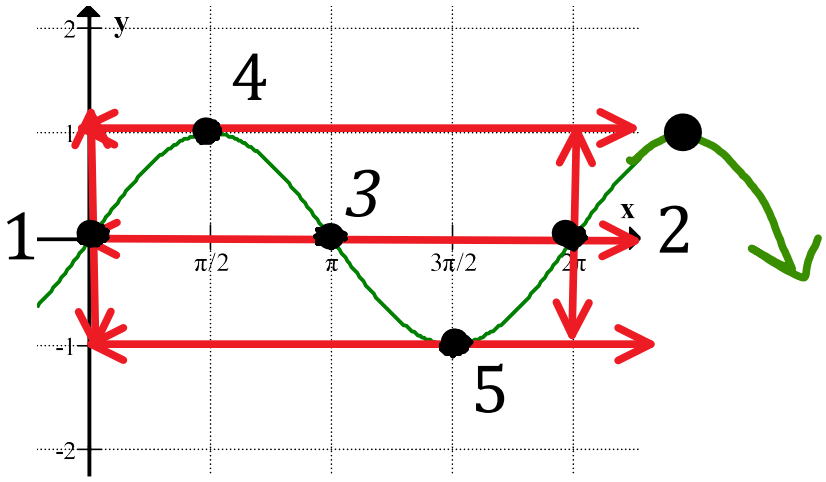
C12 - 5.1 - TOV Radians sinx,cosx,tanx TOV Graphs Notes

$y = \sin x$

x	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

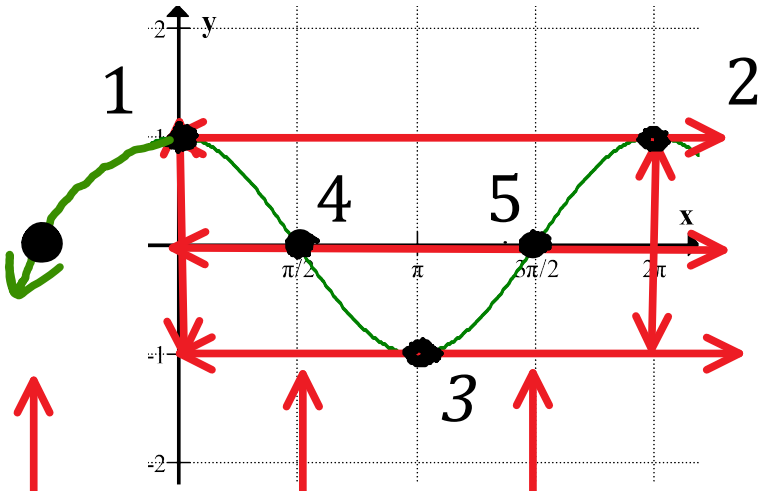
Pt.
(0,0)
$(\frac{\pi}{2},1)$
$(\pi,0)$
$(\frac{3\pi}{2},-1)$
$(2\pi,0)$



$y = \cos x$

x	y
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1

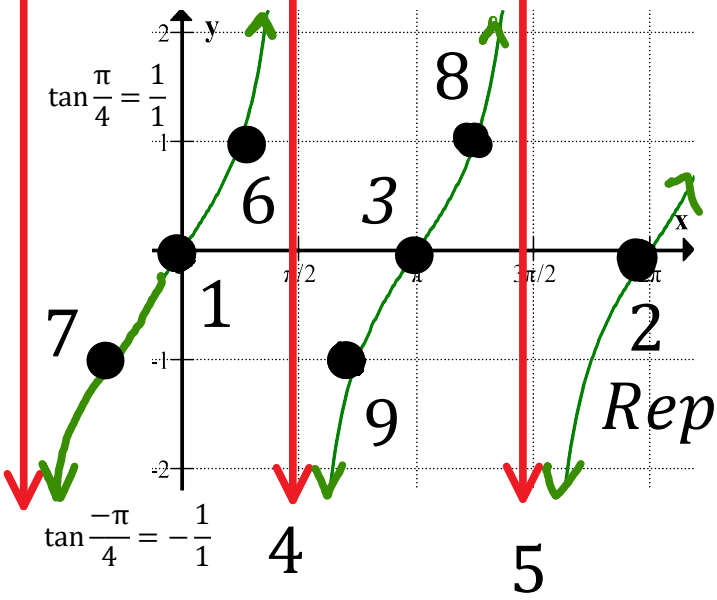
Pt.
(0,1)
$(\frac{\pi}{2},0)$
$(\pi,-1)$
$(\frac{3\pi}{2},0)$
$(2\pi,1)$



$y = \tan x$

x	y
0	0
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	und
$\frac{3\pi}{4}$	-1
π	0

