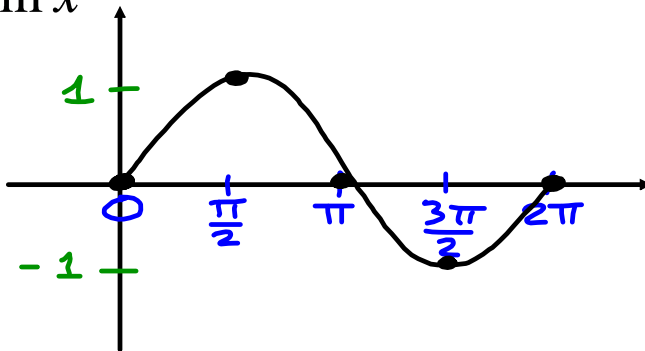


Sine Graphs with Dilations

$$y = 1 \sin x$$



amplitude: 1

period: 2π

domain: $[0, 2\pi]$

range: $[-1, 1]$
 $-1 \leq y \leq 1$

~~even or~~ odd?

$$\sin(-x) = -\sin(x)$$

In general: $y = \pm a \cdot \sin(bx)$

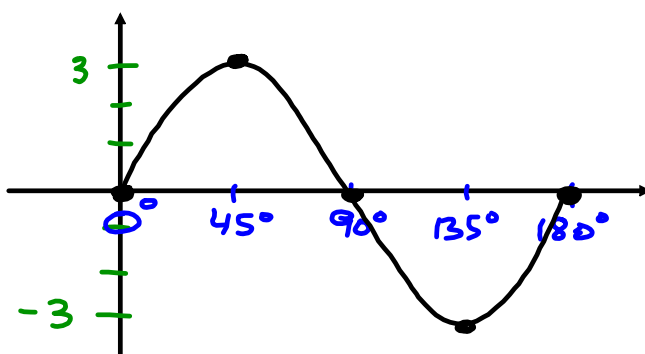
"-a"
reflection
over horizontal
axis

|a| = amplitude
vertical dilation

horizontal dilation
frequency/period
period: $\frac{2\pi}{b}$

1) $y = 3 \sin 2\theta$ ← use degrees

$$y = 3 \sin(2\theta)$$



amplitude: 3

period: $\frac{360^\circ}{2} = 180^\circ$

* domain: $[0^\circ, 180^\circ]$

range: $[-3, 3]$

~~even or~~ odd?

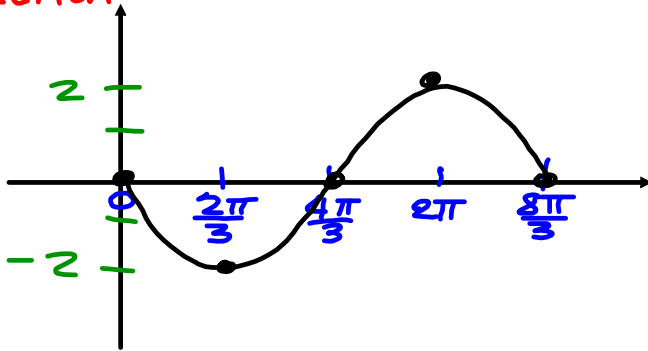
$$3 \sin(2\theta) = -3 \sin(-2\theta)$$

* $\frac{2\theta}{2} = \frac{2 \cdot 0^\circ}{2}$
 $\theta = 0^\circ$

* $\frac{2\theta}{2} = \frac{360^\circ}{2}$
 $\theta = 180^\circ$

2) $y = -2 \sin \frac{3}{4} x$ ← use radians
 $b = \frac{3}{4}$

reflection



amplitude: 2

period: $\frac{2\pi}{3/4} = 2\pi \cdot \frac{4}{3} = \frac{8\pi}{3}$

* domain: $[0, \frac{8\pi}{3}]$

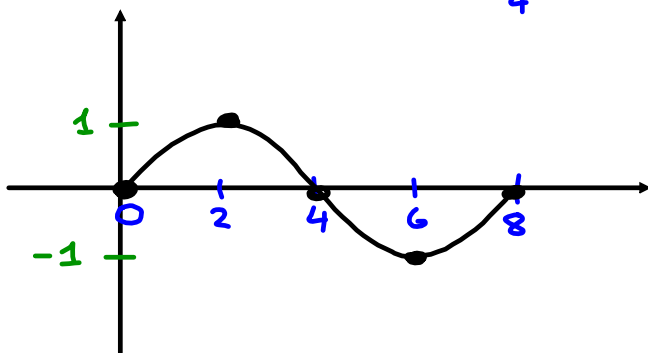
range: $[-2, 2]$

even or odd?

$-2 \sin(\frac{3}{4}x) = 2 \sin(-\frac{3}{4}x)$

* $\frac{3}{4}x = 0 \cdot \frac{4}{3} \quad \frac{3}{4}x = 2\pi \cdot \frac{4}{3}$
 $x = 0 \quad x = \frac{8\pi}{3}$

3) $y = \sin\left(\frac{\pi x}{4}\right) = \sin\left(\frac{\pi}{4}x\right)$
 $b = \frac{\pi}{4}$



amplitude: 1

period: 8

* domain: $[0, 8]$

range: $[-1, 1]$

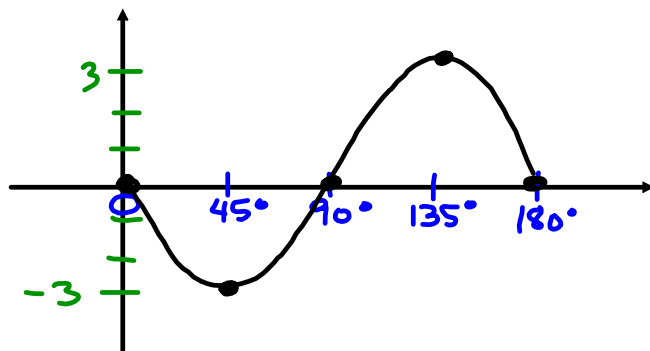
even or odd?

$\sin\left(\frac{\pi x}{4}\right) = -\sin\left(-\frac{\pi x}{4}\right)$

* $\frac{\pi}{4}x = 0 \cdot \frac{4}{\pi} \quad \frac{\pi}{4}x = 2\pi \cdot \frac{4}{\pi}$
 $x = 0 \quad x = 8$

4) $y = 3\sin(-2\theta) = -3\sin(2\theta)$

reflection



amplitude: 3

period: 180°

* domain: $[0^\circ, 180^\circ]$

range: $[-3, 3]$

~~even~~ or odd?

* $2\theta = 0^\circ$
 $\theta = 0^\circ$

$2\theta = 360^\circ$
 $\theta = 180^\circ$