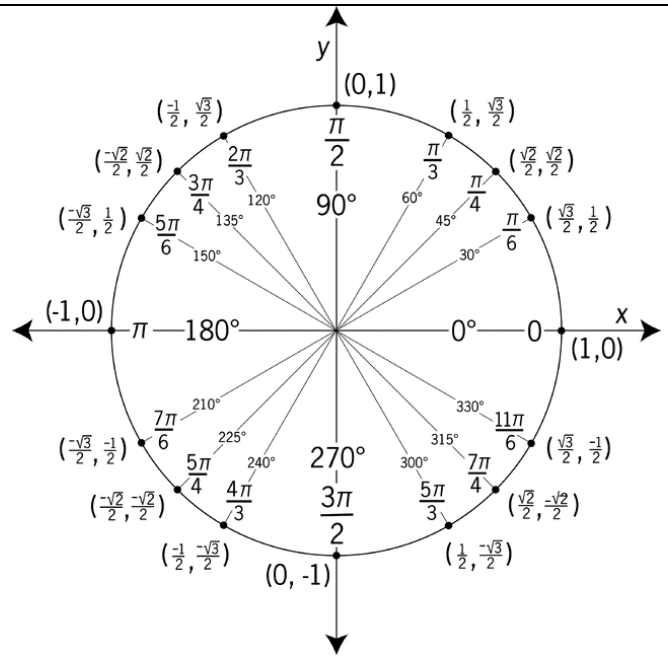


$f(\theta) = \cos \theta$

θ	$f(\theta)$
0	
$\frac{\pi}{2}$	
π	
$\frac{3\pi}{2}$	
2π	

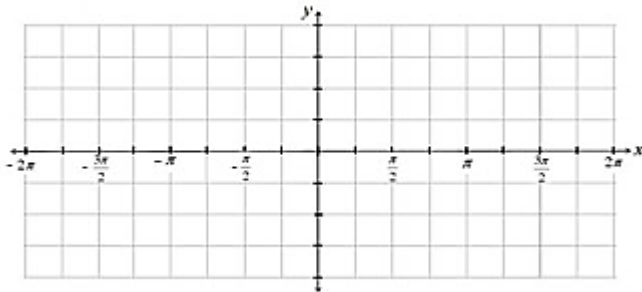
$f(\theta) = \sin \theta$

θ	$f(\theta)$
0	
$\frac{\pi}{2}$	
π	
$\frac{3\pi}{2}$	
2π	

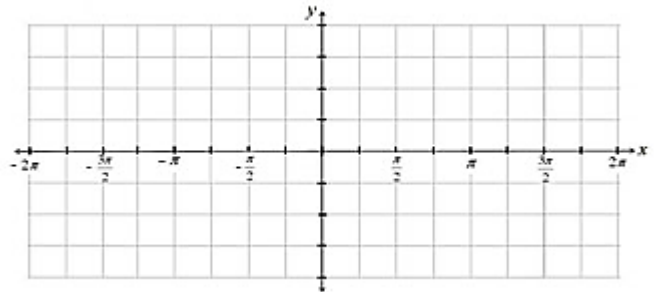


Parent Functions

$f(\theta) = \sin \theta$

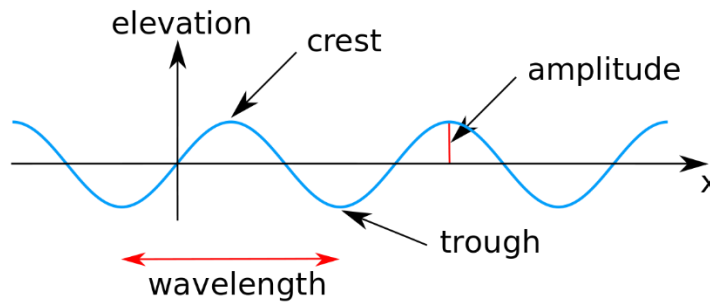


$f(\theta) = \cos \theta$



The sine function looks like a _____.
Standard equation: $f(\theta) = a \cdot \sin(b(\theta - h)) + k$

The cosine function looks like a _____.
Standard equation: $f(\theta) = a \cdot \cos(b(\theta - h)) + k$



Amplitude (a) is the height from the center line to the peak (or to the trough). Or we can measure the height from highest to lowest points and divide that by 2.

Period the change in x to complete one full cycle. $Period = \frac{2\pi}{b}$

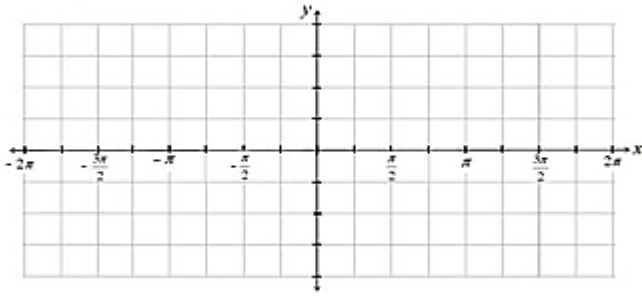
Vertical Shift (k) is how far the function is shifted **vertically** from the usual position.

Phase Shift (h) is how far the function is shifted **horizontally** from the usual position.