Pt.
(0,0)
$(\frac{\pi}{4},1)$
$(\frac{\pi}{2},\text{und})$
$(\frac{3\pi}{4},-1)$
$(\pi,0)$



$tanx = \frac{sinx}{cosx}$

x	y
$\frac{\pi}{4}$	1
$-\frac{\pi}{4}$	-1

Special Triangles ASTC

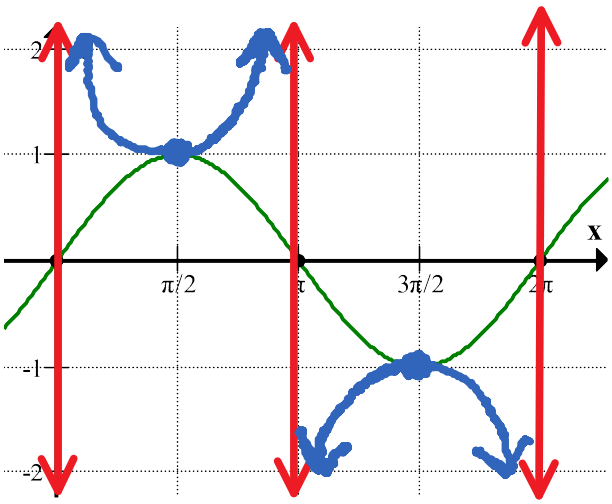
Tan is Zero when sin is zero
Tan is UND when cos is zero

C12 - 5.1 - TOV Radians cscx,secx,cotx TOV Graphs Notes

$y = \csc x$

x	y
0	und
$\frac{\pi}{2}$	1
π	und
$\frac{3\pi}{2}$	-1
2π	und

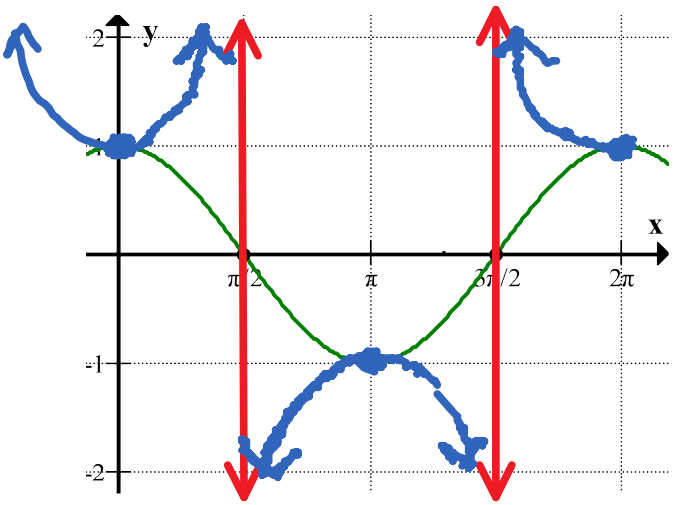
Pt.
(0,0)
$(\frac{\pi}{2},1)$
$(\pi,0)$
$(\frac{3\pi}{2},-1)$
$(2\pi,0)$



$y = \sec x$

x	y
0	1
$\frac{\pi}{2}$	und
π	-1
$\frac{3\pi}{2}$	und
2π	1

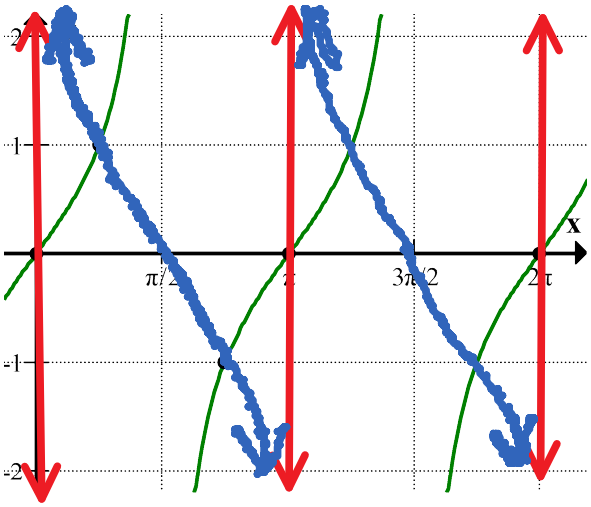
Pt.
(0,1)
$(\frac{\pi}{2},0)$
$(\pi,-1)$
$(\frac{3\pi}{2},0)$
$(2\pi,1)$



$y = \cot x$

x	y
0	und
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	0
$\frac{3\pi}{4}$	-1
π	und

Pt.
(0,0)
$(\frac{\pi}{4},1)$
$(\frac{\pi}{2},\text{und})$
$(\frac{3\pi}{4},-1)$
$(\pi,0)$



