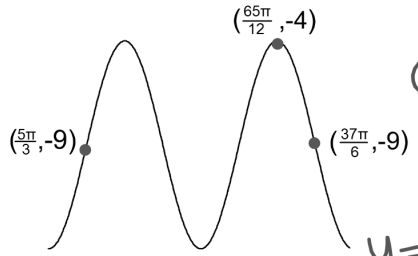
1. Write an equation of this function:



Amp 5

Sin EQ: $y = 5\sin\left(\frac{2}{3}\left(x - \frac{5\pi}{3}\right)\right) - 9$

Period 3π

midline

Cos EQ: $y = 5\cos\left(\frac{2}{3}\left(x - \frac{65\pi}{12}\right)\right) - 9$

Graph one period of each. Label the coordinates of the Max, Min, and points on the midline.

2. $y = 6\sin\left(\frac{8x}{9}\right)$

$\frac{2\pi}{\frac{8}{9}} \cdot \frac{9}{8} = \frac{9\pi}{4} \cdot \frac{1}{4} = \frac{9\pi}{16}$

$(\frac{9\pi}{16}, 6)$, $(\frac{18\pi}{16}, 0)$, $(\frac{9\pi}{4}, 0)$, $(0, 0)$, $(\frac{27\pi}{16}, -6)$

3. $y = -13\cos(10(x + \frac{7\pi}{4})) - 8$

$\frac{2\pi}{10} = \frac{\pi}{5} \cdot \frac{1}{4} = \frac{\pi}{20}$

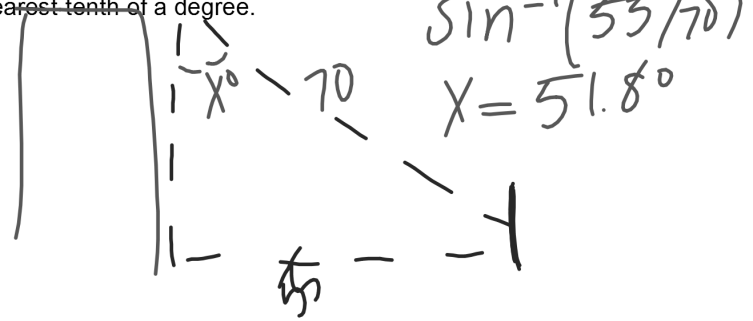
$(-\frac{33\pi}{20}, 5)$, $(-\frac{32\pi}{20}, -8)$, $(-\frac{31\pi}{20}, -21)$, $(-\frac{34\pi}{20}, -8)$, $(-\frac{7\pi}{4}, -21)$, $y = -8$

4. Given $\tan = \frac{-\sqrt{3}}{3}$ and $\cos\theta > 0$, find θ such that $0° \leq \theta \leq 360°$.

II, IV, I, III

$\theta = 330°$

5. A 70 foot long rope is attached to the bottom of a window of an apartment building. The rope is pulled tight and anchored to a stake in the ground. If the stake is 55 feet from the apartment building find the angle the rope makes with the building to nearest tenth of a degree.



$\sin^{-1}(55/70)$

$X = 51.8°$

Sec 13-6: The Tangent Function

Use this Rational Function: $y = \frac{x+1}{x^2-9}$ $(X+3)(X-3)$

Find the Vertical Asymptotes
zeros of the denominator

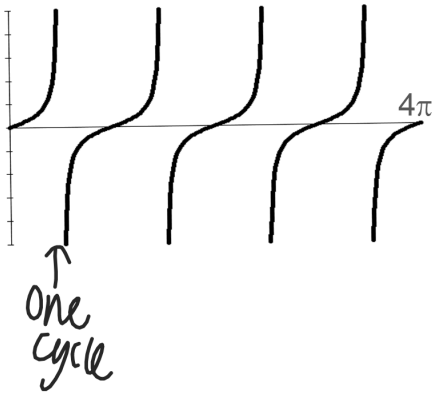
$X = \pm 3$

Find the x-intercepts:
zeros of the numerator.

