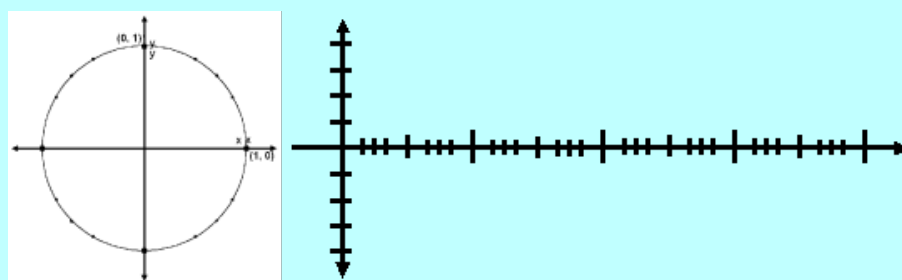
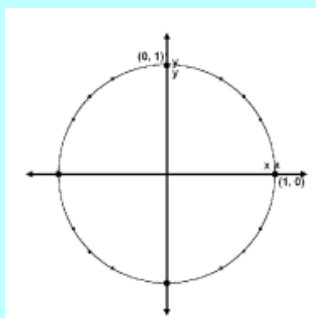


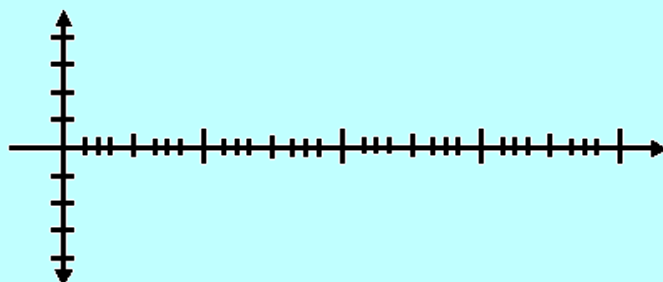
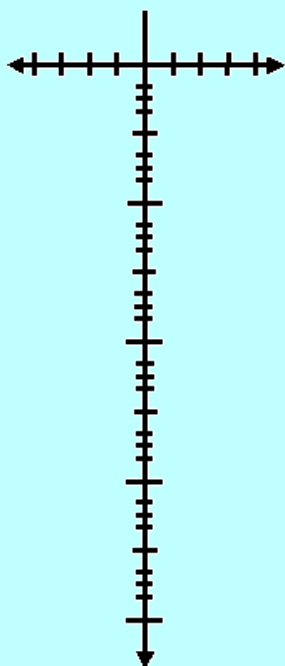
Graphing the Sine Curve



Sine Graph: Vertical Component of Unit Circle



Graphing the Cosine Curve



Cosine Graph: Horizontal Component of Unit Circle

Basic Transformations of $f(x)$


$af(x)$ amplitude
vertical stretch/
shrink

$f(ax)$ period
change

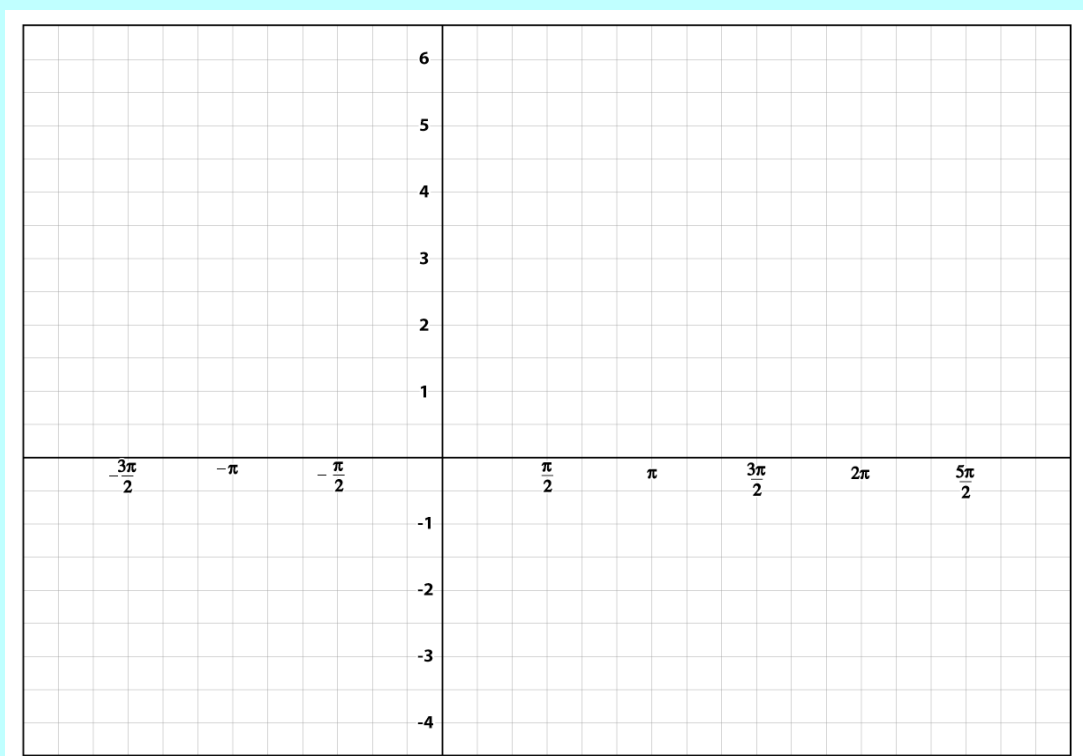
$-f(x)$ reflect over x

$f(-x)$ reflect
over y

$f(x) \pm a$ midline -
vertical $\uparrow \downarrow$

$f(x \pm a)$ phase
shift 

Basic Transformations of sine and cosine



Basic Transformations of $\sin(x)$ and $\cos(x)$

Exploring transformations of the sine function



Exploring transformations of the cosine function



Interactive Quiz



In 1–6, describe how the graphs of $y = \sin x$ or $y = \cos x$ can be shifted to produce the graph of the function.