Cot is Zero when cos is zero
Cot is UND when sin is zero

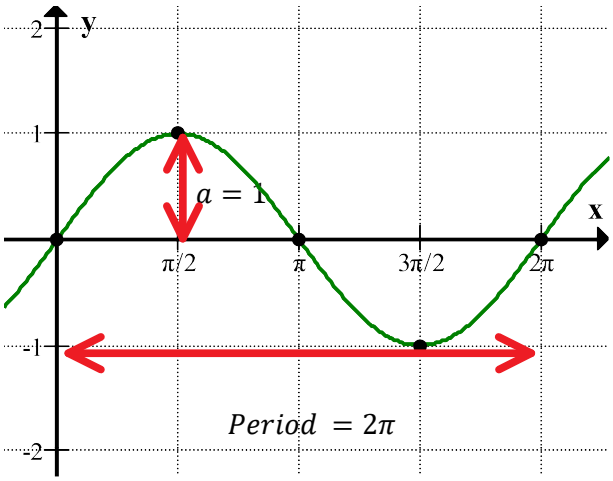
$$cotx = \frac{cosx}{sinx}$$

C12 - 5.2 - (a,b) Sine Transformations Notes

$$y = a\sin(b(x - c)) + d$$

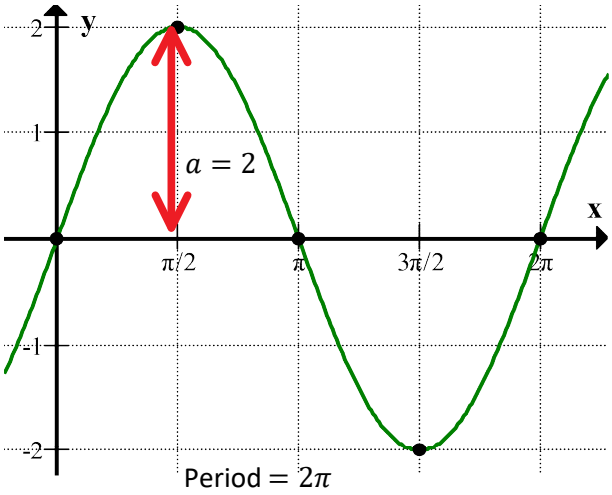
Amplitude | Period $= \frac{2\pi}{b}$ | Phase Shift | Center Line