Amplitude

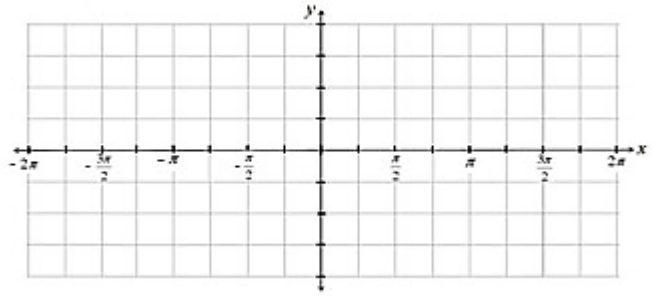
Ex. $f(\theta) = 3\sin\theta$

Amplitude: _____ period: _____



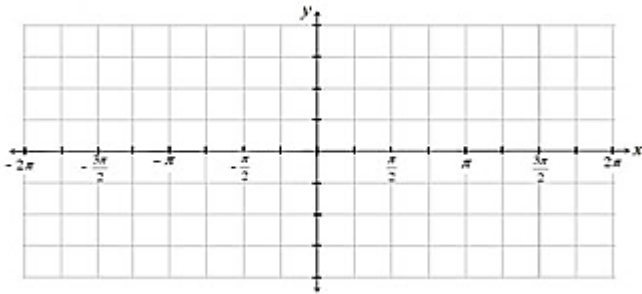
Ex. $f(\theta) = 2\cos\theta$

Amplitude: _____ period: _____



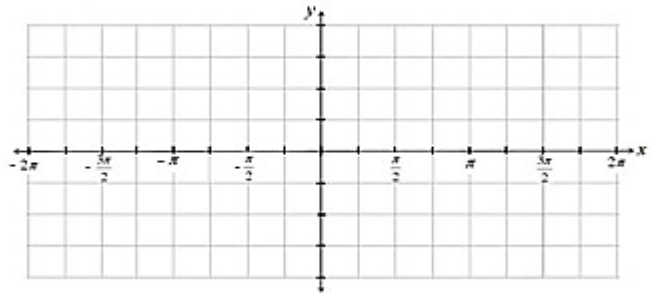
Ex. $f(\theta) = -\cos\theta$

Amplitude: _____ period: _____



Ex. $f(\theta) = -\sin\theta$

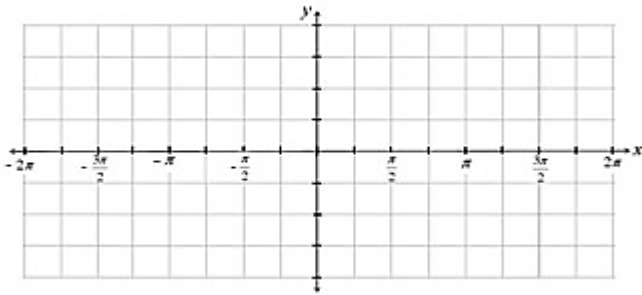
Amplitude: _____ period: _____



Vertical Shifts

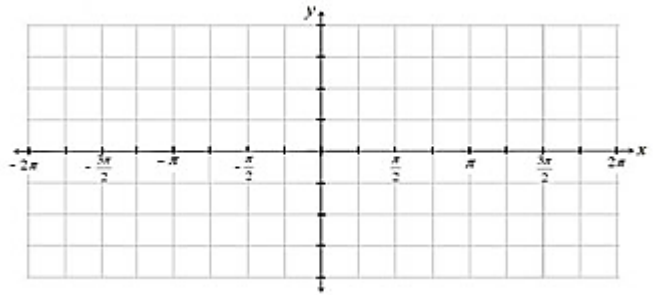
Ex. $f(\theta) = \cos\theta + 2$

Amplitude: _____ period: _____



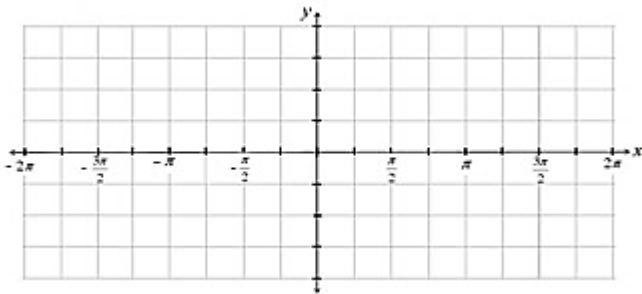
Ex. $f(\theta) = \sin\theta - 2$

Amplitude: _____ period: _____



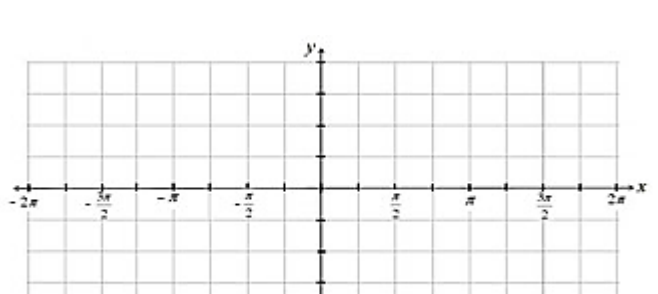
Ex. $f(\theta) = 3\sin\theta + 1$

Amplitude: _____ period: _____



Ex. $f(\theta) = -2\cos\theta - 2$

Amplitude: _____ period: _____

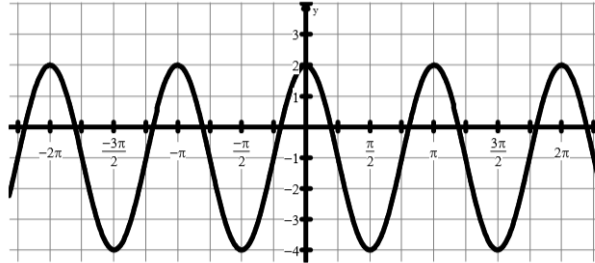


Use the given information to create a sine function

Ex.
Amplitude: 5
Period: 2π
Vertical Shift: down 4

Ex.
Amplitude: 3
Period: 2π
Vertical Shift: up 1

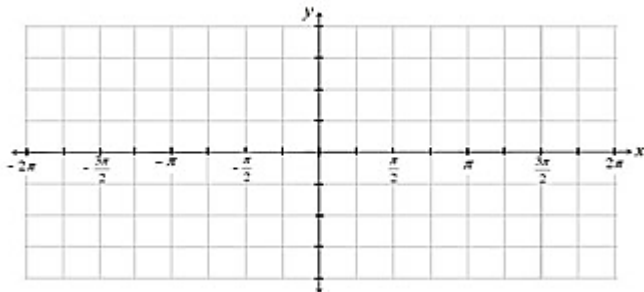
Ex. Write one cosine function for the graph.



