

# 10.2 Practice – Phase Shift and Tangent

Name: \_\_\_\_\_

Pre-Calculus

**For 1-3, identify the amplitude, period, phase shift and vertical shift of each function.**

1.  $f(x) = 13 \sin\left(4\left(x + \frac{\pi}{11}\right)\right) - 7$   
 Amp:  $|13|=13$  Period:  $\frac{\pi}{2}$   
 Phase Shift:  $-\frac{\pi}{11}$   
 Vertical Shift:  $-7$

2.  $f(\theta) = -25 \cos(7(\theta - 10)) + 3$   
 Amp:  $|-25|=25$  Period:  $\frac{2\pi}{7}$   
 Phase Shift:  $10$   
 Vertical Shift:  $3$

3.  $f(\theta) = 4 - 9 \sin\left(2\left(\theta + \frac{2\pi}{7}\right)\right)$   
 Amp:  $|-9|=9$  Period:  $\pi$   
 Phase Shift:  $-\frac{2\pi}{7}$   
 Vertical Shift:  $4$

4.  $f(\theta) = -3 \cos\left(2\theta + \frac{\pi}{4}\right) - 10$   
 Amp:  $|-3|=3$  Period:  $\pi$   
 Phase Shift:  $\frac{\pi}{8}$   
 Vertical Shift:  $-10$

5.  $f(\theta) = 2 \sin\left(\frac{\theta}{2} - \frac{\pi}{5}\right) - 5$   
 Amp:  $|2|=2$  Period:  $4\pi$   
 Phase Shift:  $\frac{2\pi}{5}$   
 Vertical Shift:  $-5$

6.  $f(x) = 6 \cos\left(3x + \frac{\pi}{6}\right) + 11$   
 Amp:  $|6|=6$  Period:  $\frac{2\pi}{3}$   
 Phase Shift:  $-\frac{\pi}{18}$   
 Vertical Shift:  $11$

**For 7-18, graph the trig function.**

7.  $y = \sin\left(x + \frac{\pi}{4}\right)$   
 Amp:  $1$  Period:  $2\pi$  P.S.:  $-\frac{\pi}{4}$  V.S.:  $0$

8.  $y = -\cos\left(x - \frac{\pi}{2}\right)$   
 Amp:  $1$  Period:  $2\pi$  P.S.:  $\frac{\pi}{2}$  V.S.:  $0$

9.  $y = 3 \cos\left(x - \frac{3\pi}{4}\right) - 1$   
 Amp:  $3$  Period:  $2\pi$  P.S.:  $\frac{3\pi}{4}$  V.S.:  $-1$

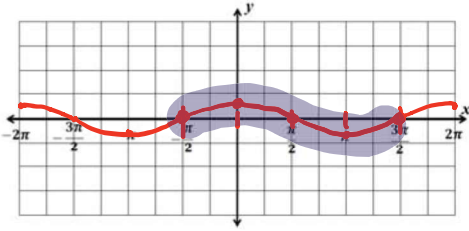
10.  $y = 2 + \sin\left(2\left(x + \frac{\pi}{4}\right)\right)$   
 Amp:  $1$  Period:  $\pi$  P.S.:  $-\frac{\pi}{4}$  V.S.:  $2$

11.  $y = -\sin\left(\frac{1}{2}\left(x - \frac{\pi}{2}\right)\right) - 2$   
 Amp:  $1$  Period:  $4\pi$  P.S.:  $\frac{\pi}{2}$  V.S.:  $-2$

