

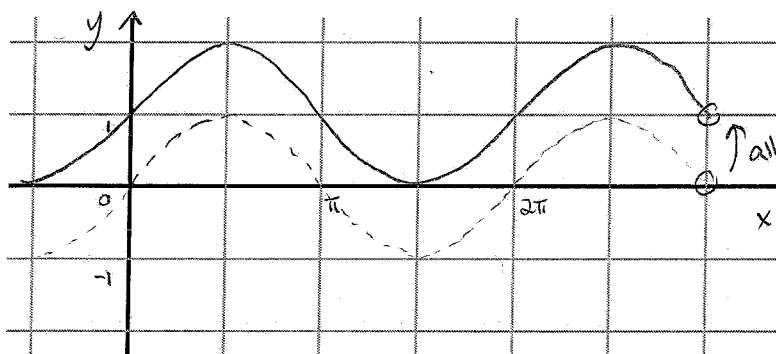
6.6

Math 173 – Section 6.6: Transforming Sine & Cosine Graphs

Consider the function $y = A \sin(Bx - C) + D$.

What does the D do?

Sketch $y = \sin x + 1$:

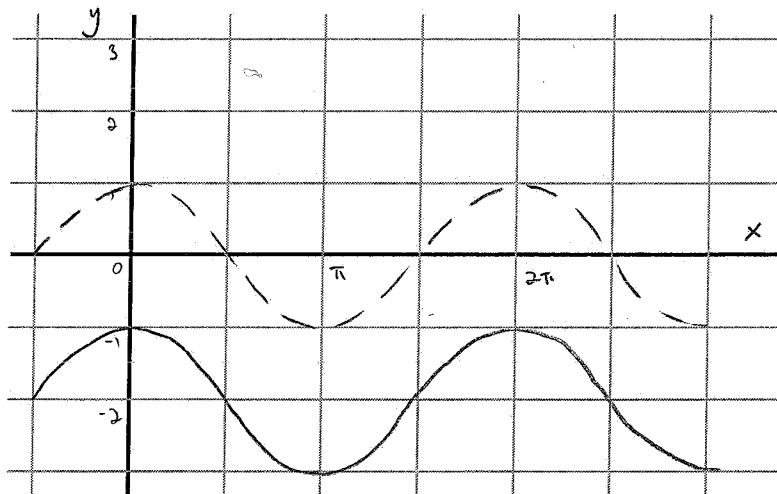


amplitude: $\frac{1}{}$

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

(same as basic function $y = \sin x$)

Sketch $y = \cos x - 2$:



amplitude: $\frac{1}{}$

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

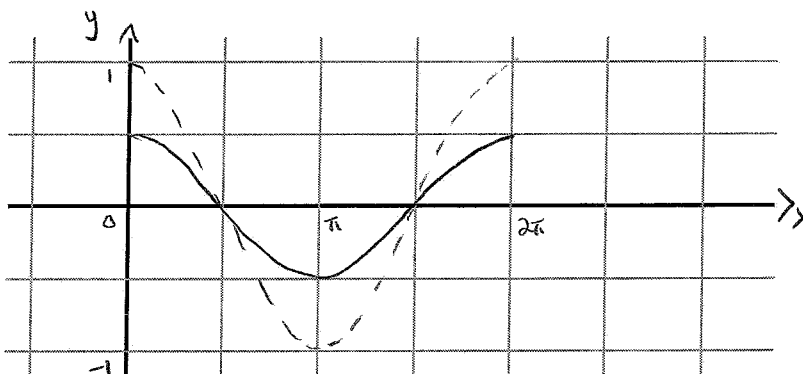
(same as $\cos x$)

What does the A do?

