

Law of Sines

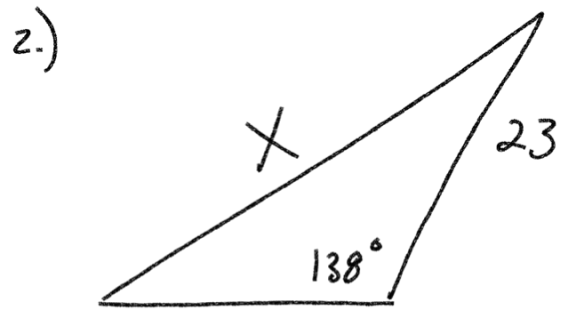
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin X}{27} = \frac{\sin 107}{45}$$

$$\sin X = \frac{27 \sin 107}{45}$$

$$X = \sin^{-1} \left( \frac{27 \sin 107}{45} \right)$$

$$X = 35^\circ$$

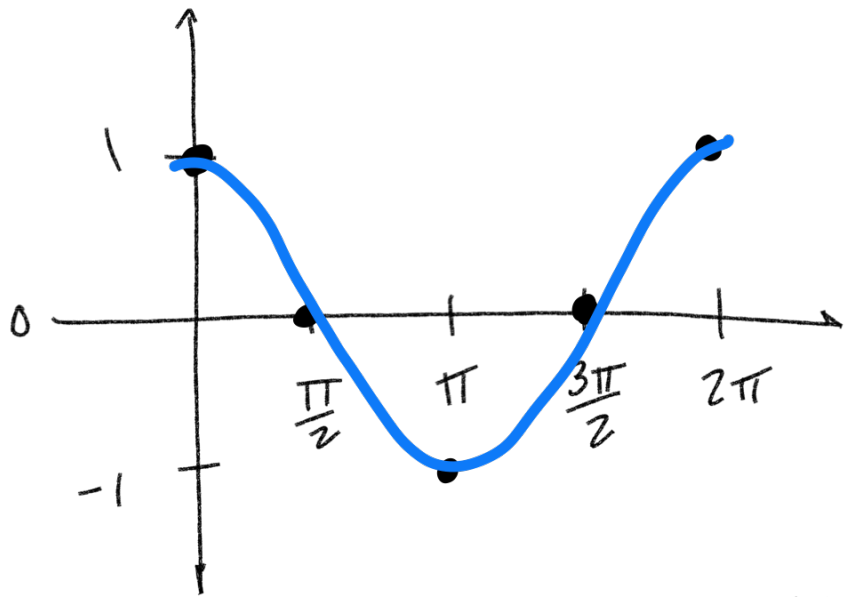
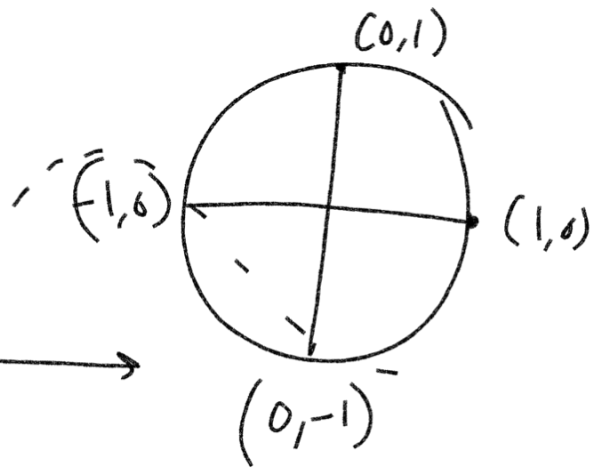
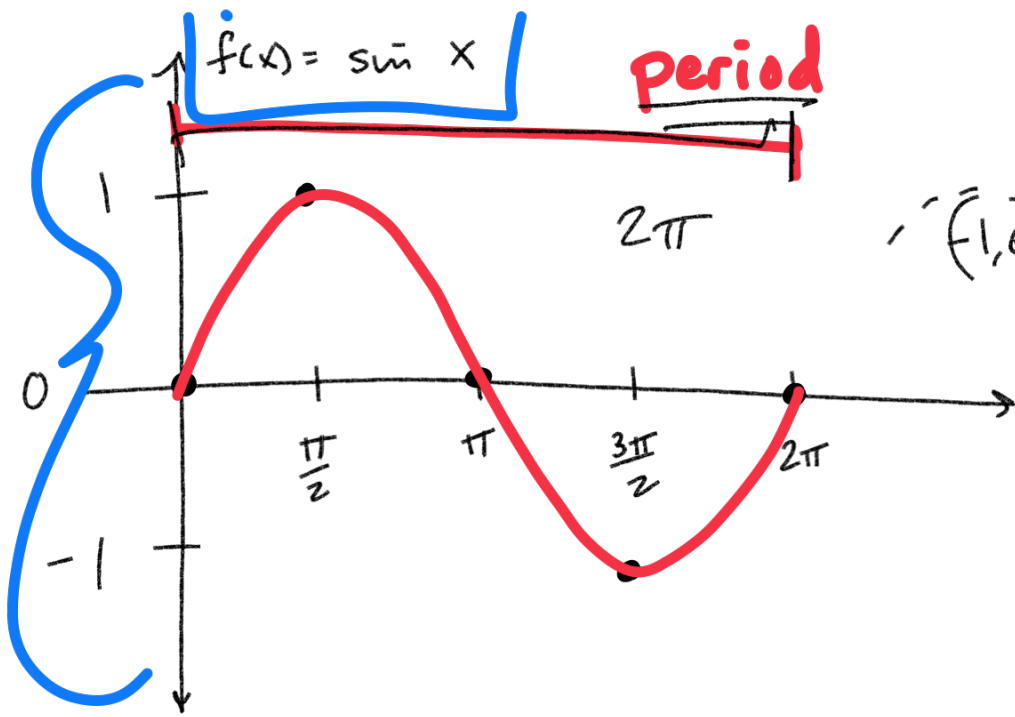