Practice

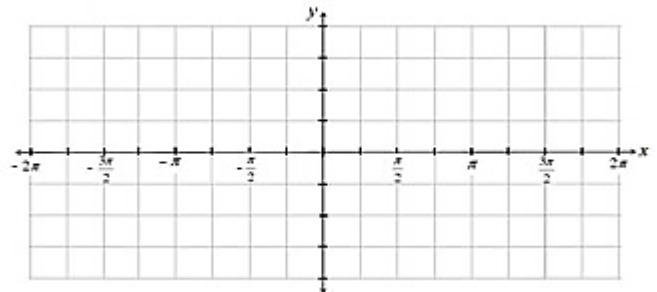
1. $f(\theta) = 4\sin\theta$

Amplitude: _____ period: _____



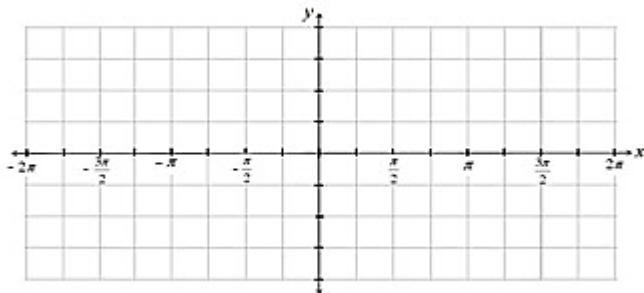
2. $f(\theta) = 1.5\cos\theta$

Amplitude: _____ period: _____



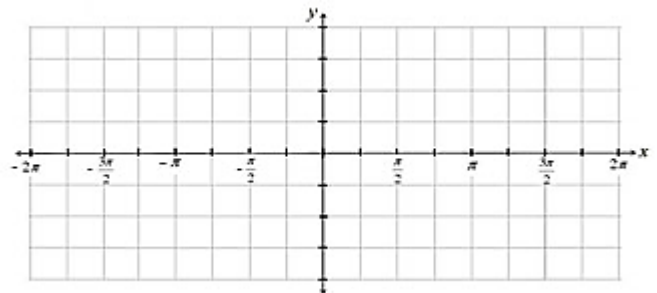
3. $f(\theta) = 3\sin\theta + 1$

Amplitude: _____ period: _____



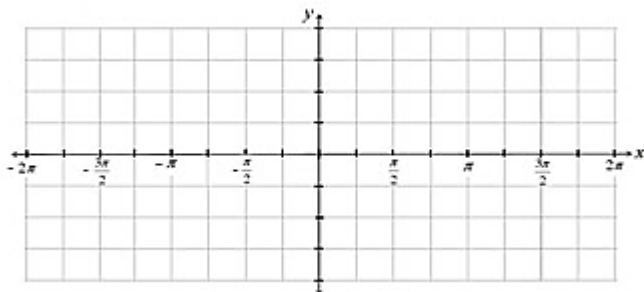
4. $f(\theta) = 2\cos\theta - 1$

Amplitude: _____ period: _____



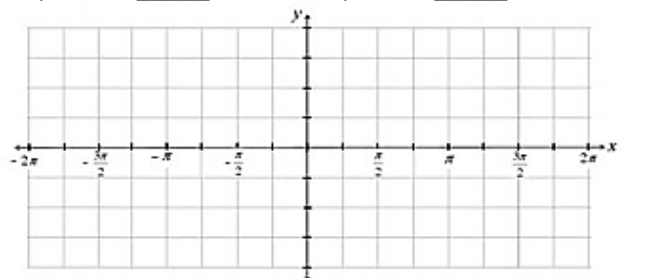
5. $f(\theta) = \sin\theta - 3$

Amplitude: _____ period: _____



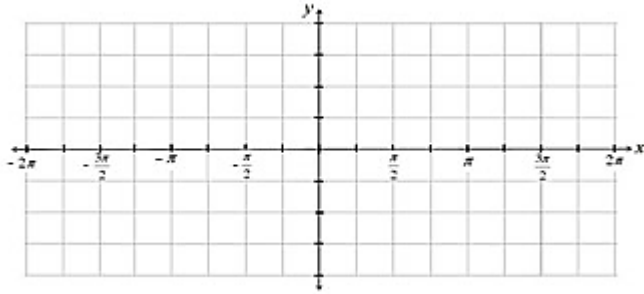
6. $f(\theta) = \frac{5}{2}\sin\theta$

Amplitude: _____ period: _____



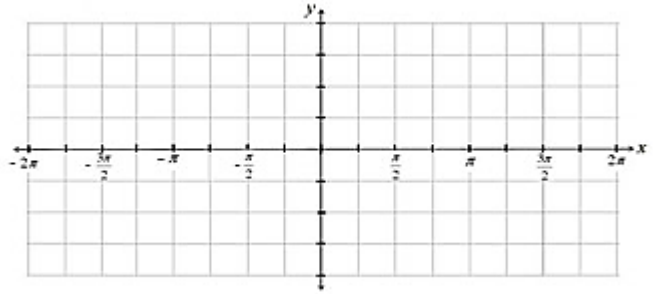
7. $f(\theta) = -\cos\theta + 3$

Amplitude: _____ period: _____



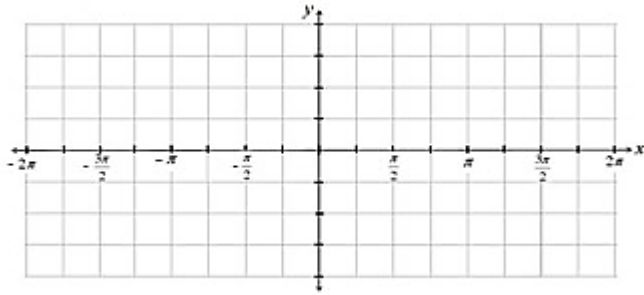
8. $f(\theta) = -\sin\theta + 1$

Amplitude: _____ period: _____



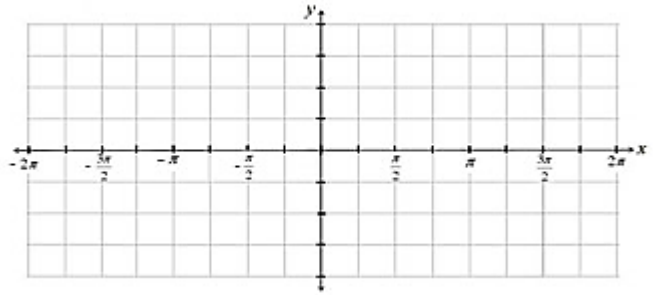
9. $f(\theta) = 0.5\sin\theta$