Sketch $y = \frac{1}{2} \cos x$:

amplitude: $\frac{1}{2}$

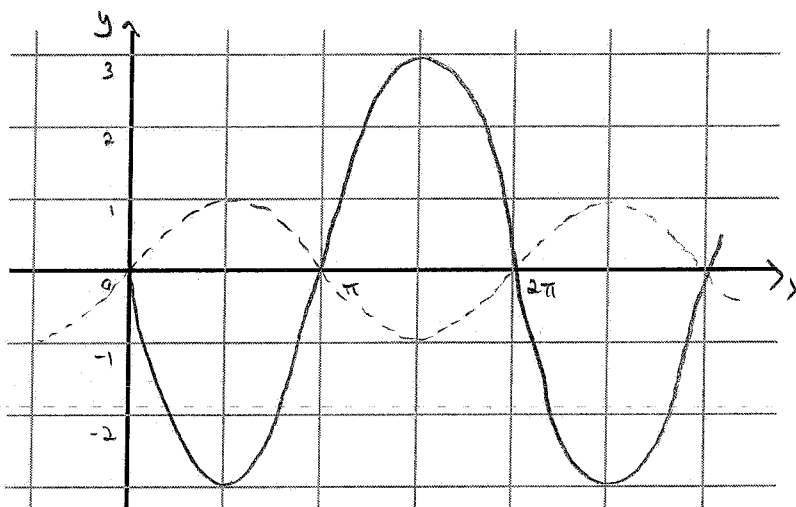
period: 2π



Sketch $y = -3 \sin x$:

amplitude: 3

period: 2π

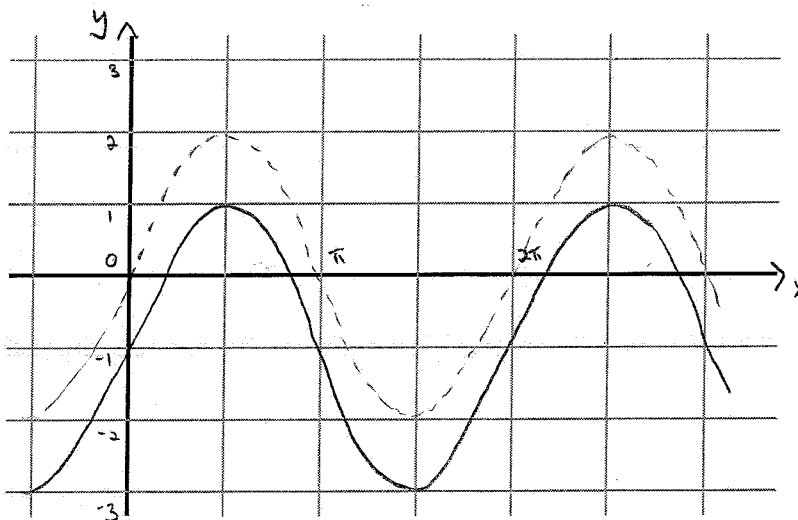


Combining the effects of A and D :

Sketch $y = 2 \sin x - 1$:

amplitude: 2

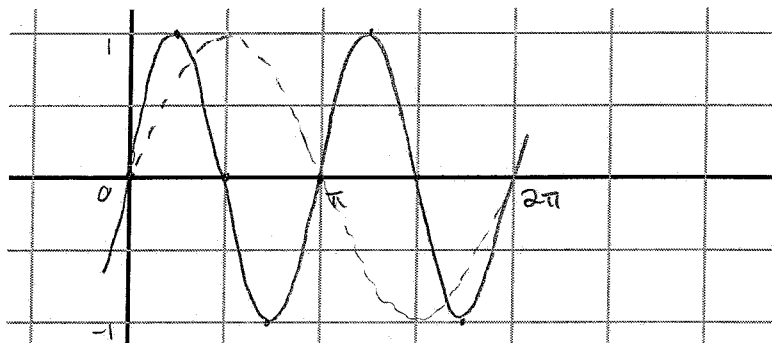
period: 2π



What does the B do?

Sketch $y = \sin 2x$:

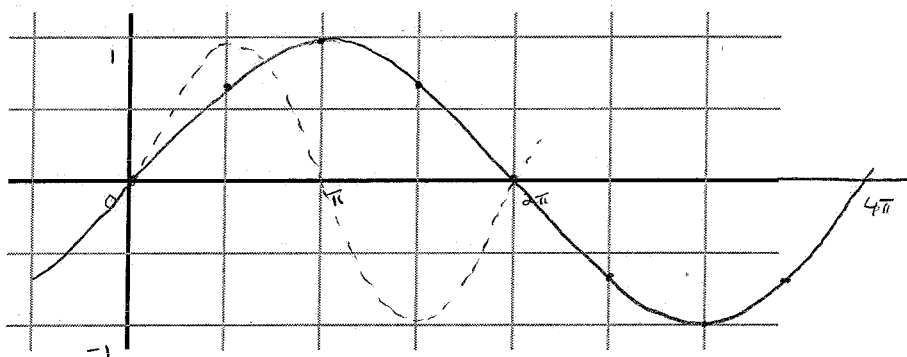
x	$2x$	$\sin 2x$
0	0	0
$\pi/4$	$\pi/2$	1
$\pi/2$	π	0
$3\pi/4$	$3\pi/2$	-1
π	2π	0
$5\pi/4$		
$3\pi/2$		
$7\pi/4$		
2π		