Law of Cosines

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$X = \sqrt{(19)^2 + (23)^2 - 2(19)(23)\cos 138^\circ}$$

$$X = 39.2$$

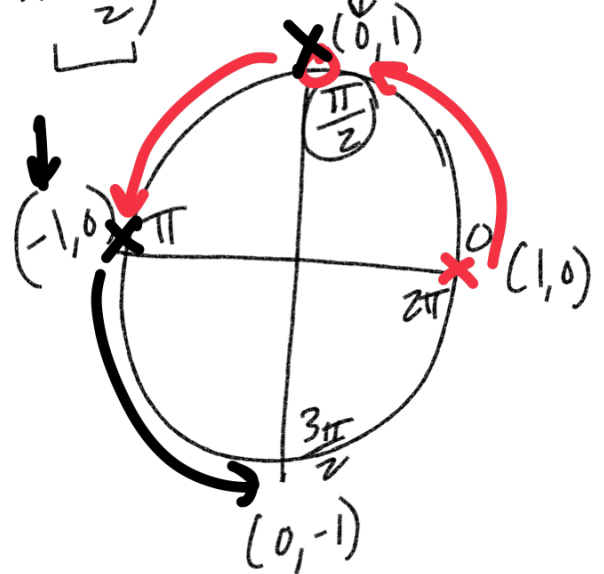
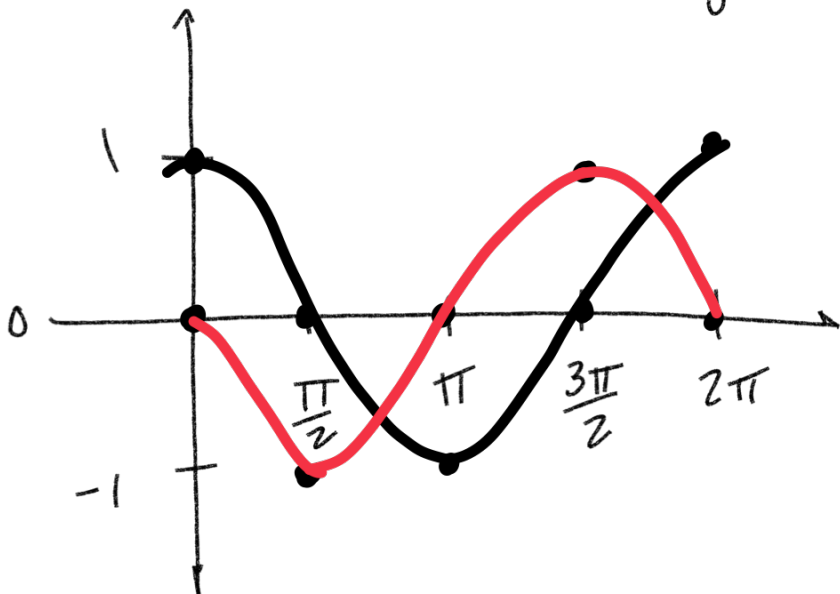


