

7.6 Cont'd

Amplitude of a Wave : rest to crest



$$\text{Amplitude } A = \frac{1}{2}(\text{max} - \text{min})$$

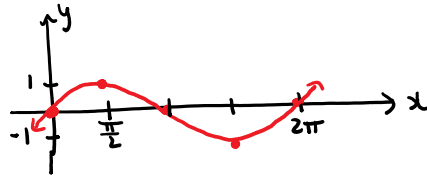
FACT

The amplitude of $y = \sin x$ and $y = \cos x$ is 1.

Transformations

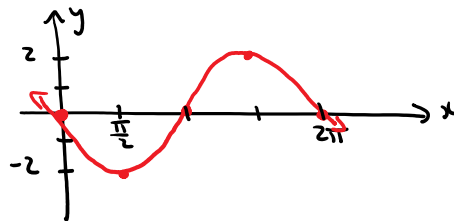
Ex: Graph $y = -2\sin x + 2$

$$y = \sin x$$



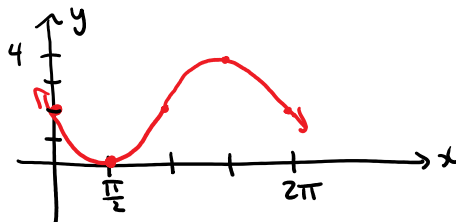
$$y = -2\sin x$$

(Mult. y by -2)



$$y = -2\sin x + 2$$

(Add 2 to y
shift up)



Period : 2π

Amplitude : 2

FACT

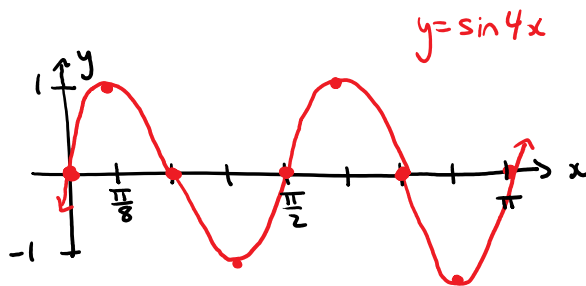
FACT

$y = a \sin wx$ and $y = a \cos wx$
have amplitude $|a|$ and period $\frac{2\pi}{|w|}$

Ex: Graph $y = \sin 4x$ on $0 \leq x \leq \pi$

$$\text{Period} = \frac{2\pi}{4} = \frac{\pi}{2}$$

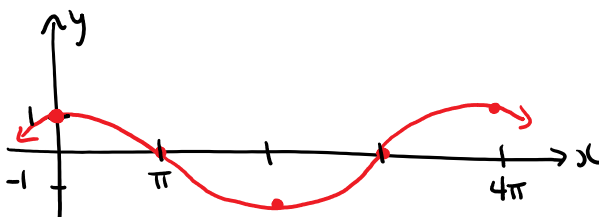
x	$y = \sin(4x)$
0	$\sin 0 = 0$
$\frac{\pi}{8}$	$\sin \frac{\pi}{2} = 1$
$\frac{2\pi}{8} = \frac{\pi}{4}$	$\sin \pi = 0$
$\frac{3\pi}{8}$	$\sin \left(4 \cdot \frac{3\pi}{8}\right) = -1$
$\frac{4\pi}{8} = \frac{\pi}{2}$	$\sin 2\pi = 0$

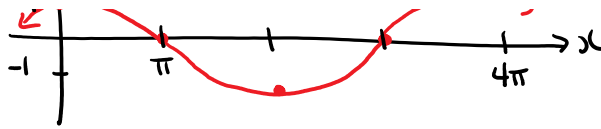


Ex: Graph $y = \cos \frac{x}{2}$

$$\text{Period} = \frac{2\pi}{|\frac{1}{2}|} = \frac{2\pi}{(\frac{1}{2})} = 2\pi \times \frac{2}{1} = 4\pi$$

x	$y = \cos \frac{x}{2}$
0	$\cos 0 = 1$
π	$\cos \frac{\pi}{2} = 0$
2π	$\cos \pi = -1$
3π	$\cos \frac{3\pi}{2} = 0$
4π	$\cos 2\pi = 1$





Ex: Find amplitude and period

$$y = -6 \sin(-5x) + 2$$

doesn't change
amplitude/period

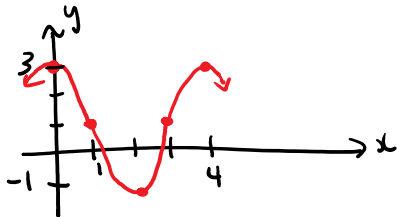
$$\text{amplitude} = |-6| = 6$$

$$\text{period} = \frac{2\pi}{| -5 |} = \frac{2\pi}{5}$$

FACT

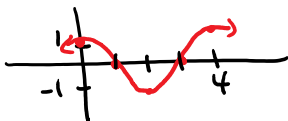
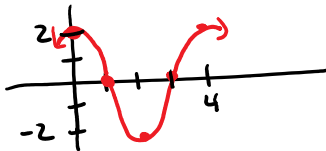
$y = a \sin(wx) + c$ and $y = a \cos(wx) + c$
have amplitude = $|a|$ and period = $\frac{2\pi}{|w|}$

Ex:



Write it as $y = A \sin(wx) + C$ or $y = A \cos(wx) + C$

Graphs first
Work backwards to $y = \sin x$ or $y = \cos x$
shift before stretch (backwards!)



Details on Monday ...

$$y = 2 \cos\left(\frac{\pi}{2}x\right) + 1$$