amplitude: $\frac{1}{1}$
 period: $\frac{\pi}{2}$ ← $\frac{2\pi}{2}$
 $B \uparrow$

Sketch $y = \frac{\sin x}{2}$:

x	$x/2$	$\sin(x/2)$
0	0	0
$\pi/4$	$\pi/8$	
$\pi/2$	$\pi/4$	0.707
$3\pi/4$		
π	$\pi/2$	1
$5\pi/4$		
$3\pi/2$	$3\pi/4$	0.707
$7\pi/4$		
2π	π	0

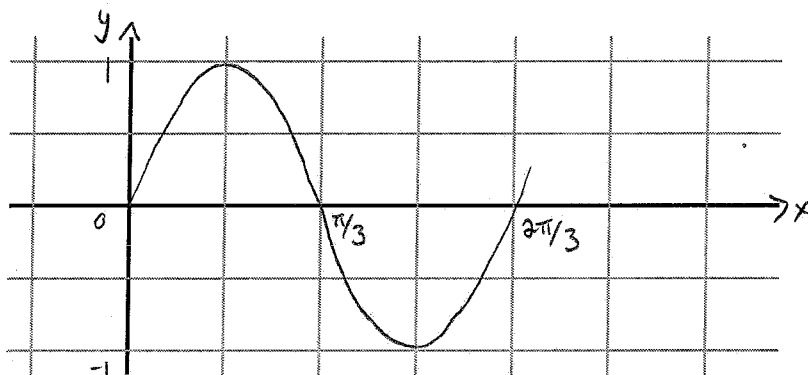


amplitude: $\frac{1}{1}$
 period: $\frac{4\pi}{1}$ note: this is $\frac{2\pi}{1/2}$

Conclusion: the period of the graph $y = \sin Bx$ or $y = \cos Bx$ is:

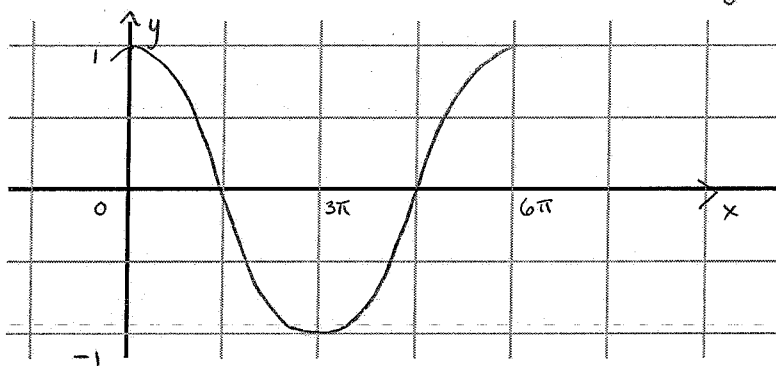
$\frac{2\pi}{|B|}$
 \uparrow
 absolute value because B can be negative,
 but the period is always +

Sketch $y = \sin 3x$:



amplitude: $\frac{1}{1}$
 period: $\frac{2\pi}{3}$

Sketch $y = \cos\left(-\frac{x}{3}\right)$: remember that the negative flips over y axis, but cos is symmetric about y-axis \rightarrow doesn't change!