12.  $y = 2 \cos(4(x - \pi)) - 1$   
 Amp:  $2$  Period:  $\frac{\pi}{2}$  P.S.:  $\pi$  V.S.:  $-1$

$$13. y = \frac{1}{2} \sin\left(x - \frac{3\pi}{2}\right)$$

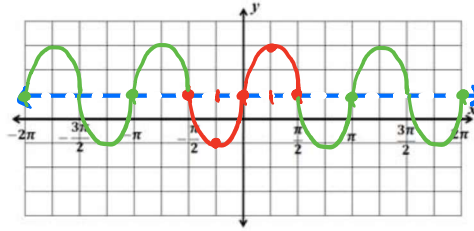
Amp  $\frac{1}{2}$     Period  $2\pi$     P.S.  $\frac{3\pi}{2}$     V.S.  $0$



$$14. y = -2 \sin(2x + \pi) + 1$$

$$[2(x + \frac{\pi}{2})]$$

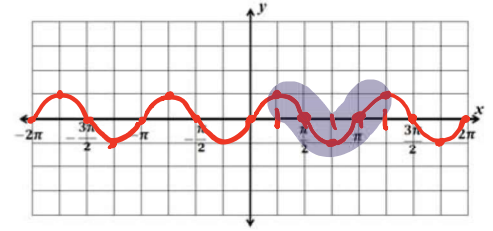
Amp  $2$     Period  $\pi$     P.S.  $-\frac{\pi}{2}$     V.S.  $1$



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

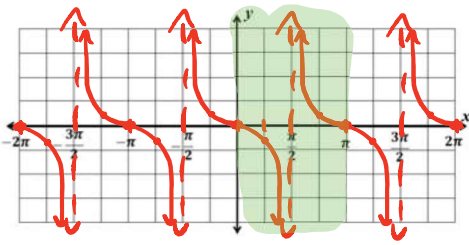
$$[2(x - \frac{\pi}{4})]$$

Amp  $1$     Period  $\pi$     P.S.  $\frac{\pi}{4}$     V.S.  $0$



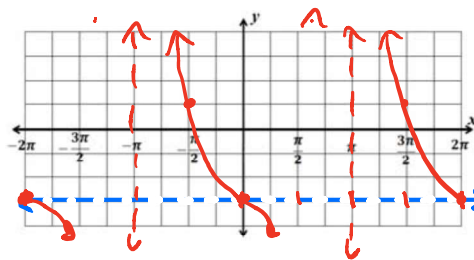
$$16. y = -\frac{1}{2} \tan x$$

Period  $\pi$     P.S.  $0$     V.S.  $0$



$$17. y = 4 \tan\left(-\frac{1}{2}x\right) - 3$$

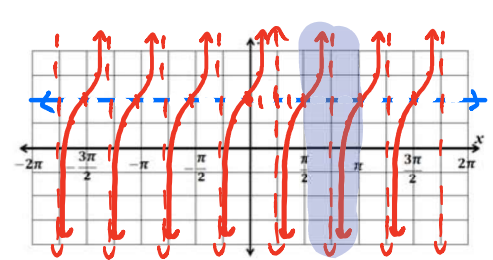
Period  $2\pi$     P.S.  $0$     V.S.  $-3$   
horizontal reflection



$$18. y = \tan(2x - \pi) + 2$$

$$[2(x - \frac{\pi}{2})]$$

Period  $\frac{\pi}{2}$     P.S.  $\frac{\pi}{2}$     V.S.  $2$



For 19 – 21, use the given information to create a sine function.

19.

Amplitude: 2

Period:  $\frac{3\pi}{2}$

Phase Shift: left  $\frac{5\pi}{9}$

Vertical Shift: down 14

$$b = 2\pi \cdot \frac{2}{3\pi} = \frac{4}{3}$$

$$y = \pm 2 \sin\left[\frac{4}{3}\left(\theta + \frac{5\pi}{9}\right)\right] - 14$$

20.

Amplitude: 5

Period:  $\frac{\pi}{6}$

Phase Shift: right  $\frac{\pi}{24}$

Vertical Shift: up 8

$$b = 2\pi \cdot \frac{6}{\pi} = 12$$

$$y = \pm 5 \sin\left[12\left(\theta - \frac{\pi}{24}\right)\right] + 8$$

21.

