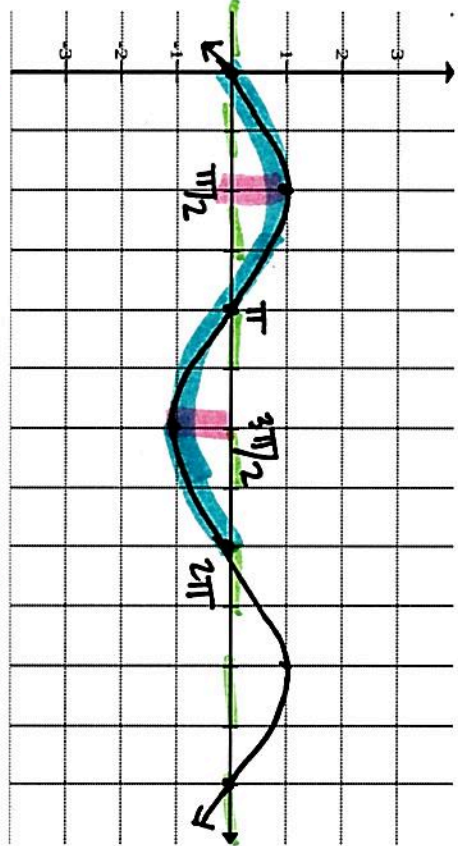


# SINE

$\sin \theta$	$\theta$
$0$	$0$
$1$	$-\frac{3\pi}{2}$
$0$	$-\pi$
$-1$	$-\frac{\pi}{2}$
$0$	$0$
$1$	$\frac{\pi}{2}$
$0$	$\pi$
$-1$	$\frac{3\pi}{2}$
$0$	$2\pi$



Changes to x-value (opposite)		Changes to y-value	
$x$	$y$	$x$	$y$
$0$	$0$	$0$	$0$
$\frac{\pi}{2}$	$-1$	$\frac{\pi}{2}$	$-1$
$\pi$	$0$	$\pi$	$0$
$\frac{3\pi}{2}$	$1$	$\frac{3\pi}{2}$	$1$
$2\pi$	$0$	$2\pi$	$0$

Period =  $2\pi$   
 Amplitude =  $1$

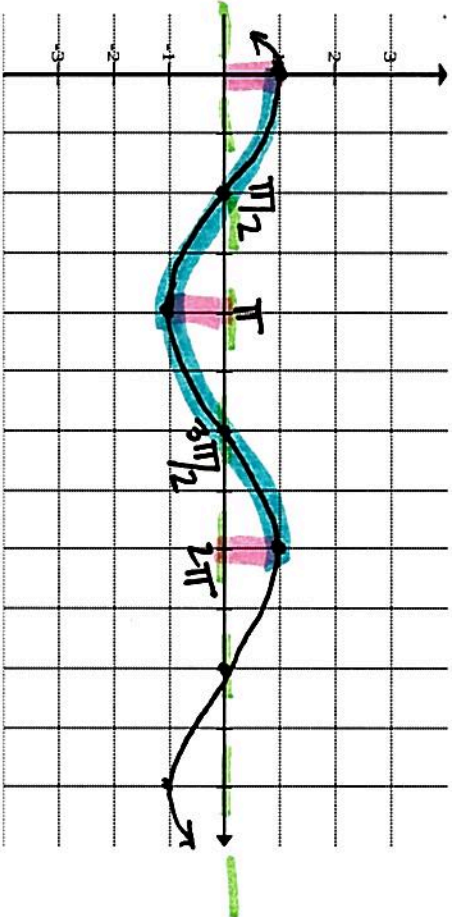
Domain:  $\mathbb{R}$   
 Range:  $[-1, 1]$

# COSINE

Period:  $2\pi$

Domain:  $\mathbb{R}$

$\cos\theta$	$\theta$
1	$0$
0	$\frac{\pi}{2}$
-1	$\pi$
0	$\frac{3\pi}{2}$
1	$2\pi$



Changes to x-value (opposite?)	x	y	Changes to y-value
$\pi$	$0$		
$\frac{3\pi}{2}$	$\frac{\pi}{2}$		
$\pi$	$\pi$		
$\frac{\pi}{2}$	$\frac{3\pi}{2}$		

Period:  $2\pi$   
Amplitude: 1

Domain:  $\mathbb{R}$   
Range:  $[-1, 1]$

# TRANSFORMATIONS

# TRANSFORMATIONS

"a" affects amplitude

$$y = a \sin[b(x - c)] + d$$

"b" affects period  $\rightarrow \frac{2\pi}{b}$

$$y = a \cos[b(x - c)] + d$$

$a > 1 =$  vert. stretch

$b > 1 =$  horiz. comp.