Amplitude: _____ period: _____



10. $f(\theta) = \cos\theta + 3$

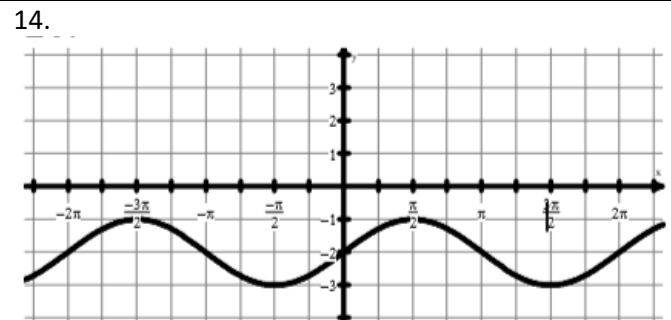
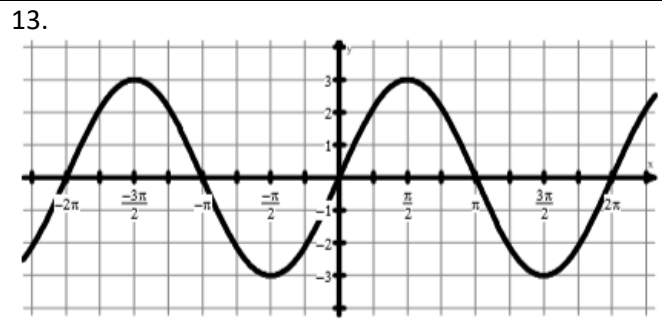
Amplitude: _____ period: _____



Use the given information to create a sine function.

11.
Amplitude: 5
Period: 2π
Vertical Shift: down 4

12.
Amplitude: $\frac{1}{5}$
Period: 2π
Vertical Shift: up 15

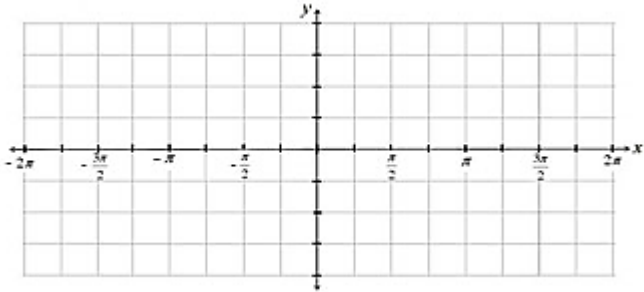


Phase Shifts and Period Changes

Phase Shifts

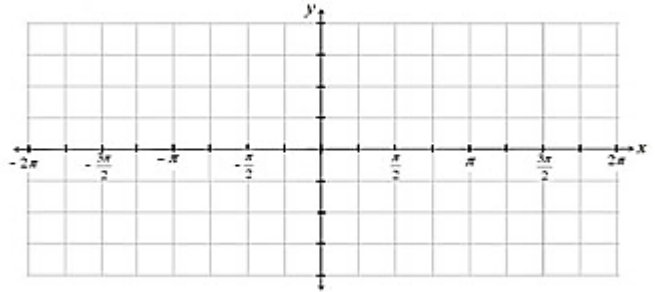
Ex. $f(\theta) = \sin\left(\theta - \frac{\pi}{2}\right)$

Amplitude: _____ period: _____



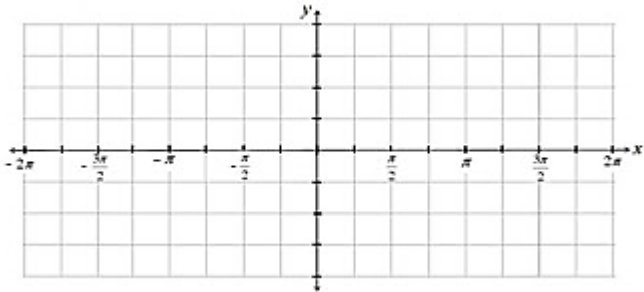
Ex. $f(\theta) = \cos\left(\theta + \frac{\pi}{4}\right)$

Amplitude: _____ period: _____



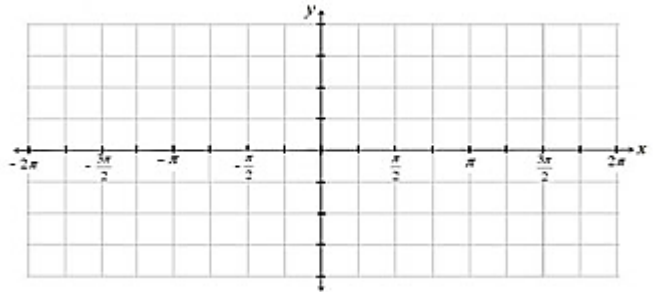
Ex. $f(\theta) = \cos(\theta + \pi) + 1$

Amplitude: _____ period: _____ VS: _____



Ex. $f(\theta) = 3\sin(\theta - \pi)$

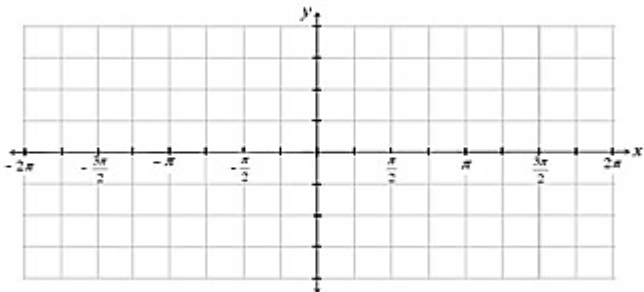
Amplitude: _____ period: _____ VS: _____