$y = \sin(x)$



Amplitude Change

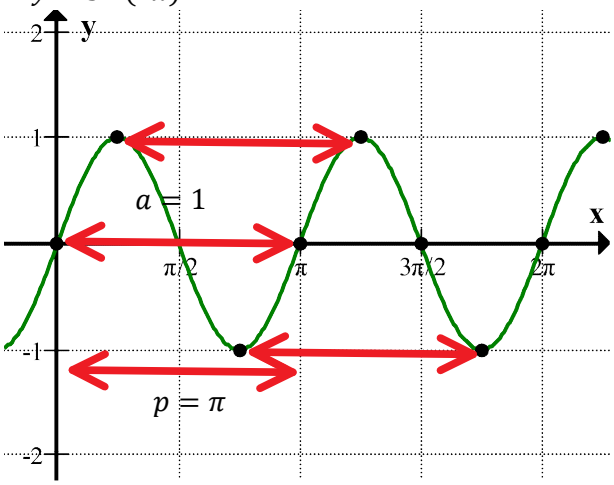
$y = 2\sin(x)$



$VE = 2$

Period Change

$y = \sin(2x)$



$HC = \frac{1}{2}$

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

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

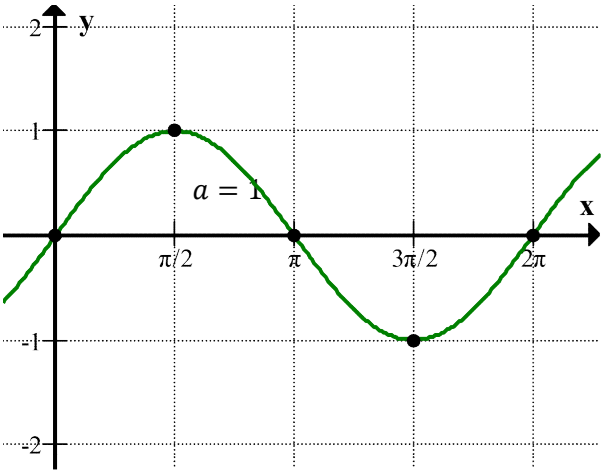
$p = \pi$

C12 - 5.3 - (d,c) Sinusoidal Transformations Notes

$$y = a\sin(b(x - c)) + d$$

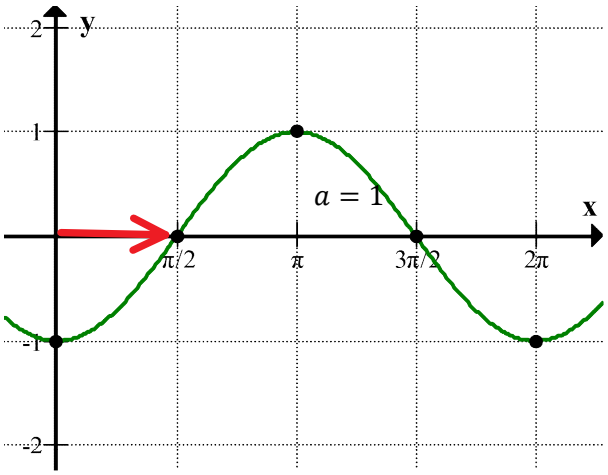
Amplitude | Period $= \frac{2\pi}{b}$ | Phase Shift | Center Line

