Pick Up the Warm Up

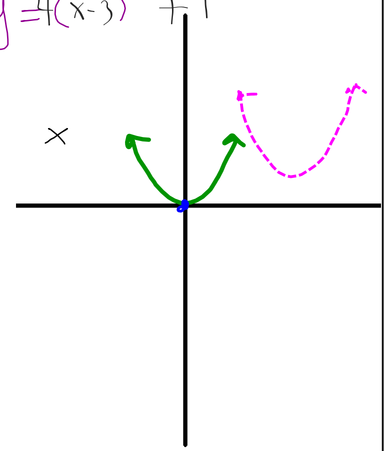
and the new recording sheet for Part B of Ch. 7

Questions on HW

1. Given the parent function $f(x) = x^2$ carry out the following transformation.

$y = 4(x-3)^2 + 1$

"Vertically stretch by 4, horizontally shift right 3 units and up 1 unit."



a) Sketch the new function
b) Write its equation.

$y =$

Parent Function for a parabola: $y = x^2$

General Equation: $y = a(x-h)^2 + k$

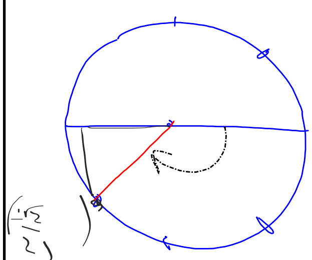
2. $\cos\left(-\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$

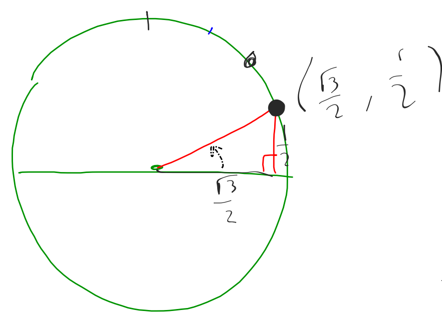
$\tan\left(\frac{\pi}{6}\right) = \frac{\sin\left(\frac{\pi}{6}\right)}{\cos\left(\frac{\pi}{6}\right)} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$