Period Changes

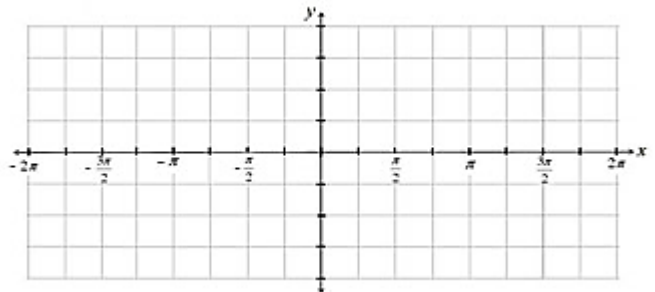
Ex. $f(\theta) = \sin 2\theta$

Amplitude: _____ period: _____ phase shift: _____ VS: _____



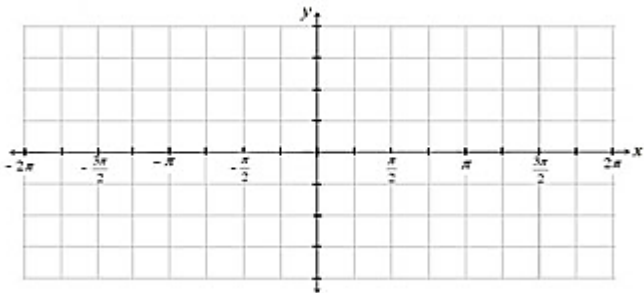
Ex. $f(\theta) = \cos 2\theta$

Amplitude: _____ period: _____ phase shift: _____ VS: _____



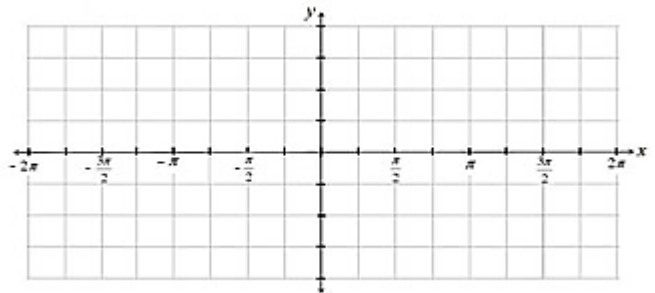
Ex. $f(\theta) = \cos \frac{1}{2}\theta$

Amplitude: _____ period: _____ phase shift: _____ VS: _____



Ex. $f(\theta) = -\sin \frac{1}{2}\theta$

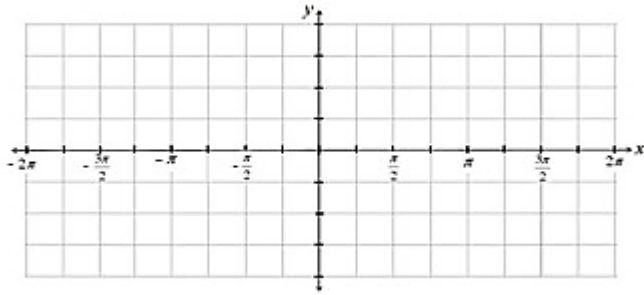
Amplitude: _____ period: _____ phase shift: _____ VS: _____



Practice 2

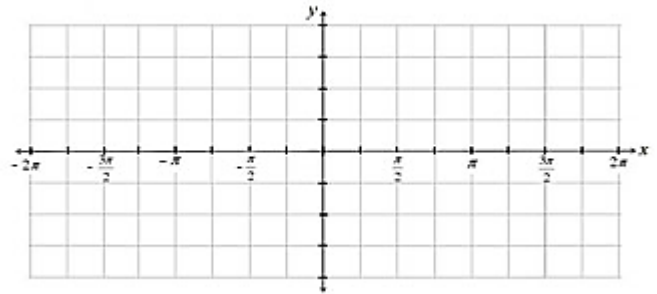
1. $f(\theta) = -\sin 2\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



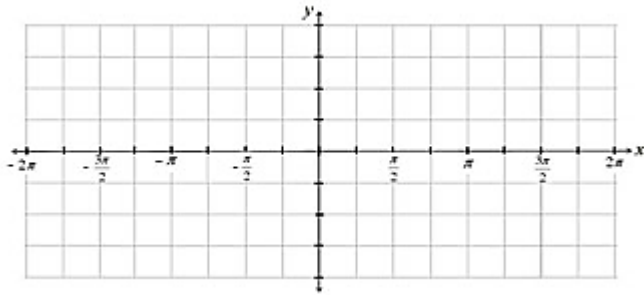
2. $f(\theta) = 4\cos \frac{1}{2}\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



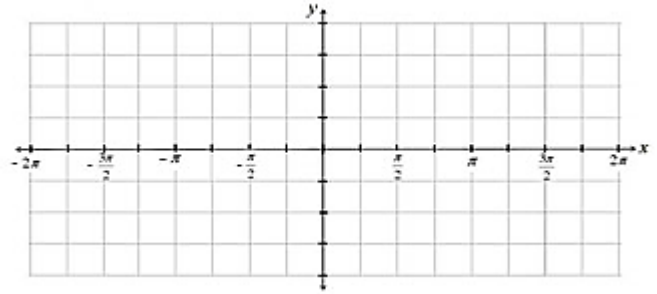
3. $f(\theta) = -3\sin \frac{1}{2}\theta + 1$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



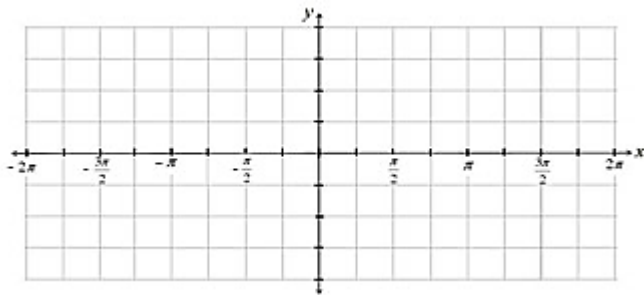
4. $f(\theta) = -\cos 4\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



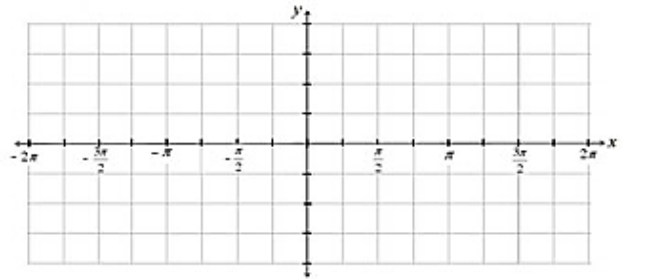
5. $f(\theta) = -3\cos 2\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



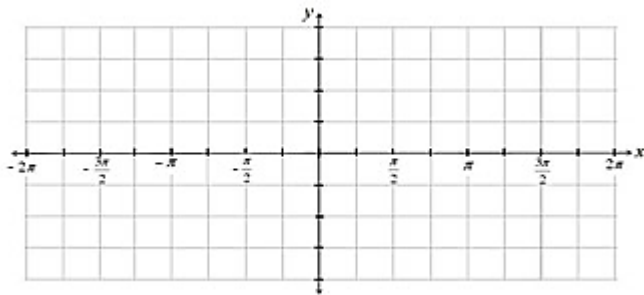
6. $f(\theta) = 2 - 3\sin \frac{1}{2}\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