$y = \sin(x)$



Phase Shift

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

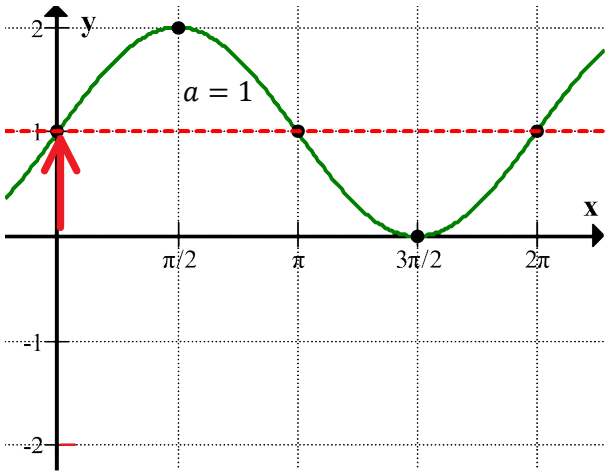


$HT = \frac{\pi}{2}$

Phase shift $\frac{\pi}{2}$ units to the right

Center Line Shift

$y = \sin(x) + 1$



$VT = +1$

$up\ 1$

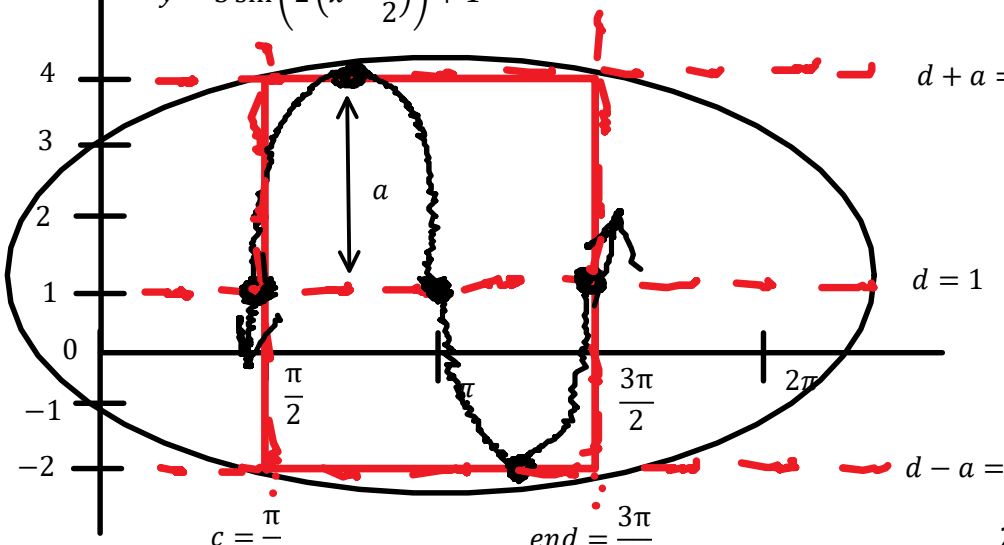
C12 - 5.4 - Trig Graphing Notes

$y = \text{asin}(b(x-c)) + d$

1) d
2) a
3) c
4) b

Graph a b c d

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

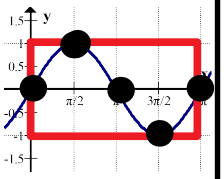


$d + a = 4$

$d = 1$

$d - a = -2$

Sine Graph



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

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

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

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

$p = \pi$

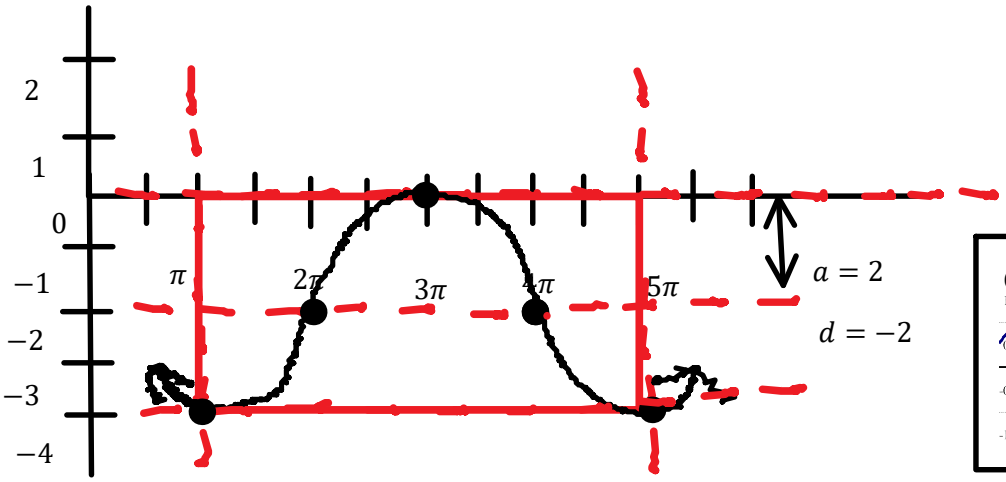
$end = c + p$

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

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

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

Find Equation

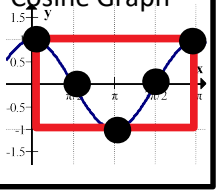


$a = 2$

$d = -2$

1) d
2) a
3) c
4) b

Cosine Graph



$c = \pi$

$p = 2nd - c$

$= 5\pi - \pi$

$= 4\pi$

$end = 5\pi$

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

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

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

$b = \frac{1}{2}$

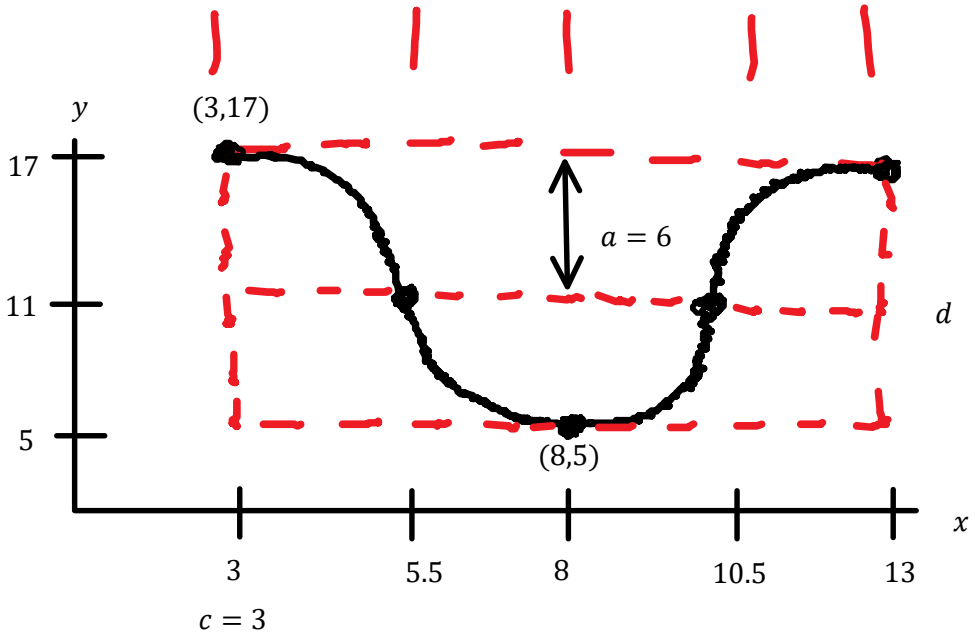
Equation a b c d

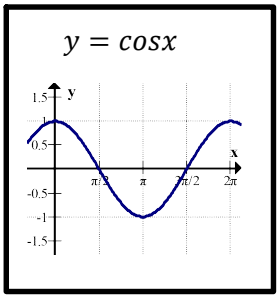
$y = -2\cos\left(\frac{1}{2}(x - \pi)\right) - 2$

$y = \text{acos}(b(x-c)) + d$

C12 - 5.4 - Max Min Points Notes

A sinusoidal function has a maximum at $(3,17)$ and a minimum at $(8,5)$. Find the equation.





