Transformations of Sine and Cosine Graphs

Parent Graphs: $y = a \sin bx$ $y = a \cos bx$

Transformed Graphs:

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

1. Identify the period and amplitude. Plot the parent graph.
2. Draw the midline ($y = k$)
3. Translate the 5 key points horizontally h units and vertically k units.
4. If $a < 0$, reflect in the midline.

Example 1: $y = 3 \cos (x - \pi) + 2$

Parent: $y = 3 \cos x$

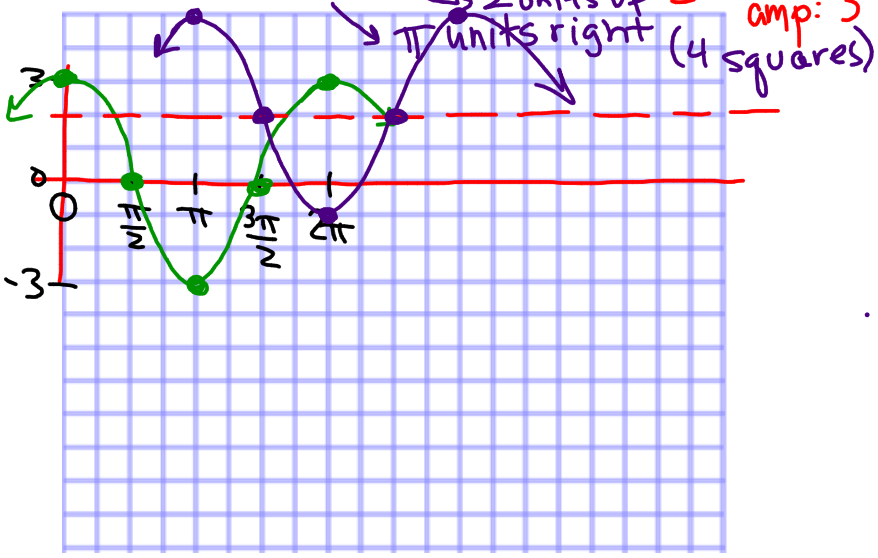
period $= \frac{2\pi}{b} = 2\pi$

amp: 3

π units right

2 units up

(4 squares)