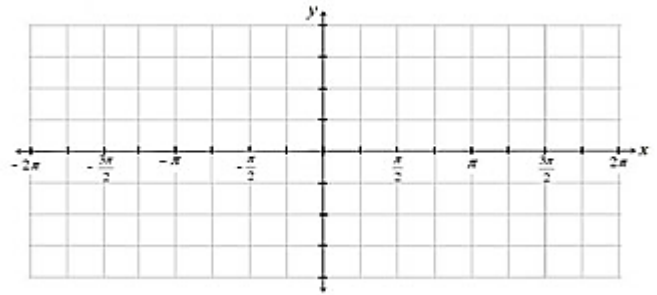
7. $f(\theta) = \cos \left(\theta - \frac{\pi}{4}\right)$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



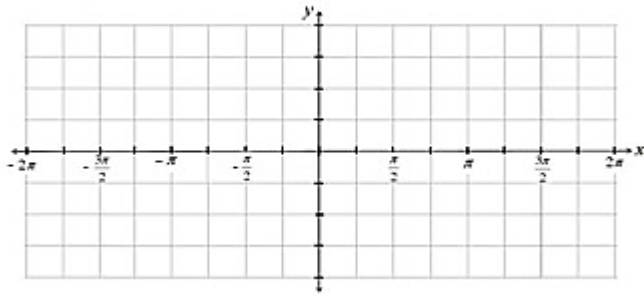
8. $f(\theta) = \sin (\theta + \pi)$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



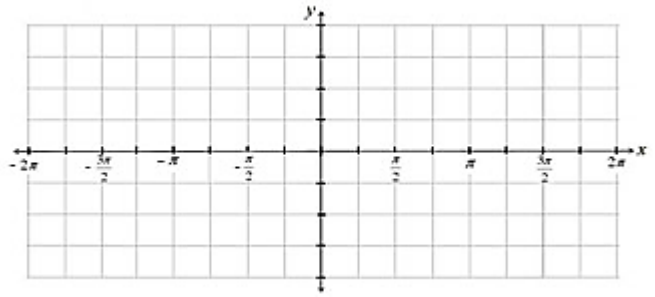
9. $f(\theta) = 2\sin(\theta + \frac{\pi}{4})$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



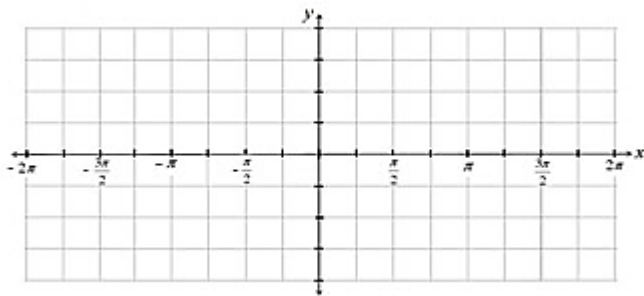
10. $f(\theta) = \cos 2(\theta + \frac{\pi}{2})$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



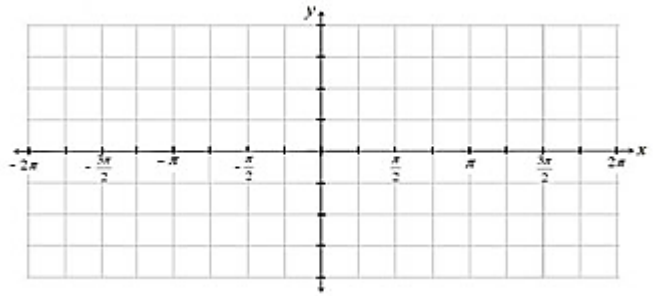
11. $f(\theta) = \sin(\theta - \frac{\pi}{4}) - 1$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



12. $f(\theta) = -\cos \frac{1}{2}(\theta + \pi)$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



Use the given information to create a sine function.

13.

Amplitude: $\frac{1}{5}$

Period: $\frac{\pi}{10}$

Vertical Shift: up 15

14.

Amplitude: 5

Period: 4π

Vertical Shift: up 4

15.

Amplitude: 5

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

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

Vertical Shift: up 8

16.

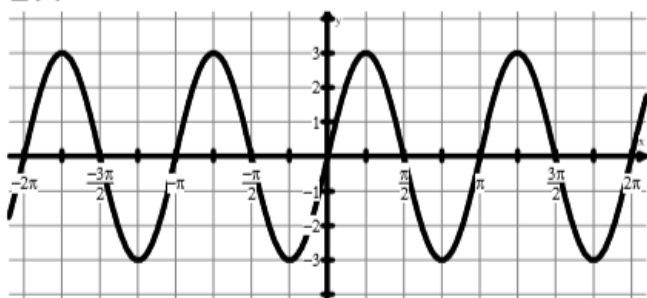
Amplitude: 2

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

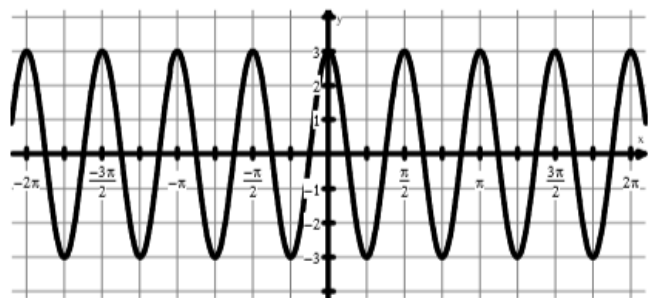
Phase Shift: left $\frac{5\pi}{9}$

Vertical Shift: down 14

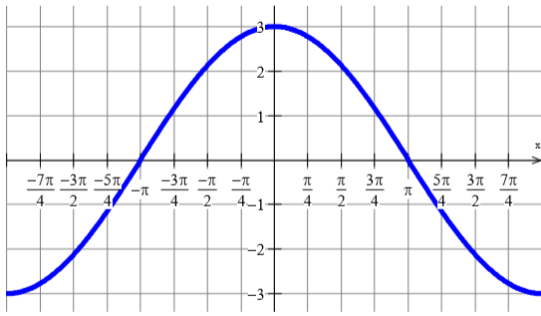
17.