$\frac{17+5}{2} = 11$ $\quad \frac{17-5}{2} = 6$ $\quad 8-3=5$ $\quad 5\times 2 = 10$ $\quad p = 10$

$17-6=11$
$5+6=11$

$\frac{5}{2} = 2.5$ $\quad 3+2.5=5.5$

$y = \text{a}\cos(b(x-c))+d$

$$y = 6\cos\left(\frac{\pi}{5}(x-3)\right)+11$$

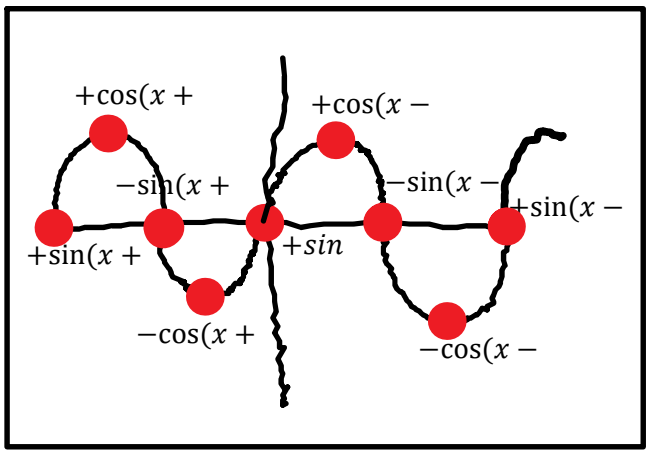
$$p = \frac{2\pi}{b}$$
$$b = \frac{2\pi}{p}$$
$$b = \frac{2\pi}{10}$$
$$b = \frac{\pi}{5}$$

$$y = 6\sin\left(\frac{\pi}{5}(x-10.5)\right)+11$$

$$y = -6\sin\left(\frac{\pi}{5}(x-5.5)\right)+11$$

$$y = -6\cos\left(\frac{\pi}{5}(x-8)\right)+11$$

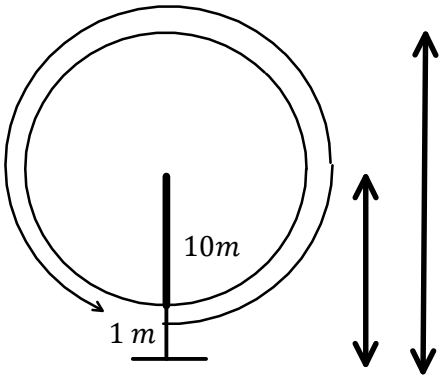
$\pm sin/\cos$ and "c"



Make it 6m in one cycle!

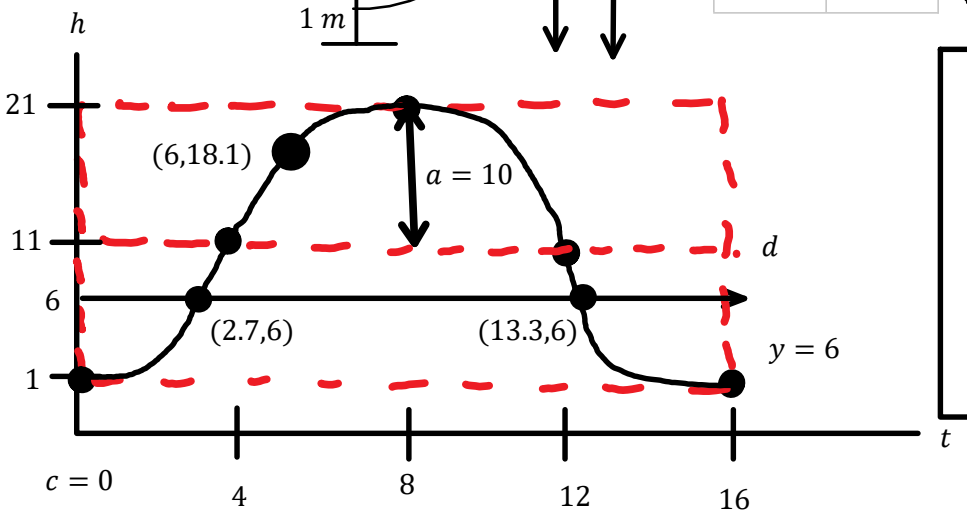
C12 - 5.5 - Ferris Wheel Notes

A Ferris wheel with radius 10 m is 1 m off the ground. It takes 16 seconds for one complete revolution. Draw a diagram of the Ferris wheel, graph the height of a passenger starting at the bottom and write the sinusoidal equation. How high 6 at second? How long above 6m in one cycle? No Calculator!