$$\cos\left(x + \frac{\pi}{2}\right) = -\sin x$$

Left  $\frac{\pi}{2}$

horizontal shift

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



$$f(x) = \sin\left(x + \frac{3\pi}{2}\right)$$

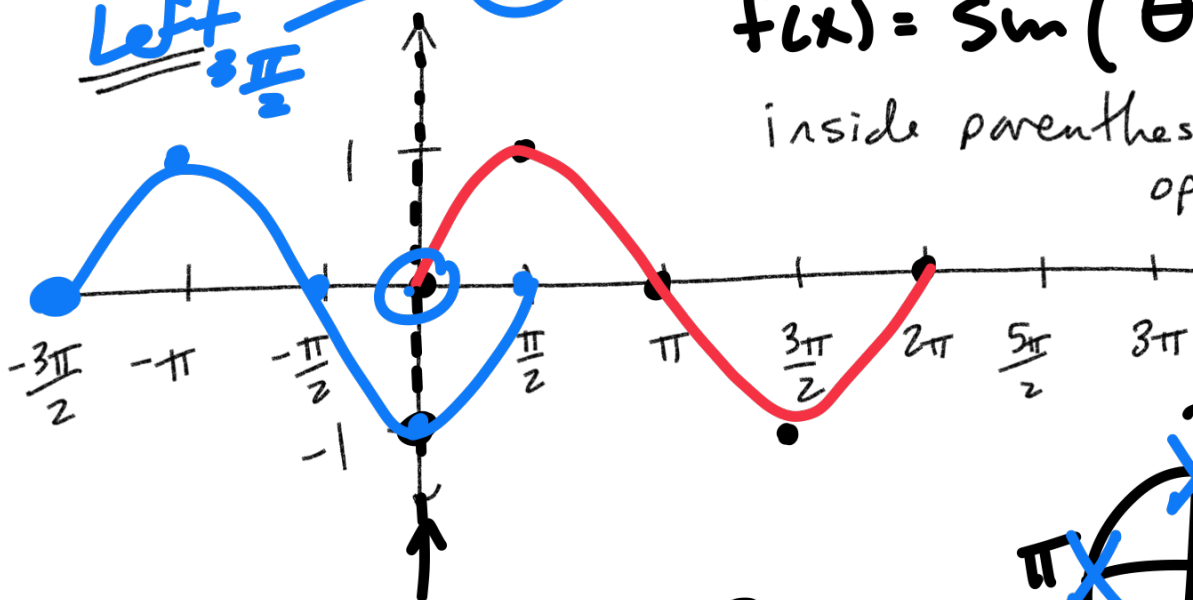
Left  $\frac{3\pi}{2}$

angle

