

## Unit 5.3 Graph Phase &amp; Vertical Shift (Sin &amp; Cos) PRACTICE

Period \_\_\_\_\_

**Find the phase shift in radians, the vertical shift, the minimum and maximum values, two vertical asymptotes (if any), and the transformations required to obtain the graph starting with a basic trig function.**

1)  $y = 3 + \cos\left(\theta - \frac{3\pi}{4}\right)$  Phase shift: Right  $\frac{3\pi}{4}$

Phase Shift: Vert. shift: Up 3  
 Vert. Shift: Min: 2  
 Min: Max: 4  
 Max: Vert asym: None  
 Transformation: Transformations:  
 Starting with  $\cos \theta$ ,  
 translate right  $\frac{3\pi}{4}$ ,  
 translate up 3

2)  $y = \sin \theta + 5$  Phase shift: None  
 Phase Shift: Vert. shift: Up 5  
 Vert. Shift: Min: 4  
 Min: Max: 6  
 Max: Vert asym: None  
 Transformation: Transformations:  
 Starting with  $\sin \theta$ ,  
 translate up 5

3)  $y = \sin\left(\theta - \frac{5\pi}{4}\right) + 2$  Phase shift: Right  $\frac{5\pi}{4}$

Phase Shift: Vert. shift: Up 2  
 Vert. Shift: Min: 1  
 Min: Max: 3  
 Max: Vert asym: None  
 Transformation: Transformations:  
 Starting with  $\sin \theta$ ,  
 translate right  $\frac{5\pi}{4}$ ,  
 translate up 2

4)  $y = \cos\left(\theta + \frac{2\pi}{3}\right) - 2$  Phase shift: Left  $\frac{2\pi}{3}$

Phase Shift: Vert. shift: Down 2  
 Vert. Shift: Min: -3  
 Min: Max: -1  
 Max: Vert asym: None  
 Transformation: Transformations:  
 Starting with  $\cos \theta$ ,  
 translate left  $\frac{2\pi}{3}$ ,  
 translate down 2

5)  $y = \cos\left(\theta - \frac{\pi}{3}\right) - 4$  Phase shift: Right  $\frac{\pi}{3}$

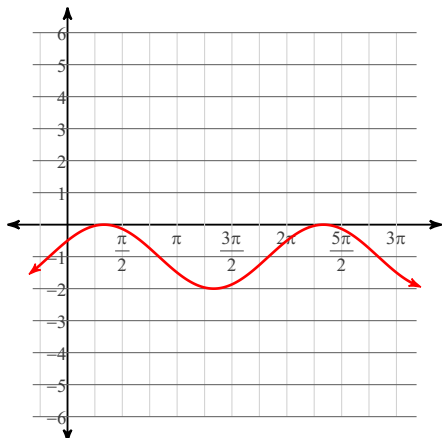
Phase Shift: Vert. shift: Down 4  
 Vert. Shift: Min: -5  
 Min: Max: -3  
 Max: Vert asym: None  
 Transformation: Transformations:  
 Starting with  $\cos \theta$ ,  
 translate right  $\frac{\pi}{3}$ ,  
 translate down 4

6)  $y = \sin\left(\theta - \frac{5\pi}{6}\right) + 3$  Phase shift: Right  $\frac{5\pi}{6}$

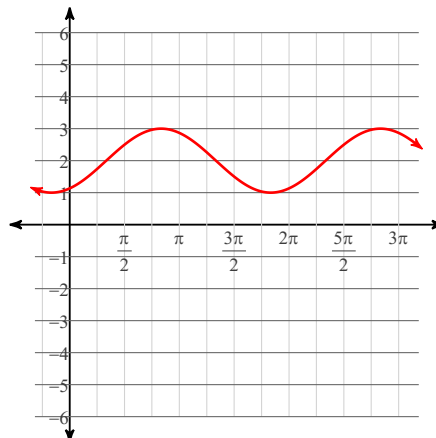
Phase Shift: Vert. shift: Up 3  
 Vert. Shift: Min: 2  
 Min: Max: 4  
 Max: Vert asym: None  
 Transformation: Transformations:  
 Starting with  $\sin \theta$ ,  
 translate right  $\frac{5\pi}{6}$ ,  
 translate up 3

Graph each function using radians.

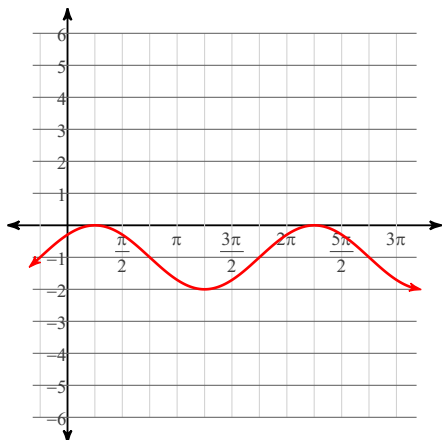
7)  $y = -1 + \cos\left(\theta + \frac{5\pi}{3}\right)$



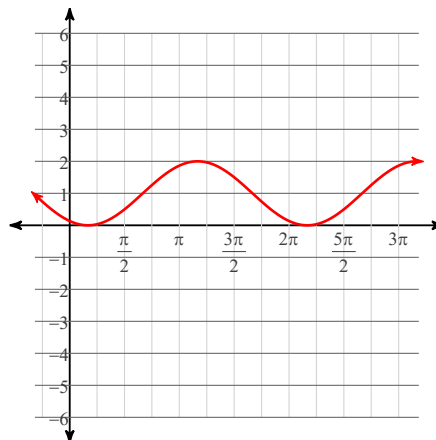
8)  $y = 2 + \cos\left(\theta + \frac{7\pi}{6}\right)$



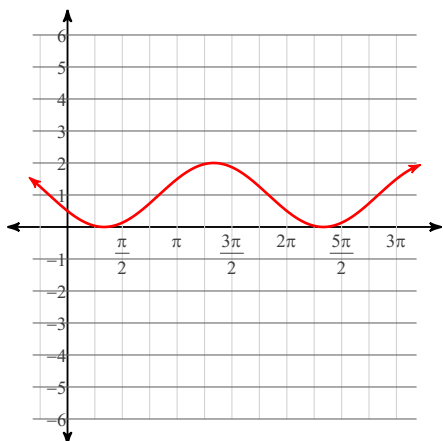
9)  $y = -1 + \cos\left(\theta + \frac{7\pi}{4}\right)$



10)  $y = \sin\left(\theta + \frac{4\pi}{3}\right) + 1$



11)  $y = \cos\left(\theta + \frac{2\pi}{3}\right) + 1$



12)  $y = \cos\left(\theta + \frac{5\pi}{6}\right) - 2$