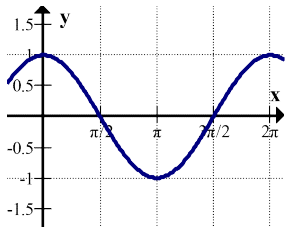


t	h
0	1
4	11
8	21
12	11
16	1

$\frac{16}{4} = 4$



$y = cosx$



$y = \text{a}\cos(b(x - c)) + d$

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

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

$b = \frac{2\pi}{16}$

$b = \frac{\pi}{8}$

$p = 16\ seconds$

$h = -10\cos\left(\frac{\pi}{8}(\text{t})\right) + 11$

$h = +10\sin\left(\frac{\pi}{8}(\text{t} - 4)\right) + 11$

$h = -10\cos\left(\frac{\pi}{8}(6)\right) + 11$

$h = 18.1m$

Sub 6 in for t. Or. Graph and 2nd Calc Value

$\frac{10 + 11\sqrt{2}}{\sqrt{2}} = 18.1$ *Exact Value*

$y_1 = -10\cos\left(\frac{\pi}{8}(\text{t})\right) + 11$

$y_2 = 6$

$10.7\ seconds$

Find Intersection, and Subtract, (or Algebra and Inverse)

$13.333 - 2.666 = 10.666$

$6 = -10\cos\left(\frac{\pi}{8}(\text{t})\right) + 11$

$cosm = \frac{1}{2}$

$\text{m} = \frac{\pi t}{8}$

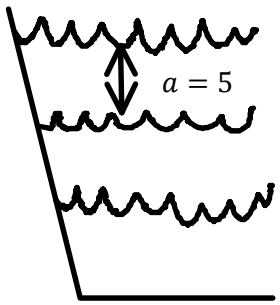
$t = \frac{8}{3}, \frac{40}{3}$ *Exact Value*

C12 - 5.5 - Tide Notes

$\frac{24min}{60min} = 0.4\ hr$

Graph and find Equation. High tide depth 18m at 8 am. Low tide depth 8 m at 1:24 pm.

(8,18) (13.4,8)



$d = 18\ m$

$d = 13$

$d = 8\ m$

t	h
8	18
10.7	13
13.4	8
16.1	13
18.8	18

$\frac{8 + 13.4}{2} = 10.7$

$\frac{13.4 - 8}{2} = 2.7$

$8 + 2.7 = 10.7$

$13.4 + 2.7 = 16.1$

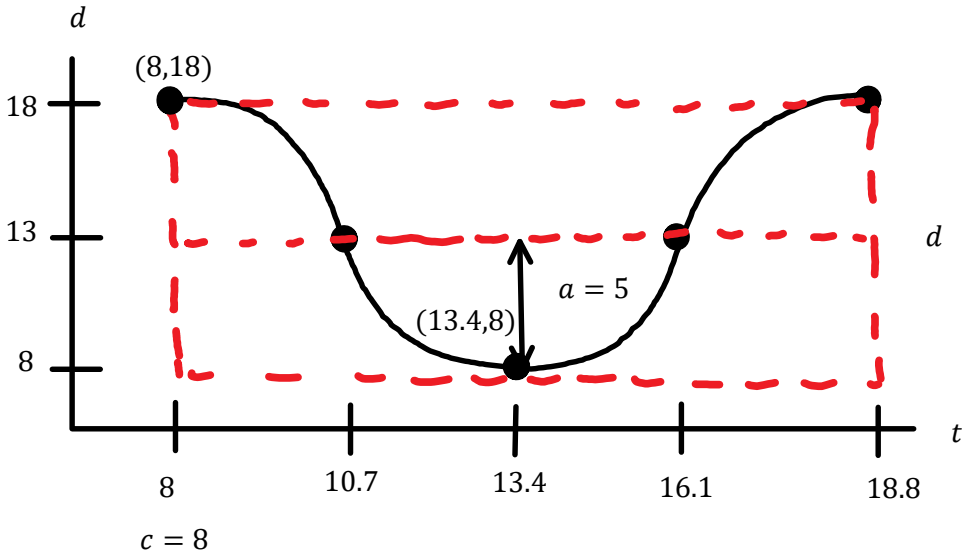
$16.1 + 2.7 = 18.8$

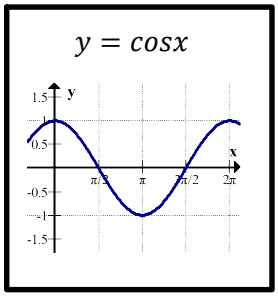
$\frac{8 + 18}{2} = 13$

$\frac{18 - 8}{2} = 5$

$18 - 5 = 13$

$8 + 5 = 13$





$y = a\cos(b(x - c)) + d$

$d = +10\cos\left(\frac{\pi}{5.4}(x - 8)\right) + 13$

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

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

$b = \frac{2\pi}{10.8}$

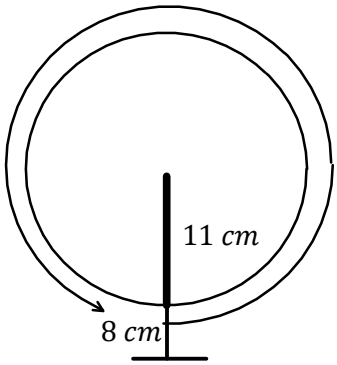
$b = \frac{\pi}{5.4}$

$p = 18.8 - 8 = 10.8$

(13.4,8)