$= \frac{1}{\cancel{2}} \cdot \frac{\cancel{2}}{\sqrt{3}}$

$= \frac{1}{\sqrt{3}}$

$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

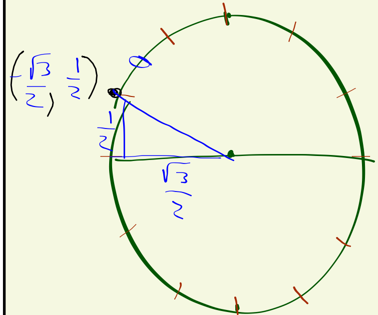


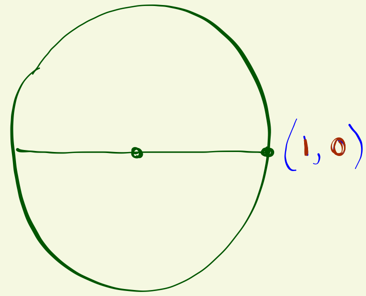


$$\cos\left(\frac{17\pi}{6}\right) = -\frac{\sqrt{3}}{2}$$

$$\tan(100\pi) = 0$$

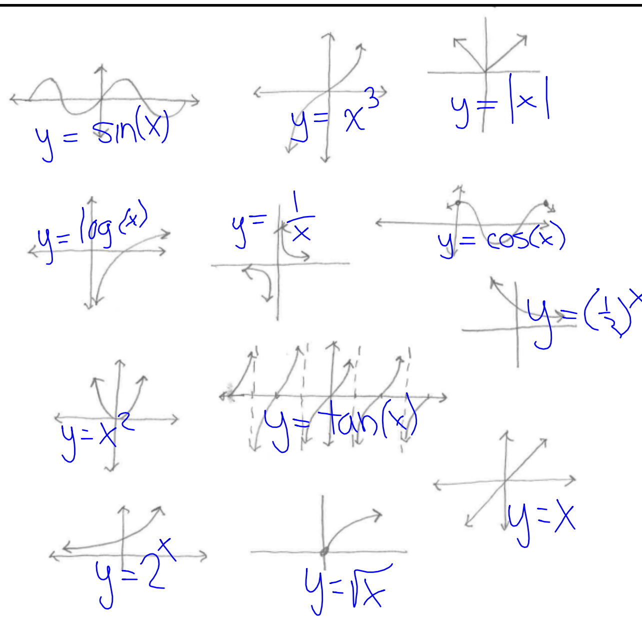
$\frac{\pi}{6}$





$$= \frac{\sin(100\pi)}{\cos(100\pi)} = \frac{0}{1} = 0$$

$\frac{0}{1}$

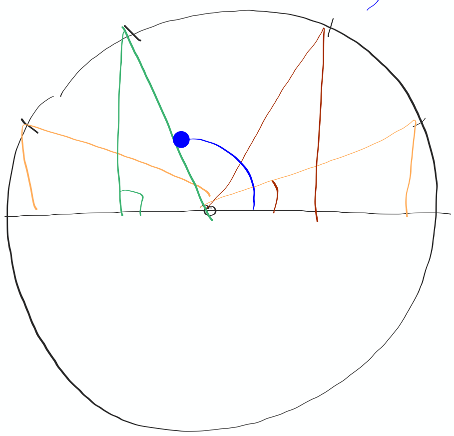


Solve $\boxed{\sin(\theta) = \frac{\sqrt{3}}{2}}$ w/o a calculator over the interval

$0 \le \theta \le 2\pi$

$\theta = \pi/3$

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



$\theta =$

Tues-May 21 Closure 1

Wed-May 22 Closure 2 $\boxed{\text{Part 1 Ch. 7 Test + (No calculator)}}$

Thur-May 23 $\boxed{\text{Part 2 - Ch.7 Test}}$

HW and Recording Sheet for

Part A of Ch. 7 Due Friday

beginning of period

(includes yesterday's assignment
but not today's)

HW Questions

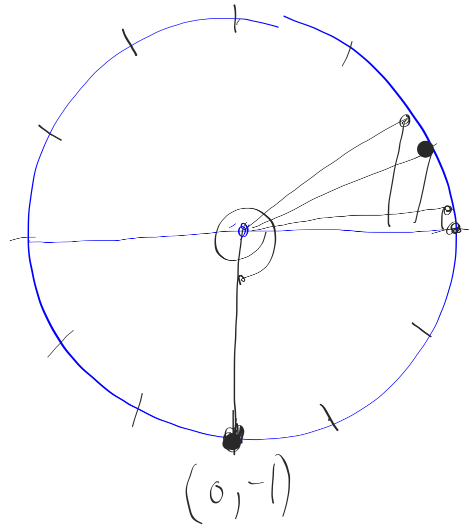
HW Questions

HW
Questions

① Without using a GDC or any notes, find the exact value of:

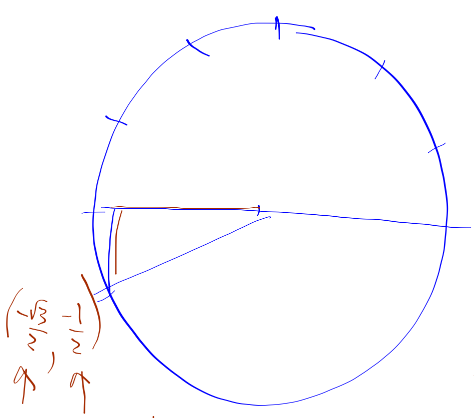
a) $\cos\left(\frac{5\pi}{4}\right) = \frac{-\sqrt{2}}{2}$