$X = -1$

Graph the function $Y_1 = \tan x$

Use this Window: $x:[0,4\pi]$ $y:[-10, 10]$



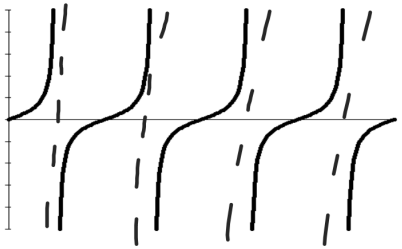
What is the period of the Tangent Function?

$$\frac{\text{Total width}}{\#\text{ cycles}} = \frac{4\pi}{4} = \pi$$

Why does the graph of

y = Tanθ look like this?

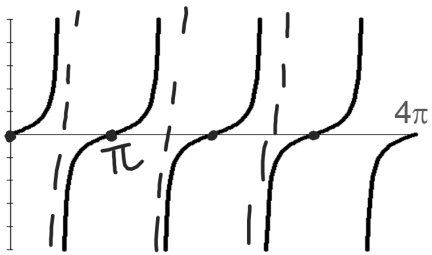
$$\text{Tan}\theta = \frac{y}{x}$$



When y = 0
Tanθ = 0 and there is an x-intercept

When x = 0
Tanθ is undefined and there is a Vertical Asymptote

The Parent Tangent Function: y = Tanx



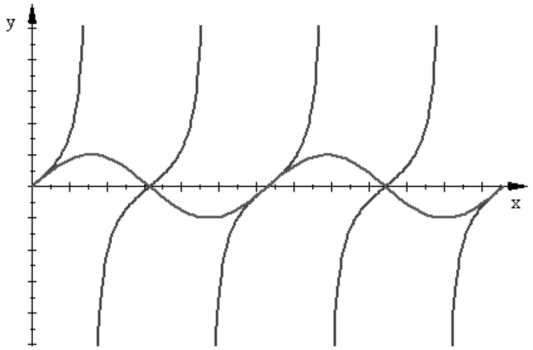
Period of Tanθ = π

What are the Eq's of the Vertical Asymtpotes? $\frac{\pi}{2}, \frac{3\pi}{2}$

What are the x-intercepts? $0, \pi, 2\pi, 3\pi, 4\pi$

$$\text{Tan}\theta = \frac{y}{x} = \frac{\text{Sin}\theta}{\text{Cos}\theta}$$

Leave Y_1 = Tanx. Graph Y_2 = Sinx.

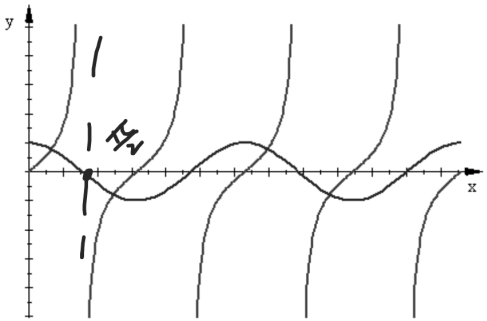


How is the graph of Tanx related to the graph of Sinx?

Tanx is zero whenever Sinx is zero.

In other words, Tanx has x-intercepts where ever Sinx has x-intercepts.

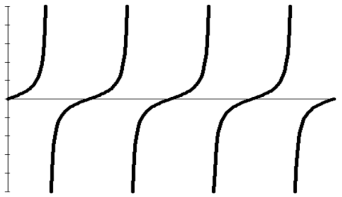
Leave Y_1 = Tanx. Graph Y_2 = Cosx.



How is the graph of Tanθ related to the graph of Cosθ?

Tanθ has a VA whenever Cosθ is zero.

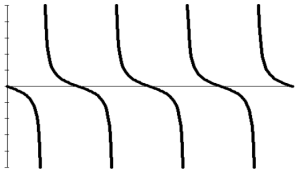
y = Tanx



Since Tanx = $\frac{y}{x}$
you can remember which way y=Tanx moves if you relate it to slope.
A positive Tanx moves up and to the right like a positive slope.

y = aTanx a: If a<0 there is an x-axis reflection

A negative Tanx,
just like negative slope, moves down and to the right.



a is also a Vertical Stretch or Shrink Factor but.....
there are really no points to define how "tall" the Parent Tangent function is so we will only concern ourselves with whether a is positive or negative.