$0 < a < 1 =$  vert. compression

$0 < b < 1 =$  horiz. stretch

$+c =$  left

$+d =$  up

$-c =$  right

$-d =$  down

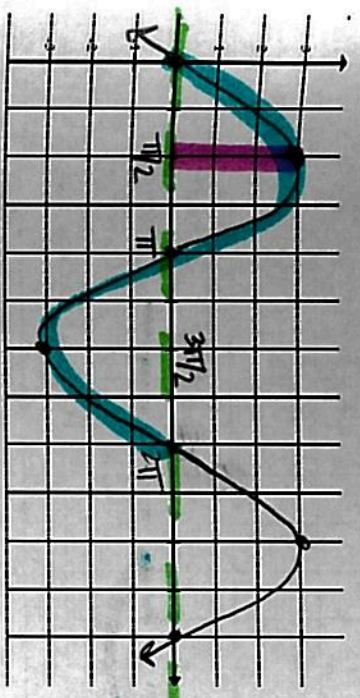
$a < 0 =$  reflect over x-axis

$b < 0 =$  reflect over y-axis

"b"  $\rightarrow$  you do the OPPOSITE operation to x-value.

# Practice Graphing Sine and Cosine

1. Graph  $y = 3\sin x$  v. stretch

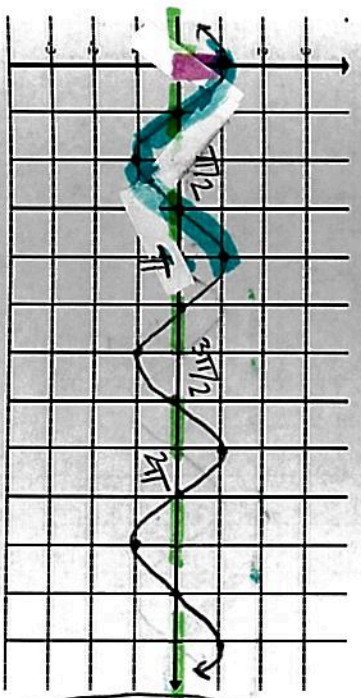


x	y	3y
0	0	0
$\pi/2$	1	3
$\pi$	0	0
$3\pi/2$	-1	-3
$2\pi$	0	0

Period:  $2\pi$       Amplitude: 3  
 Domain:  $\mathbb{R}$       Range:  $[-3, 3]$

This should be blank. This gets glued down!

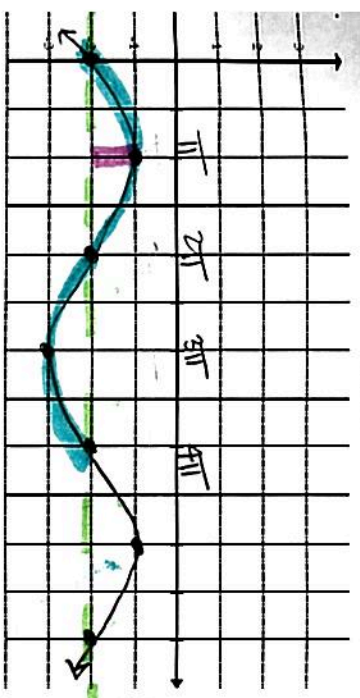
2. Graph  $y = \cos(2x)$  h. comp



x	y
$x/2$	
0	1
$\pi/4$	0
$\pi/2$	-1
$3\pi/4$	0
$\pi$	1
$2\pi$	

Period:  $\pi$       Amplitude: 1  
 Domain:  $\mathbb{R}$       Range:  $[-1, 1]$

