y = a \sin bx + c$

$-2 \sin 3x - 2$