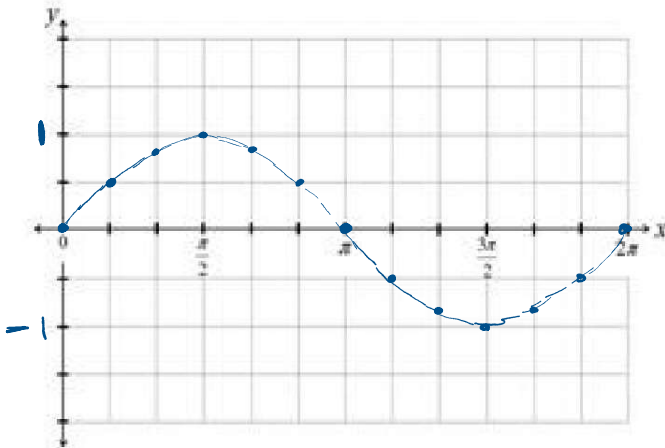


Graphing Trigonometry Functions

Properties of Sine and Cosine Functions

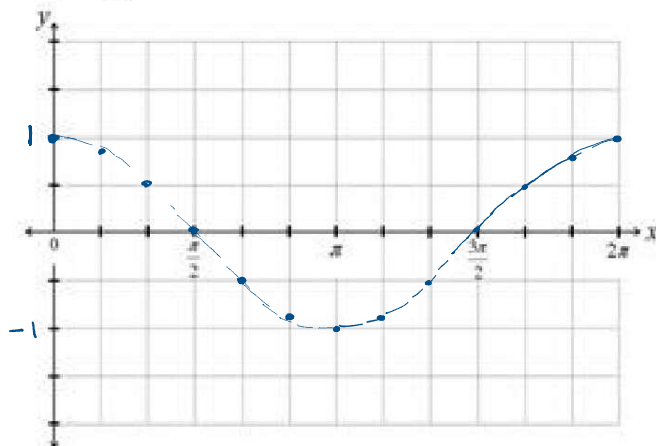
- $y = a \sin bx$ $y = a \cos bx$
- $b > 0$; θ in Radians
 - $|a|$ is amplitude of function
 - b is number of cycles in the interval from 0 to 2π
 - $\frac{2\pi}{b}$ is period of the function

Graph of $y = \sin x$



Amplitude: $|a| = |1| = 1$
 2 Blocks Up/Down = Amplitude
 1/2 Blocks Right = π

Graph of $y = \cos x$



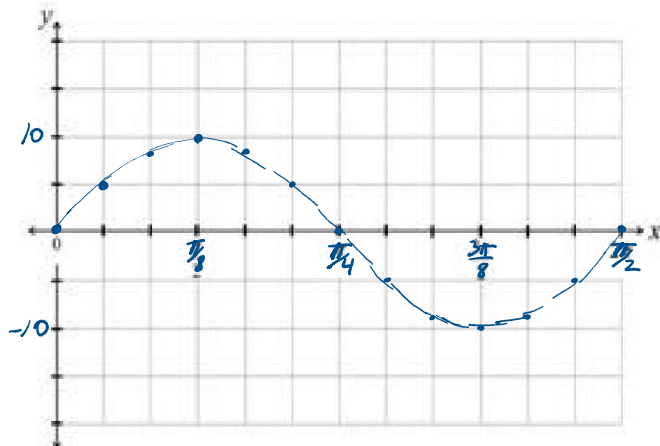
$a = 1$
 $b = 1$

Examples:

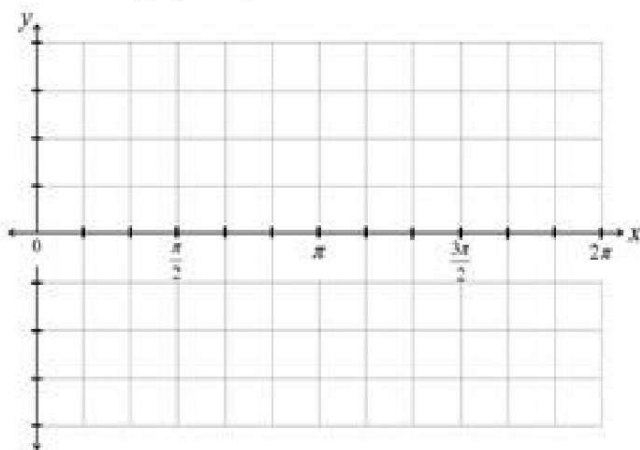
- What is the amplitude of $f(x) = 0.4 \sin 5x$?
 $= 0.4$
- A sine curve has amplitude 0.2, period 8π , and $a > 0$. What is the equation in the form $y = a \sin b\theta$?
 $Pl = 8\pi = \frac{2\pi}{b} \implies b = \frac{2\pi}{8\pi} = \frac{1}{4} \implies y = 0.2 \sin \frac{1}{4}\theta$
- What is the graph of one cycle of $y = 10 \sin 4\theta$?
 $10 \sin \left(\frac{4}{12}\theta \right)$

Amplitude = 10

$b = 4$
 $pd = \frac{2\pi}{4} = \frac{\pi}{2}$



- What is the graph of $y = 0.75 \cos 3\theta$ on the interval 0 to 2π ?