$$\frac{3\pi}{2} \quad \sin \rightarrow 0 \quad \cos \rightarrow 1$$

$$f(x) = \sin\left(\theta + \frac{3\pi}{2}\right)$$

inside parenthesis - move opposite direction

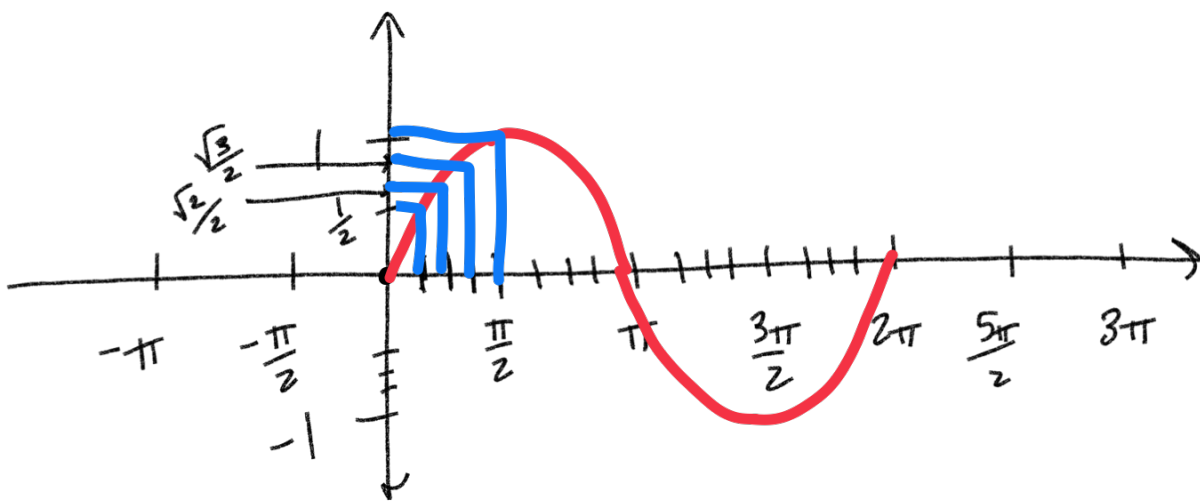


$$x=0$$

$$\sin \frac{3\pi}{2} = -1$$



④  $\sin x$



$$\frac{\sqrt{3}}{2}$$

$$\frac{\sqrt{2}}{2}$$