1. $y = 5 + \sin x$

2. $y = \sin(x + \pi)$

3. $y = -4 + \cos(x - \frac{\pi}{4})$

4. $y = 2 + \sin(x + \frac{\pi}{2})$

5. $y = -2 + \cos(x - \pi)$

6. $y = \cos(x + \frac{\pi}{4})$

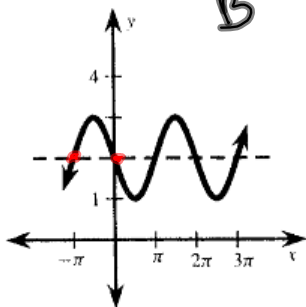
① translation up 5

② translation left π ③ translation down 4,
right $\frac{\pi}{4}$ ④ translation up 2,
left $\frac{\pi}{2}$ ⑤ translation down 2,
right π ⑥ left $\frac{\pi}{4}$

In 7-9, match the equation to its graph.

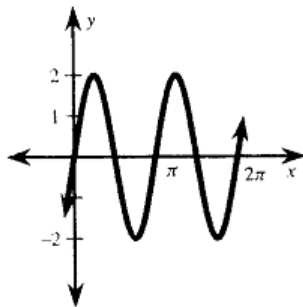
7. $y = \frac{-2 \sin 2(x + \frac{\pi}{2})}{2}$ **B**

a.



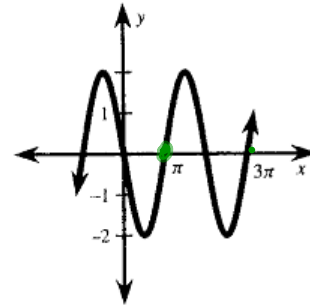
8. $y = 2 + \sin(x + \pi)$ **A**

b.



9. $y = 2 \sin(x - \pi)$ **C**

c.



10. The graph of $y = 3 \sin \frac{1}{2}x$ is drawn, then shifted down $\frac{1}{2}$ unit. Write an equation of the resulting graph.
11. The graph of $y = 3 \cos(x)$ is drawn, then shifted π units to the left and 2 units up. Write an equation of the resulting graph.

$$\textcircled{i} \quad y = 3 \sin \frac{1}{2}x - \frac{1}{2}$$

$$\textcircled{ii} \quad y = 3 \cos(x + \pi) + 2$$

Find period, amplitude, shifts BEFORE graphing on the interval $-2\pi \leq x \leq 2\pi$

$$12. y = 3 + \cos\left(x - \frac{\pi}{2}\right)$$

$$14. y = 1 - \sin\frac{1}{2}\pi x$$

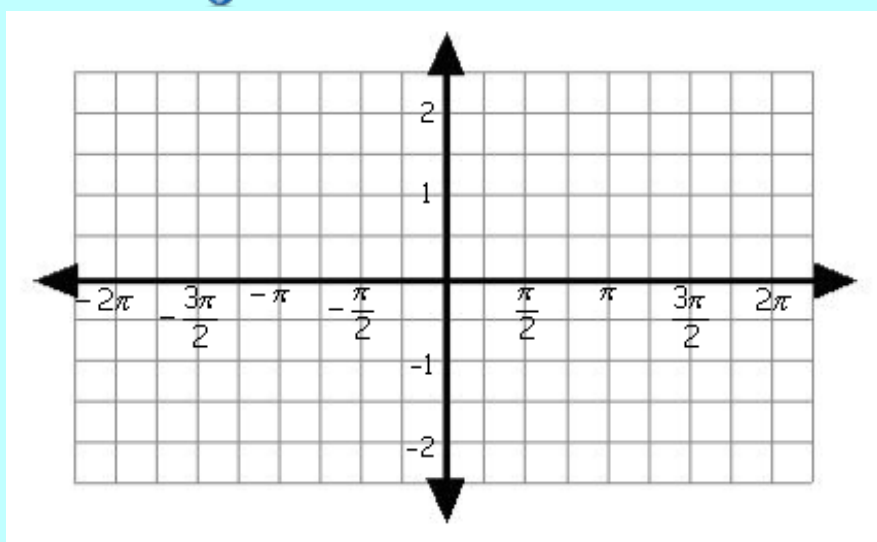
$$15. \cancel{y = -2 + \sin\left(2x + \frac{\pi}{2}\right)}$$

$$16. y = 2 + 2\cos(x - \pi)$$

FOCUS ON ACCURATE SHAPE, CRITICAL POINTS

$$15. y = -2 + \sin 2\left(x + \frac{\pi}{4}\right)$$

Graphing the Tangent Curve



Attachments

Ch4_Unit Circle.gsp