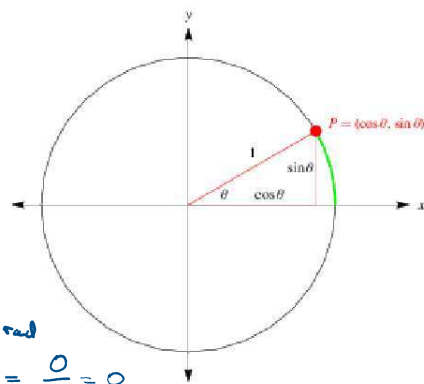
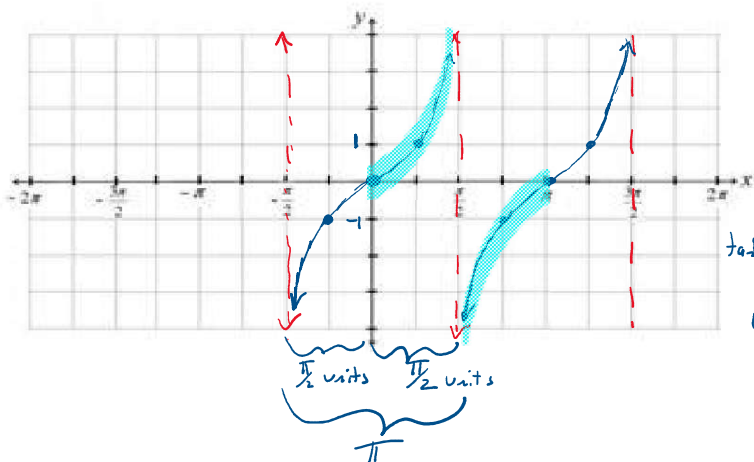
$Amp = .75$
 $pd = \frac{2\pi}{3}$

Properties of Tangent Function

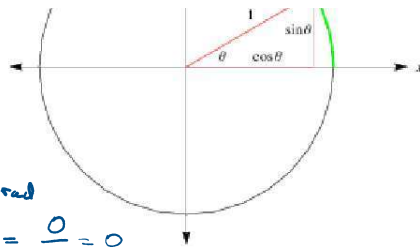
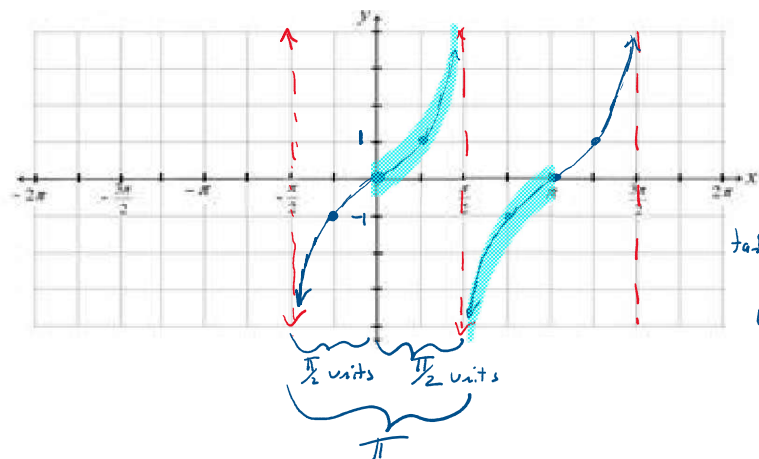
- $y = a \tan b\theta$
- $b > 0$; θ in Radians
 - $\frac{\pi}{b}$ is period of the function
 - One cycle occurs in the interval $-\frac{\pi}{2b}$ to $\frac{\pi}{2b}$
 - There are vertical asymptotes at each end of the cycle

Graph $y = \tan x$

- Remember, $\tan x = \frac{\text{Opposite}}{\text{Adjacent}} = \frac{\sin \theta}{\cos \theta}$



$\theta = 0 \text{ rad}$
 $\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{0}{1} = 0$
 $0^\circ = (1, 0) = (\cos \theta, \sin \theta)$



$$\theta = 0 \text{ rad}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{0}{1} = 0$$

$$\theta^\circ = (1, 0) = (\cos \theta, \sin \theta)$$

Examples

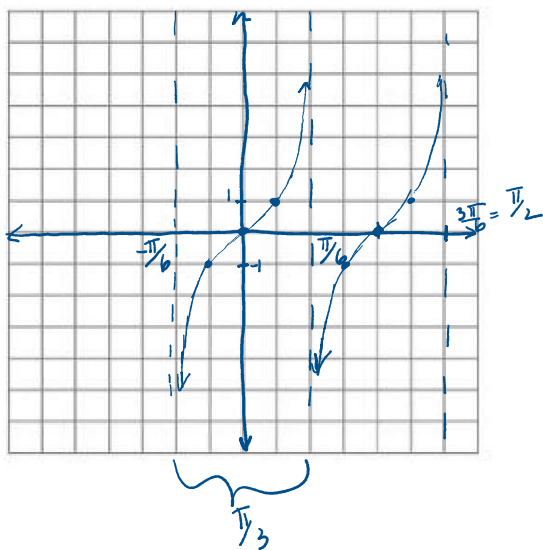
- What is the value of each expression? Don't use a calculator.

- $\tan \frac{5\pi}{4} = 1$

- $\tan \left(-\frac{\pi}{2}\right) = \frac{-1}{0}$ undefined

- $\tan \frac{\pi}{6} = \frac{\sin \frac{\pi}{6}}{\cos \frac{\pi}{6}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

- Sketch two cycles of $y = \tan 3\theta$



amplitude: 1

$$b = 3$$

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