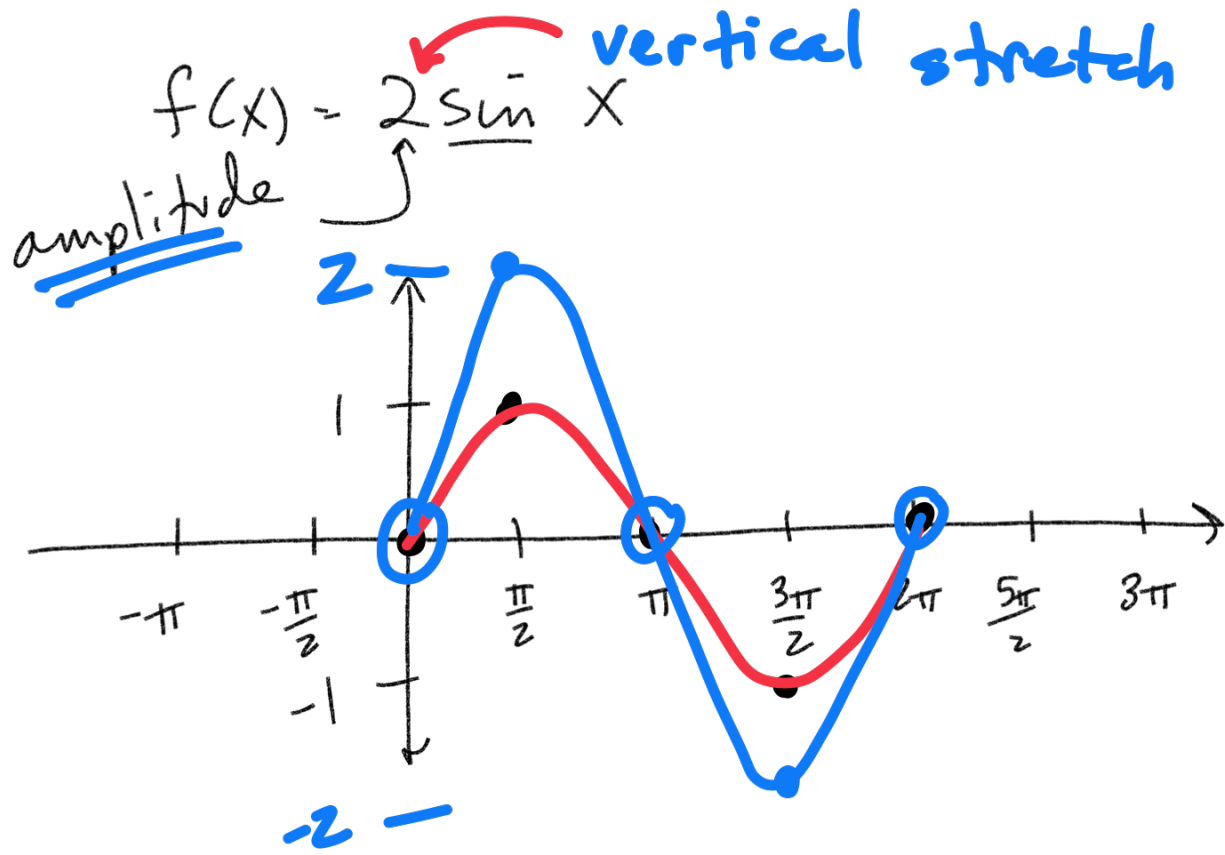
$$\sin \frac{\pi}{3} =$$

$$\sin\left(\theta + \frac{3\pi}{2}\right)$$

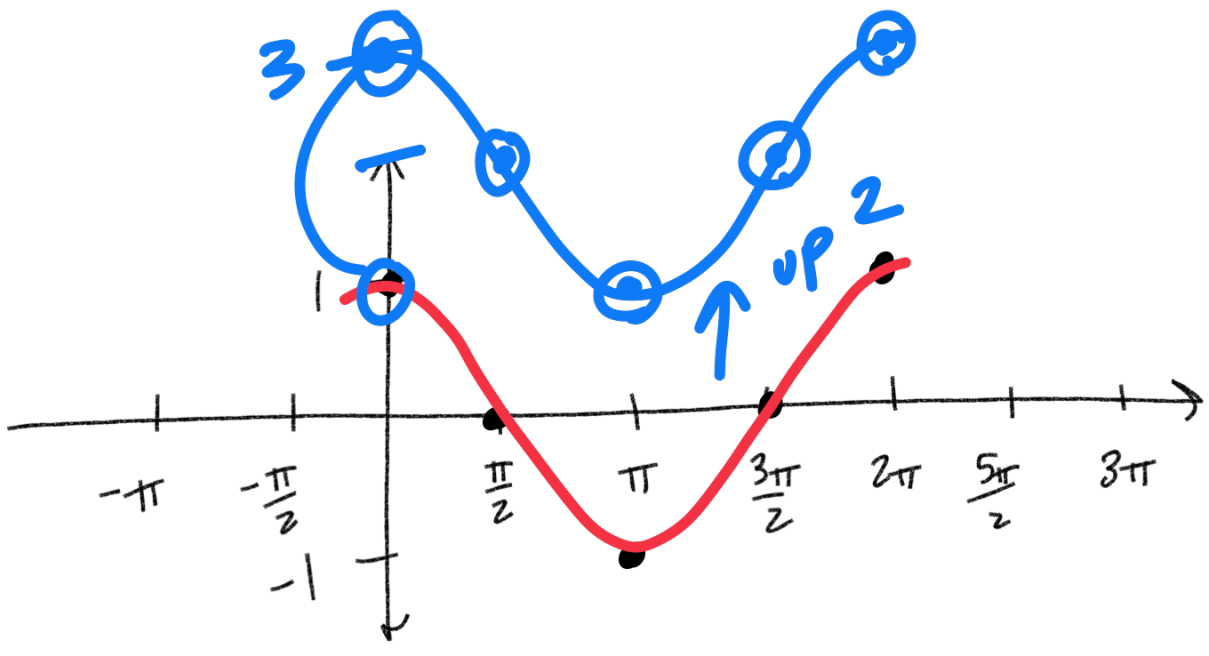
$$\frac{\pi}{3} * \frac{180}{\pi} = 60^\circ$$



$$0 \rightarrow \frac{\pi}{2} \rightarrow \pi \rightarrow \frac{3\pi}{2} \rightarrow 2\pi$$