$$y = \text{Tan}(bx) = \frac{\text{Sin}(bx)}{\text{Cos}(bx)}$$

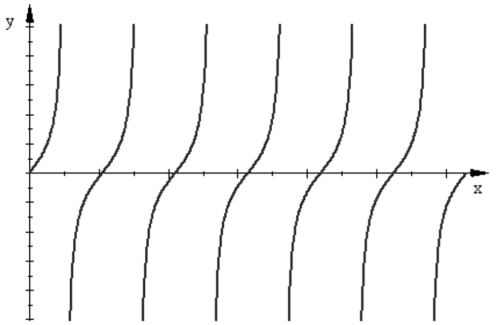
b: The period of Tanbx = $\frac{\pi}{b}$

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

VA occur wherever Cos$(bx)=0$

x-int occur wherever Sin$(bx)=0$

The Tangent function is graphed in the window 0 to 2π.



1. What is the period?

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

$per = \frac{2\pi}{b} = \frac{\pi}{3}$

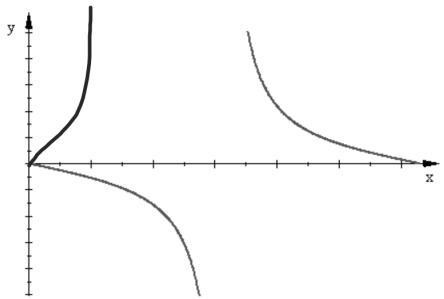
2. What is the equation of this Tangent Function?

$b=3$

$y = \tan 3x$

The Tangent function is graphed in the window 0 to 2π.

$a = -$



1. What is the period?

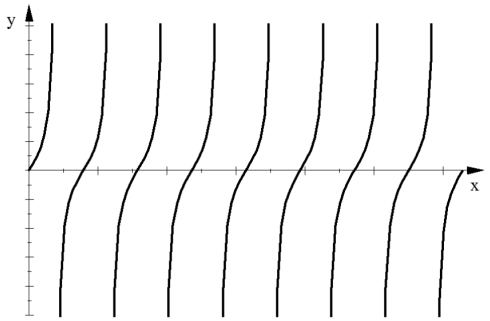
$b = \frac{\pi}{2\pi}$

$per = \frac{2\pi}{1} = 2\pi$

2. What is the equation of this Tangent Function?

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

The Tangent function is graphed in the window 0 to 2π.



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

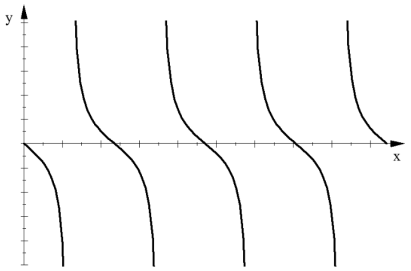
1. What is the period?

$per = \frac{2\pi}{8} = \frac{\pi}{4}$

2. What is the equation of this Tangent Function?

$y = \tan 4x$

The Tangent function is graphed in the window 0 to 6π.



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

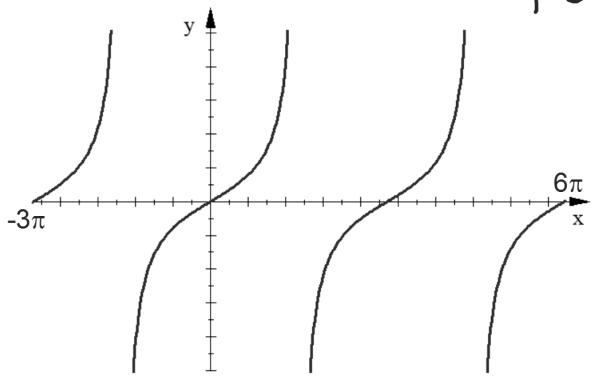
1. What is the period?

$per = \frac{6\pi}{4} = \frac{3\pi}{2}$

2. What is the equation of this Tangent Function?

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

Write the equation of this Tangent Function



period $\frac{9\pi}{3} = 3\pi$

$b = \frac{\pi}{\frac{9\pi}{3}} \quad \frac{\pi}{3\pi}$

$y = \tan\frac{1}{3}x$