b) $\sin\left(-\frac{15\pi}{6}\right) = -1$



c) $\tan\left(\frac{\pi}{2}\right) =$ undefined

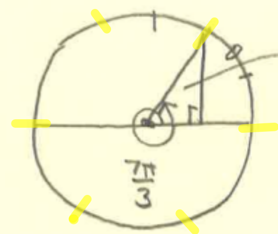
d) $\tan\left(\frac{7\pi}{6}\right) = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$



$$\frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} =$$

$$\frac{-\frac{1}{2}}{\quad}$$

$\boxed{7\text{-}104}$ $\frac{7\pi}{3}$



$60° + 360° = 420°$

a) Any angle that starts from $\frac{\pi}{3}$ where you add 2π any number of times.

in degrees

$60° + 360° = 420°$ or $60 - 360° = -300°$

$420 + 360° = 780°$ $-300 - 360° = -760°$

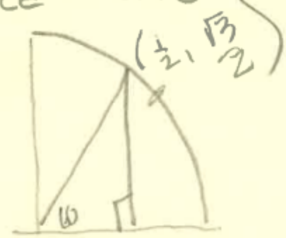
$780 + 360° = 1040°$ etc

etc

general $\theta = 60° + 360° n$

$\theta = \frac{\pi}{3} + 2\pi n$ (in radians)

b) c) See above



$\sin(\frac{7}{3}\pi) = \frac{\sqrt{3}}{2}$ $\cos(\frac{7}{3}\pi) = \frac{1}{2}$

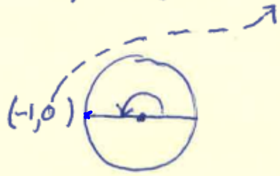
tangent

$\tan(\frac{7}{3}\pi) = \frac{\sin(\frac{4}{3}\pi)}{\cos(\frac{4}{3}\pi)} =$

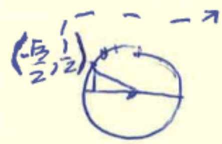
$\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$

$\boxed{7\text{-}105}$

a) $\sin(180^\circ) = 0$



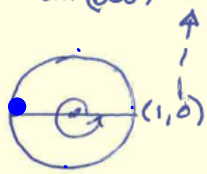
d) $\sin(510^\circ) = \frac{1}{2}$



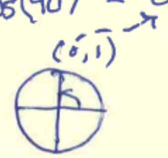
$$\begin{array}{r} 510^\circ \\ -360 \\ \hline 150 \end{array}$$

$$\frac{5\pi}{6}$$

b) $\sin(360^\circ) = 0$



e) $\cos(90^\circ) = 0$



f) $\tan(-90) = \frac{\sin(-90^\circ)}{\cos(-90^\circ)} = \frac{-1}{0} =$

$=$ undefined

c) $\sin(-90^\circ) = -1$

107e

$\frac{7\pi}{2}$ to degrees

$$810^{\cancel{\circ}} \times \frac{2\pi}{\cancel{360}_{2}} \approx$$

$\boxed{7\text{-}107}$

(a) $\frac{7\pi}{\cancel{6}_{1}} \cdot \frac{\overset{60}{\cancel{360}}^{\circ}}{2\cancel{\pi}} = \frac{7 \cdot 60}{2} = 210^{\circ}$

b) $\frac{5\cancel{\pi}}{3} \cdot \frac{\overset{180}{\cancel{360}}^{\circ}}{\cancel{2}\cancel{\pi}_{1}} = \frac{5 \cdot \overset{60}{\cancel{180}}}{\cancel{3}_{1}} = 300^{\circ}$

c) $\overset{1}{\cancel{45}}^{\circ} \times \frac{2\pi}{\cancel{360}^{\circ}_{8}} = \frac{2\pi}{8} = \pi/4$