Example 2: $y = 2 \sin (x - \frac{\pi}{2}) - 3$

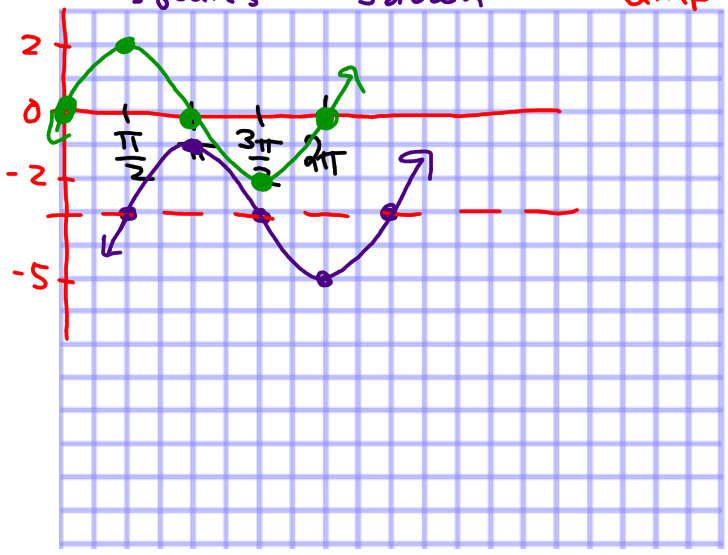
Parent: $y = 2 \sin x$

period $= 2\pi$

amp $= 2$

$\frac{\pi}{2}$ right 2 squares

3 down



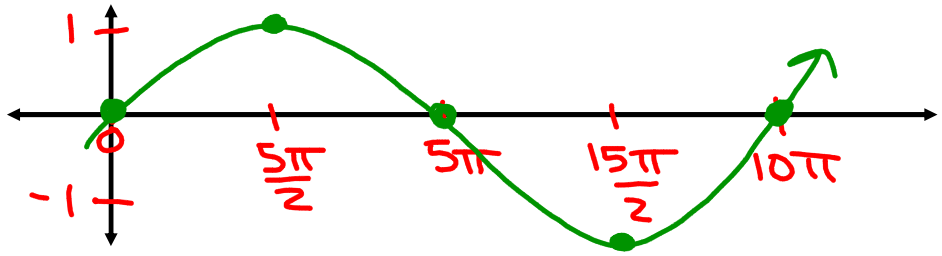
Graphing Activity

$y = \sin 1/5\ x$

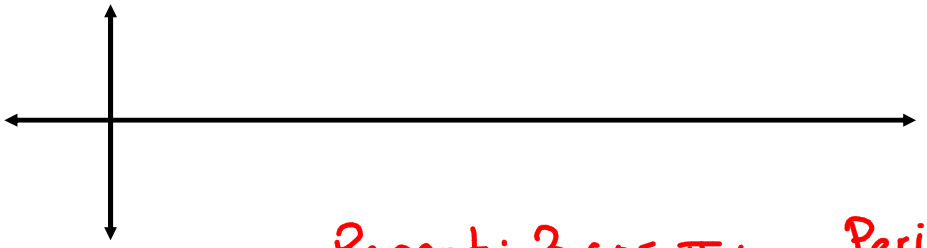
Amp = 1

Parent: $\sin \frac{1}{5}x$

Period: $\frac{2\pi}{\frac{1}{5}} = 2\pi \cdot \frac{5}{1} = 10\pi$



$y = 4 \cos x$

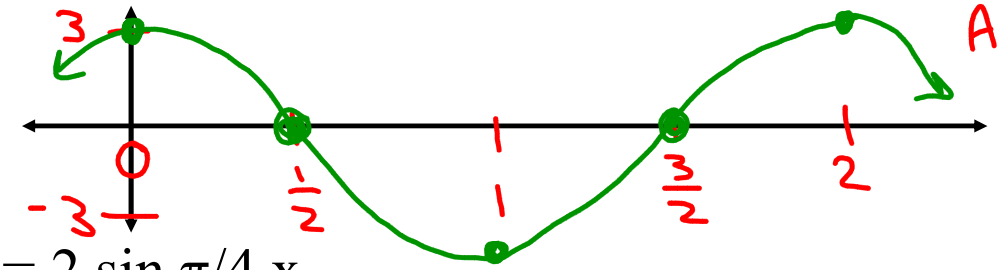


$y = 3 \cos \pi\ x$

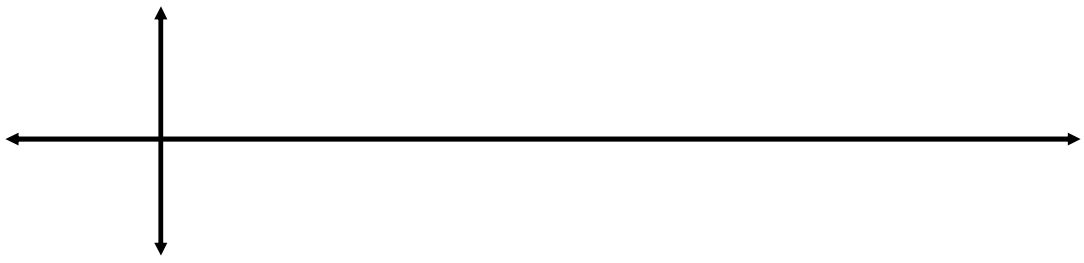
Parent: $3 \cos \pi x$

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

Amp = 3

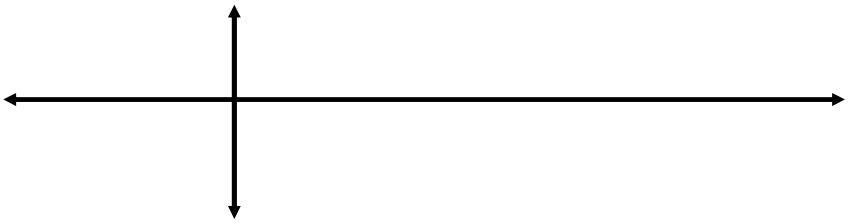


$y = 2 \sin \pi/4\ x$

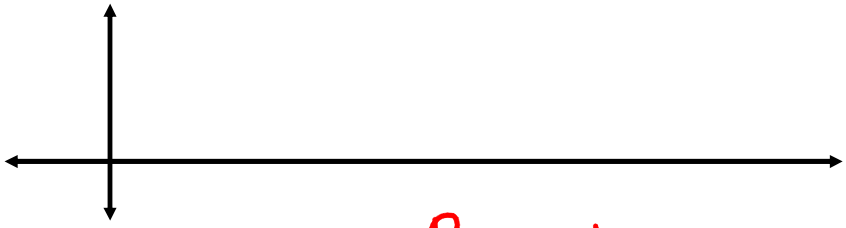


Graph parent first, then shift.

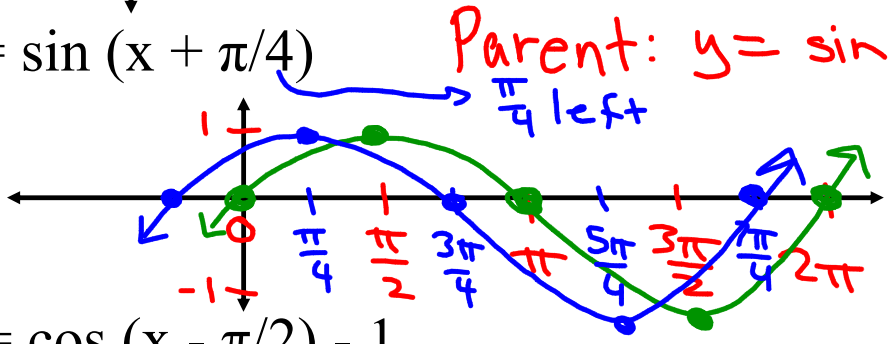
$y = \cos(x + \pi)$



$y = \sin x + 3$



$y = \sin(x + \pi/4)$



$y = \cos(x - \pi/2) - 1$