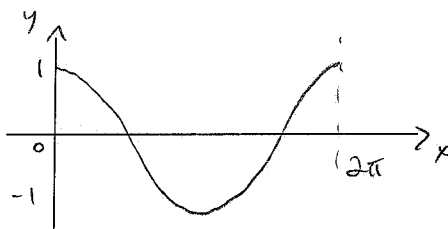


amplitude: $\frac{1}{1}$
 period: $\frac{2\pi}{1/3} = 6\pi$

Combining transformations using BEDMAS:

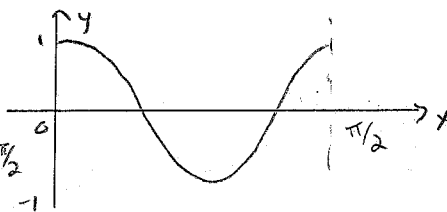
Sketch $y = -2 \cos 4x$:

quick sketch of $y = \cos x$:

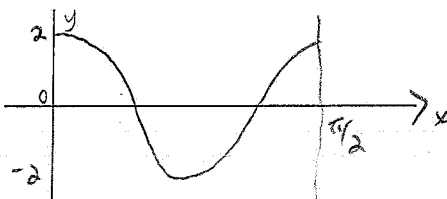


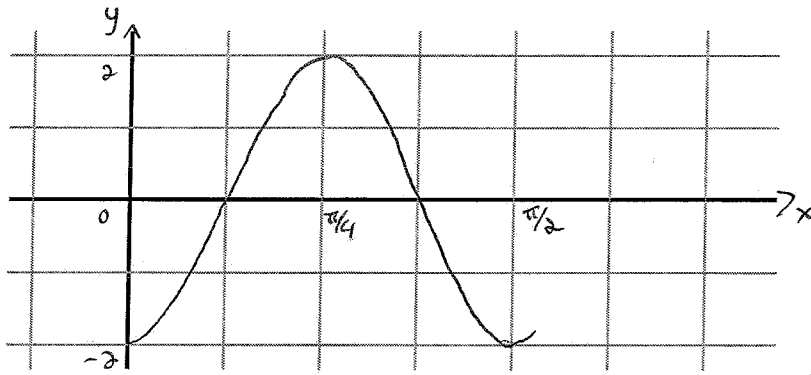
quick sketch of $y = \cos 4x$

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



quick sketch of $y = 2 \cos 4x$

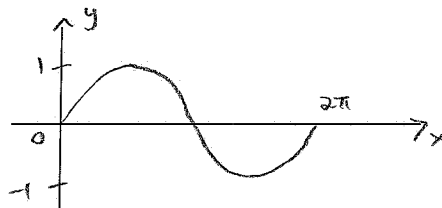




amplitude: $\frac{2}{1}$
 period: $\frac{\pi/a}{1}$

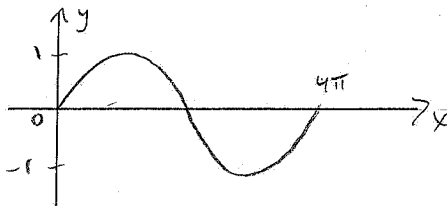
Sketch $y = -3 \sin\left(\frac{x}{2}\right) + 1$:

quick sketch of $y = \sin x$:

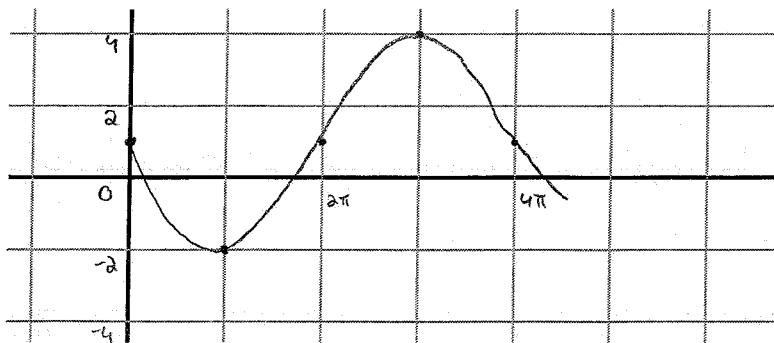
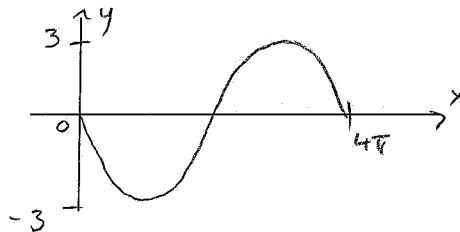


quick sketch of $y = \sin \frac{x}{2}$

$$\text{period} = \frac{2\pi}{\frac{1}{2}} = 4\pi$$



quick sketch of $y = -3 \sin \frac{x}{2}$



amplitude: $\frac{3}{1}$
 period: $\frac{4\pi}{1}$