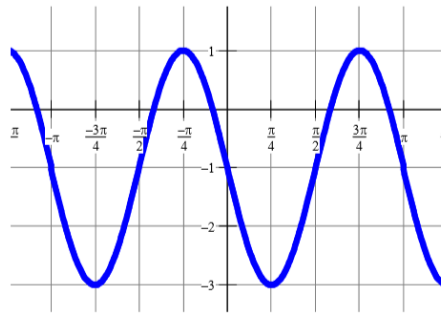
18.



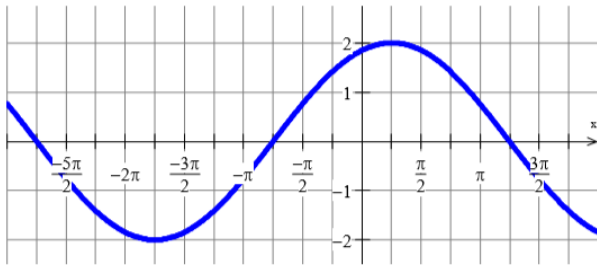
19.



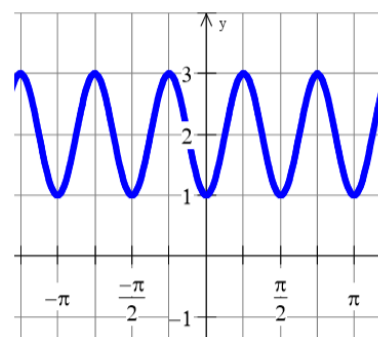
20.



21.



22.



23. The ferris wheel at the carnival is 150 feet tall. The bottom cart sits 4 feet off the ground. It takes 3 minutes to make 5 rotations.

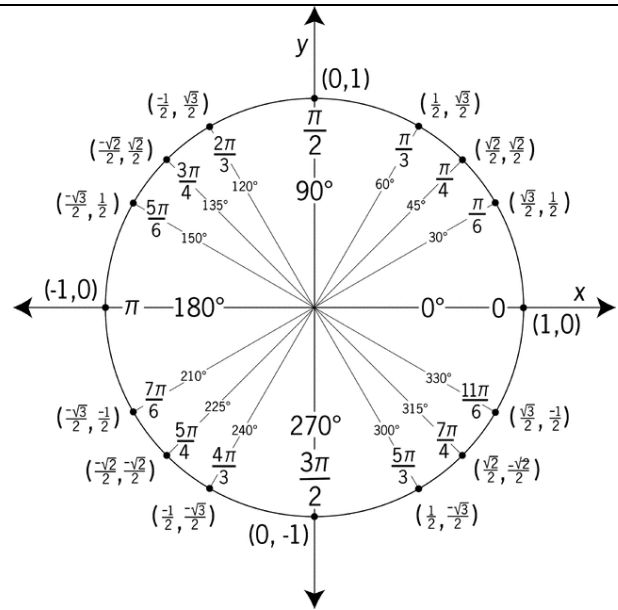
1. What represents the amplitude?
2. What represents the midline?
3. How can you find b if you know the period?
4. Would this be a sine or cosine equation if you started at the bottom?
5. Write an equation for the ferris wheel ride if you start at the bottom and then end up at the bottom.
6. Make this into a sine equation. (you must start at a different spot on the ferris wheel which makes this equation have a phase shift.)



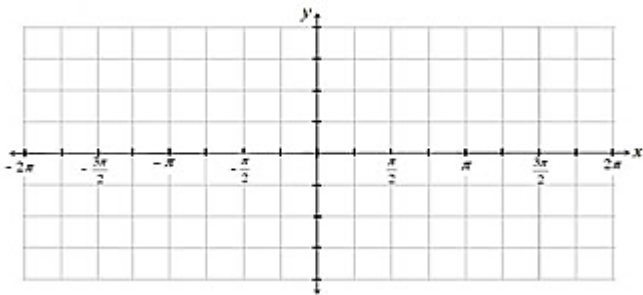
Tangent Notes

θ	$f(\theta)$
0	
$\frac{\pi}{4}$	
$\frac{\pi}{2}$	
$\frac{3\pi}{4}$	
π	

θ	$f(\theta)$
$\frac{5\pi}{4}$	
$\frac{3\pi}{2}$	
$\frac{7\pi}{4}$	
2π	



Parent Function for Tangent



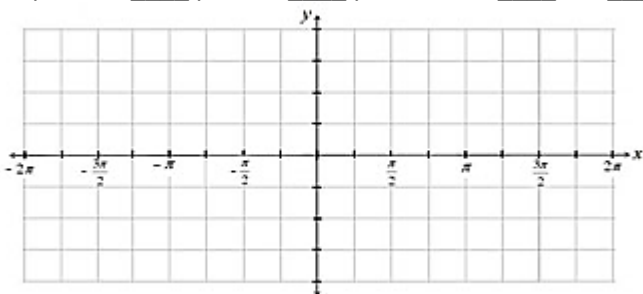
Standard equation:

$$f(\theta) = a \cdot \tan(b(\theta - h)) + k$$

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

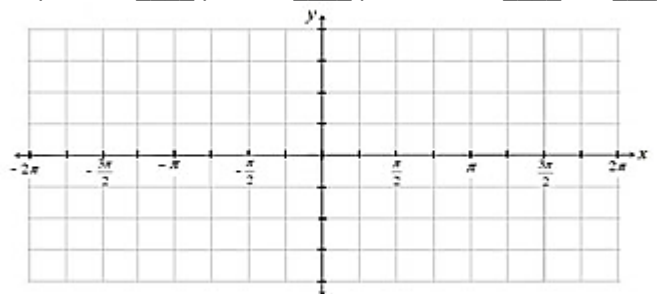
Ex. $f(\theta) = \tan\theta + 1$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



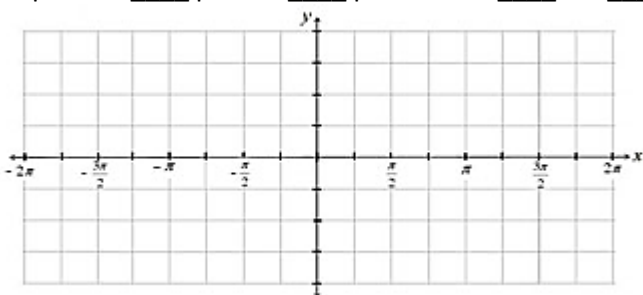
Ex. $f(\theta) = -3\tan\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