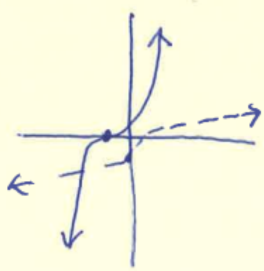
d) $\overset{10}{\cancel{100^\circ}} \times \frac{2\pi}{\underset{36}{\cancel{360^\circ}}} = \frac{\overset{5}{\cancel{20}}\pi}{\underset{9}{\cancel{36}}} = \frac{5\pi}{9}$

e) $810 \cdot \frac{2\pi}{360^\circ} = \frac{\overset{9}{\cancel{81}} \cdot 2\pi}{\underset{4}{\cancel{36}}} = \frac{18\pi}{4} = \frac{9\pi}{2}$

f) $\frac{7\cancel{\pi}}{2} \cdot \frac{360^\circ}{2\cancel{\pi}} = 630^\circ$

$\boxed{7\text{-}108}$

$f(x) = \frac{1}{2}(x+1)^3$



$x = \frac{1}{2}(y+1)^3$

$2x = (y+1)^3$

take cube root

$\sqrt[3]{2x} = y+1$

-1

$y = \sqrt[3]{2x} - 1$

$f^{-1}(x) = \sqrt[3]{2x} - 1$

$\boxed{7\text{-}109}$ $f(x) = 2x^2 - 16x + 34$

$$\frac{f(x)}{2} = \underline{\underline{x^2 - 8x}} \quad + 17$$

Add 16 to complete square

$$\frac{f(x)}{2} = x^2 - 8x + 16 \quad + 17 - 16$$

$$\frac{f(x)}{2} = (x-4)^2 + 1$$

$$f(x) = 2(x-4)^2 + 2$$

a) several methods
can use Pythag. Identity

$$\sin^2\theta + \cos^2\theta = 1$$

$$\sin^2\theta + \left(\frac{-12}{13}\right)^2 = 1^2$$

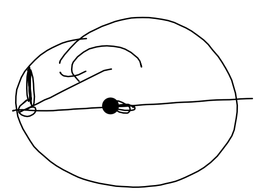
$$\sin^2\theta + \frac{144}{169} = 1$$

$$\sin^2\theta = 1 - \frac{144}{169}$$

$$\sin^2\theta = \frac{25}{169}$$

$$\sqrt{} \qquad \sqrt{}$$

$$\sin\theta = \pm\frac{5}{13}$$



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

7-110

Quadrant III

$\cos\theta = \frac{-12}{13}$

a) several methods
can use Pythag. Identity

$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + \left(\frac{-12}{13}\right)^2 = 1^2$