Amplitude: 1

Period: 6

Phase Shift: left  $\frac{6\pi}{7}$

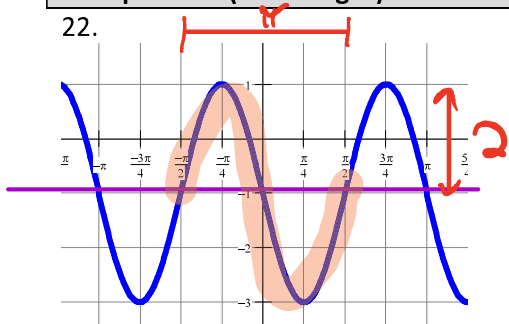
Vertical Shift: up 2

$$b = 2\pi \cdot \frac{1}{6} = \frac{\pi}{3}$$

$$y = \pm \sin\left[\frac{\pi}{3}\left(\theta + \frac{6\pi}{7}\right)\right] + 2$$

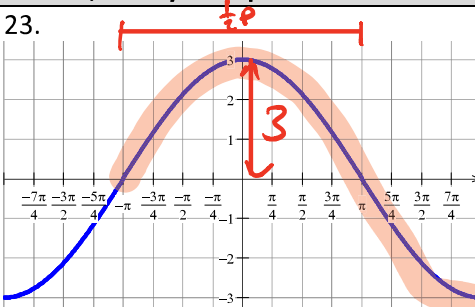
For 22-24, write the equation of the following sine curves. Use a positive leading coefficient  $a$  and the closest phase shift possible (left or right). For some problems, it may be equal to move left or right.

22.



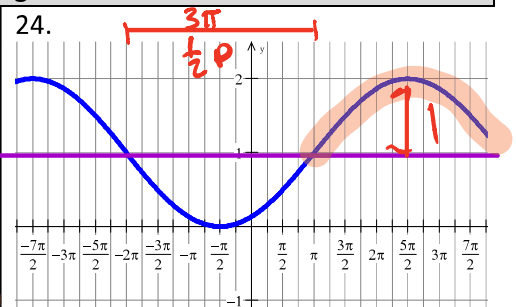
$$y = 2 \sin\left[2\left(\theta + \frac{\pi}{2}\right)\right] - 1$$

23.



$$y = 3 \sin\left[\frac{1}{2}\left(\theta + \pi\right)\right]$$

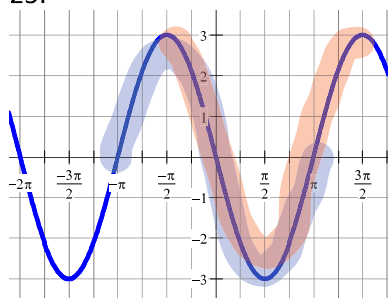
24.



$$y = \sin\left[\frac{1}{2}\left(\theta - \pi\right)\right] + 1$$

For 25-27, write a sine AND cosine function for the curve. Use a positive leading coefficient  $a$  and the closest phase shift possible (left or right). For some problems, it may equal to move left or right.

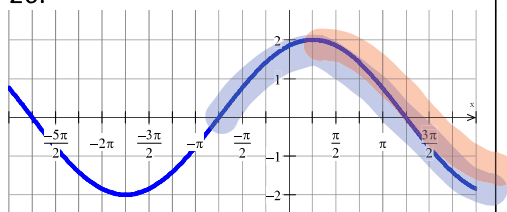
25.



sine:  $y = 3 \sin(\theta + \pi)$

cosine:  $y = 3 \cos(\theta + \frac{\pi}{2})$

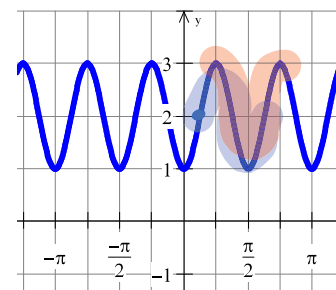
26.



sine:  $y = 2 \sin[\frac{1}{2}(\theta + \frac{3\pi}{4})]$

cosine:  $y = 2 \cos[\frac{1}{2}(\theta - \frac{\pi}{4})]$

27.



sine:  $y = \sin[4(\theta - \frac{\pi}{8})] + 2$

cosine:  $y = \cos[4(\theta - \frac{\pi}{4})] + 2$