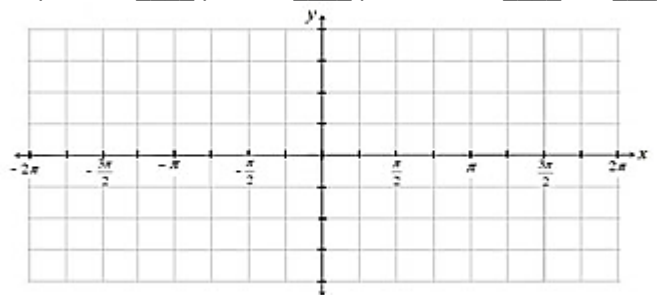
Ex. $f(\theta) = \tan\left(\theta + \frac{\pi}{4}\right)$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



Ex. $f(\theta) = \tan 2\theta$

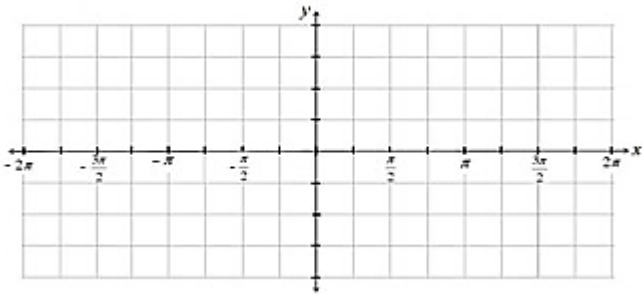
Amplitude: ____ period: ____ phase shift: ____ VS: ____



Practice

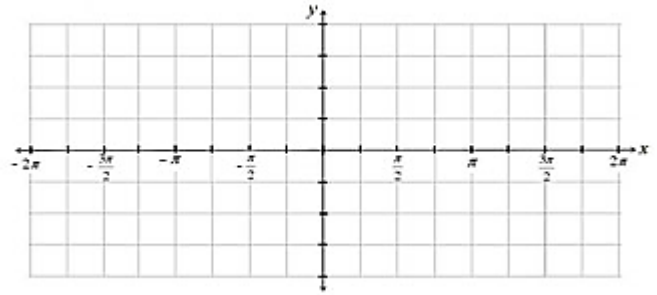
1. $f(\theta) = -\frac{1}{2}\tan\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



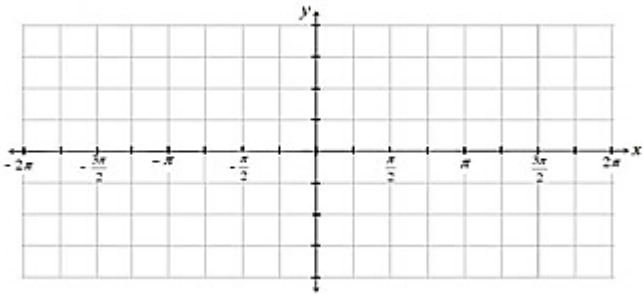
2. $f(\theta) = \tan(\theta - \pi)$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



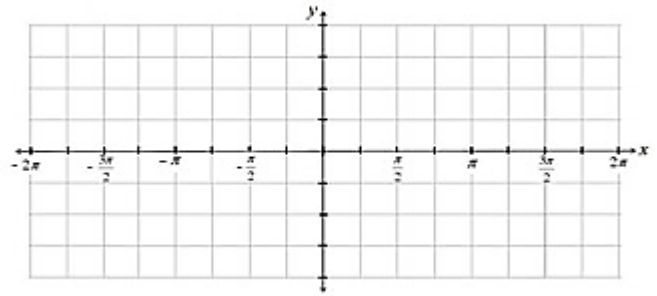
3. $f(\theta) = 4\tan\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



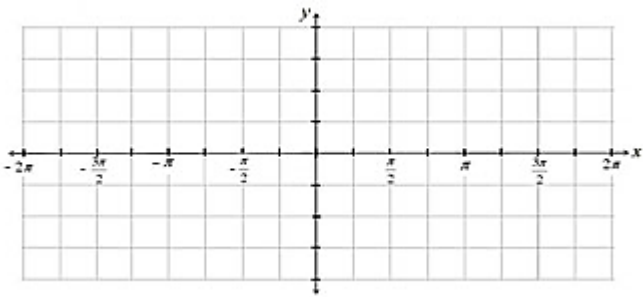
4. $f(\theta) = \tan\theta - 2$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



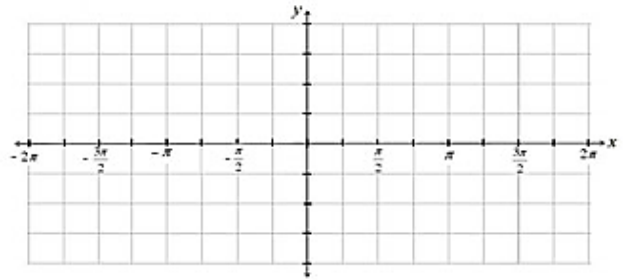
5. $f(\theta) = \tan\frac{1}{2}\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



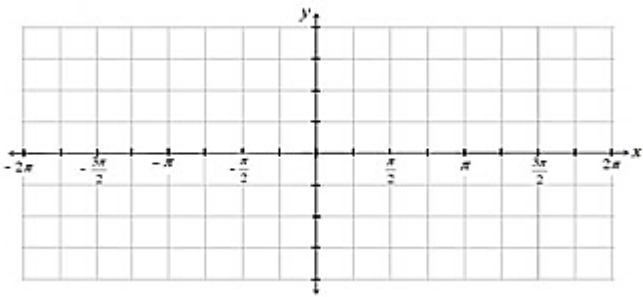
6. $f(\theta) = -\tan\theta + 1$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



7. $f(\theta) = \tan(\theta + \frac{\pi}{4})$

Amplitude: ____ period: ____ phase shift: ____ VS: ____



8. $f(\theta) = -2\tan\theta$

Amplitude: ____ period: ____ phase shift: ____ VS: ____