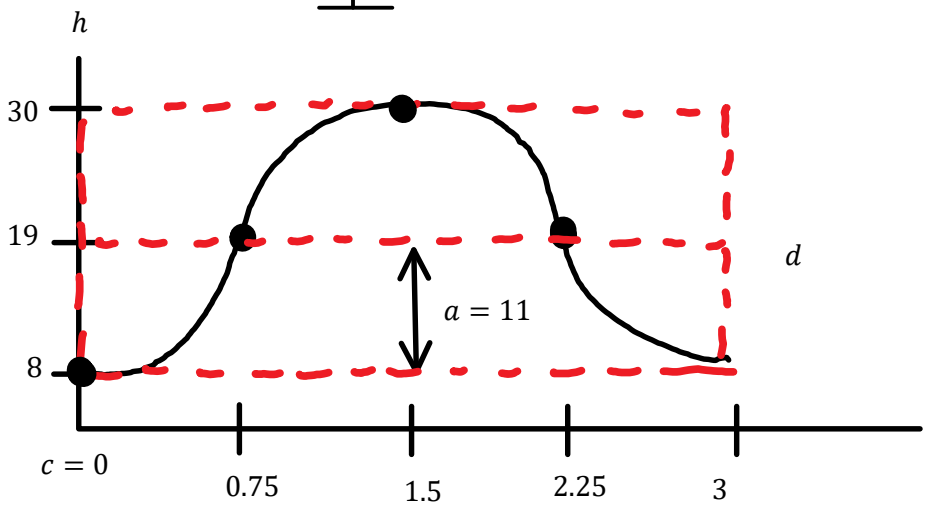
C12 - 5.5 - Bike Pedal Notes

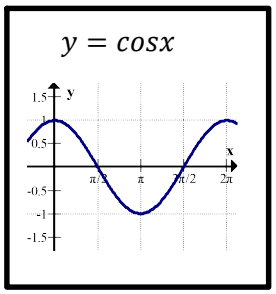
A bicycle pedal does 20 revolutions per minute and has a radius of 11 cm and the 8 cm off the ground at its lowest point. Find the sinusoidal equation.



t	h
0	8
0.75	19
1.5	30
2.25	19
3	8

$\frac{3}{4} = 0.75$





$y = a\cos(b(x - c)) + d$

$h = -11\cos\left(\frac{2\pi}{3}(t)\right) + 19$

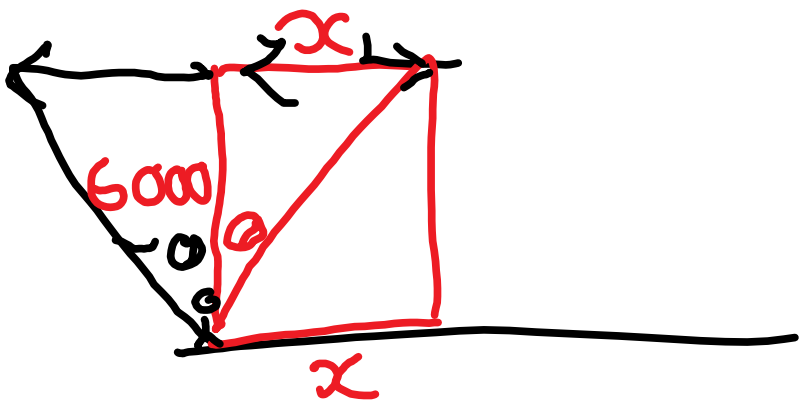
$p = \frac{2\pi}{b}$

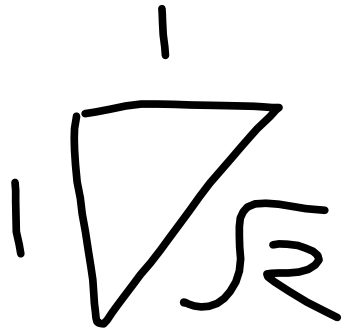
$b = \frac{2\pi}{3}$

$\frac{20rev}{min} = \frac{20rev}{60s} = \frac{1rev}{3s}$

$Period = 3s$

C12 - 5.5 - Trig Plane Overhead Notes





θ	x
0	0
$\frac{\pi}{4}$	6000
$\frac{\pi}{8}$	2485
$\frac{3\pi}{8}$	14485

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

$\tan\theta = \frac{o}{a}$

$6000\cot\tan\frac{\pi}{4} = \frac{x}{6000}$

$x = 6000$