$y = \cos(x) + 2$  shift up 2



period of  $\sin x$   $\rightarrow 2\pi$   
 $\cos$

$\sin bx$        $\sin 2x$

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

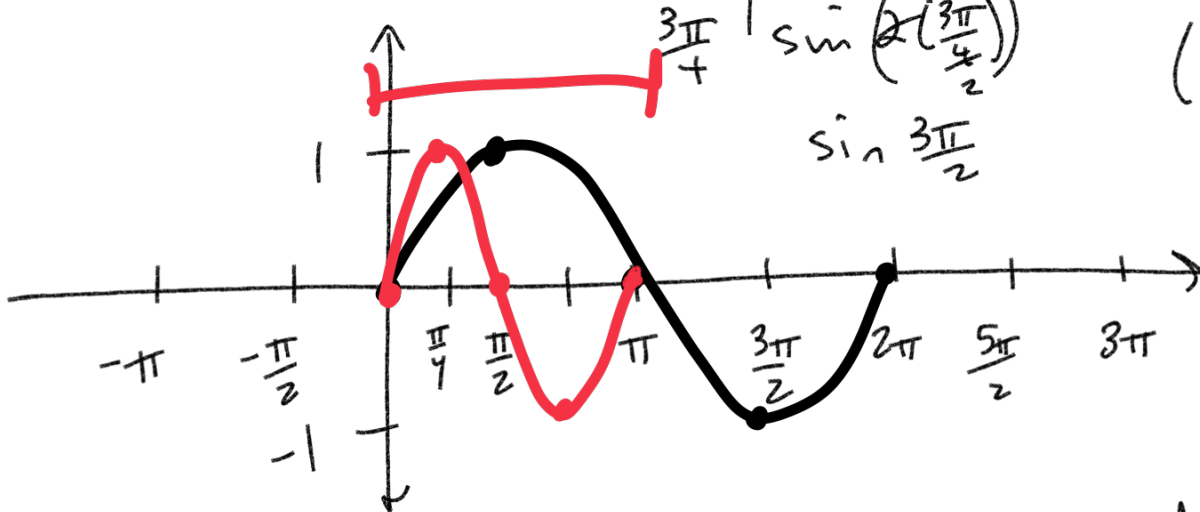
$b=2$

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

**period =  $\pi$**

$y = \sin(2x)$

X	$\sin(2x)$	y
0	$\sin(2(0)) = \sin 0 = 0$	$(0, 0)$
$\frac{\pi}{2}$	$\sin(2(\frac{\pi}{2})) = \sin \pi = 0$	$(\frac{\pi}{2}, 0)$
$\pi$	$\sin(2\pi)$	$(\pi, 0)$
$\frac{\pi}{4}$	$\sin(2(\frac{\pi}{4})) = \sin \frac{\pi}{2} = 1$	$(\frac{\pi}{4}, 1)$
$\frac{3\pi}{4}$	$\sin(2(\frac{3\pi}{4})) = \sin \frac{3\pi}{2} = -1$	$(\frac{3\pi}{4}, -1)$



$y = a \sin(bx + c) + d$

amplitude  
vertical stretch

periodicity

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

horizontal shift

vertical shift

$$4 \sin \left( \frac{2x}{2} + \frac{2\pi}{2} \right) - 5$$

$4 \sin (2(x + \pi)) - 5$

amplitude of  $4$  (2)   
 period  $\frac{2\pi}{2} = \pi$  (1)   
 horizontal shift  $\pi$  (3)   
 vertical shift  $5$  (4)   
 down 5