3. Graph  $y = \sin(\frac{1}{2}x) - 2$  down 2



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

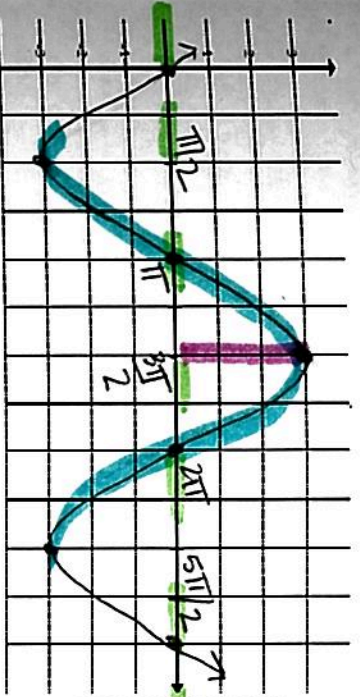
Period:  $4\pi$

Amplitude: 1

Domain:  $\mathbb{R}$

Range:  $[-3, -1]$

5. Graph  $y = -3\cos(x - 2)$  right 2



$x + \frac{\pi}{2}$	$x$	$y$	$-3$
$\frac{\pi}{2}$	0	1	-3
$\pi$	$\frac{\pi}{2}$	0	0
$\frac{3\pi}{2}$	$\pi$	-1	3
$2\pi$	$\frac{3\pi}{2}$	0	0
$\frac{5\pi}{2}$	$2\pi$	1	-3

Period:  $2\pi$

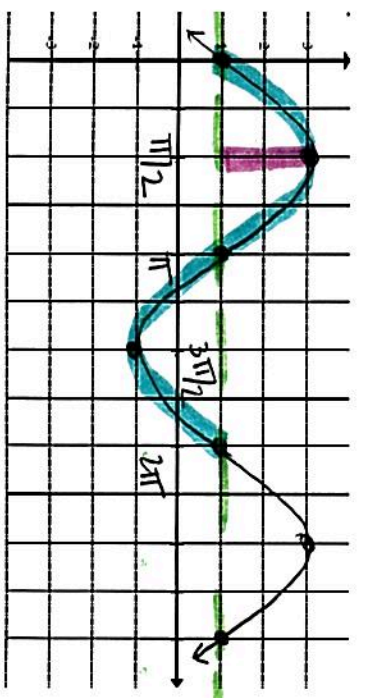
Amplitude: 3

Domain:  $\mathbb{R}$

Range:  $[-3, 3]$

4. Graph  $y = 2\sin(x) + 1$  up 1

v. stretch



$x$	$y$	$2y+1$
0	0	1
$\frac{\pi}{2}$	1	3
$\pi$	0	1
$\frac{3\pi}{2}$	-1	-1
$2\pi$	0	1

Period:  $2\pi$

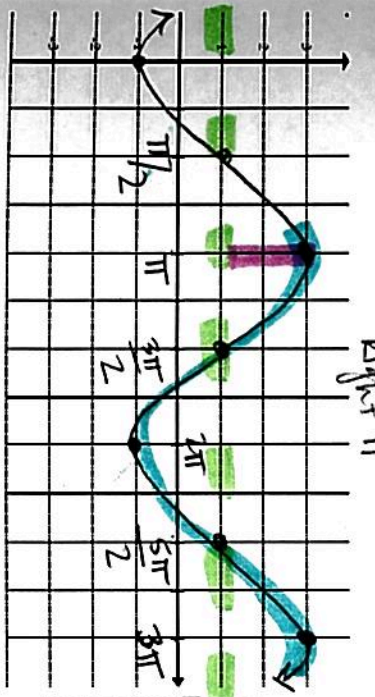
Amplitude: 2

Domain:  $\mathbb{R}$

Range:  $[-1, 3]$

6. Graph  $y = 2\cos(x - \pi) + 1$  right pi

v. stretch



$x + \pi$	$x$	$y$	$2y+1$
$\pi$	0	1	3
$\frac{3\pi}{2}$	$\frac{\pi}{2}$	0	1
$2\pi$	$\pi$	-1	-1
$\frac{5\pi}{2}$	$\frac{3\pi}{2}$	0	1
$3\pi$	$2\pi$	1	3

Period:  $2\pi$

Amplitude: 2

Domain:  $\mathbb{R}$

Range:  $[-1, 3]$