$\sin^2\theta + \frac{144}{169} = 1$

$\sin^2\theta = 1 - \frac{144}{169}$

$\sin^2\theta = \frac{25}{169}$

$\sin\theta = \pm\frac{5}{13}$

in Quadrant 3 sines are negative

so $\sin\theta = -\frac{5}{13}$

(b) $\tan\theta = \frac{\sin\theta}{\cos\theta}$

$= \frac{\frac{-5}{13}}{\frac{-12}{13}}$

$= \frac{-5}{13} \cdot \frac{-13}{12} = \frac{5}{12}$

III $\cos\theta = \frac{-12}{13}$

$\cos^2\theta + \sin^2\theta = 1$

$\left(\frac{-12}{13}\right)^2 + \sin^2\theta = 1$

$\frac{144}{169} + \sin^2\theta = 1$

$\sin^2\theta = 1 - \frac{144}{169}$

$\frac{169}{169} - \frac{144}{169}$

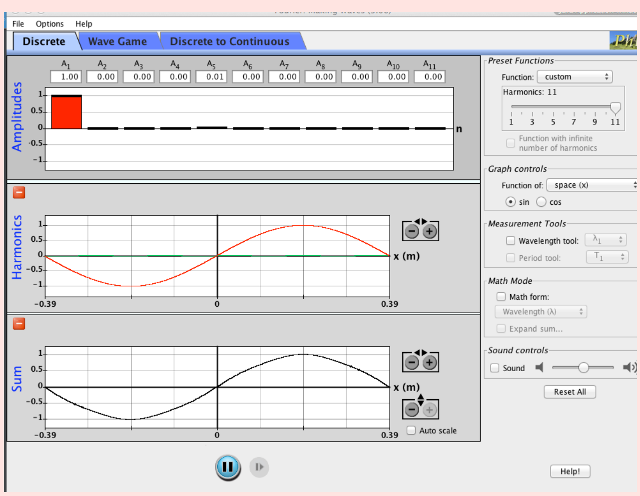
$$\overset{5}{\cancel{45}}^{\circ} \cdot \frac{2\pi}{\underset{4}{\cancel{360}}}$$

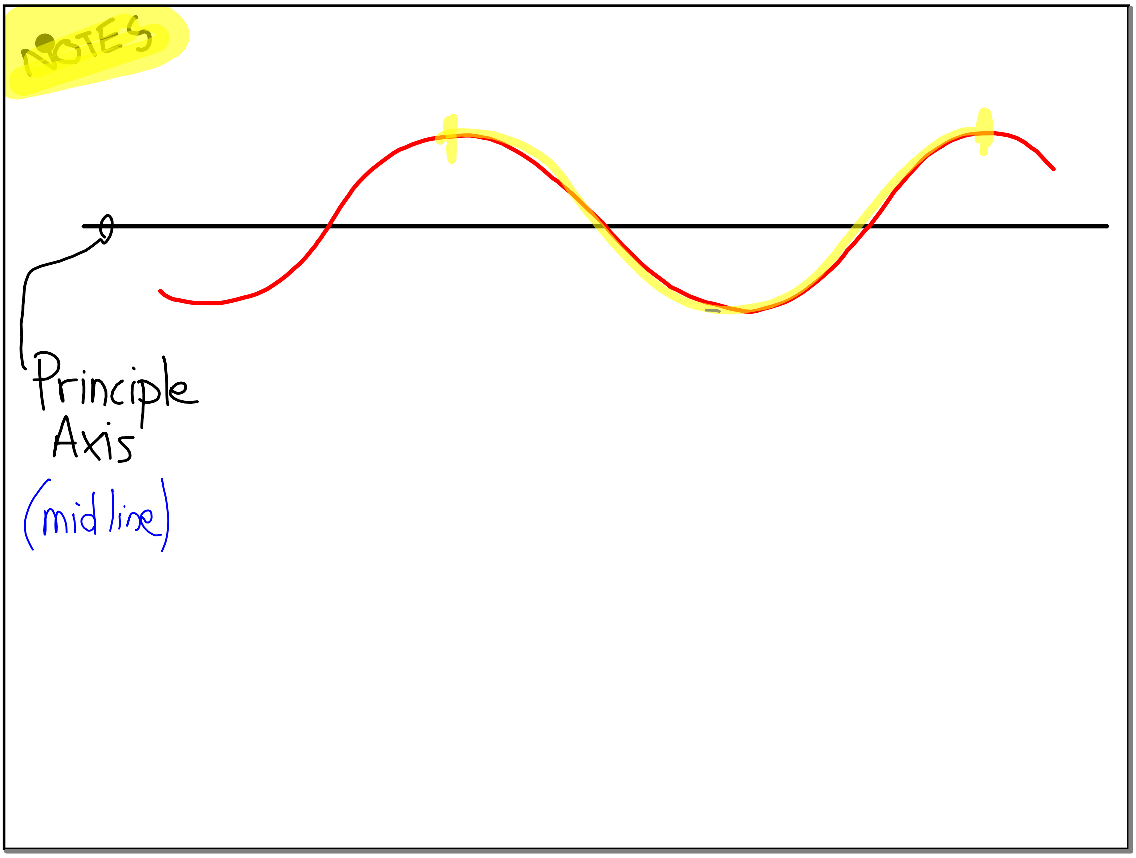
$$45^{\circ} \cdot \frac{2\pi}{360^{\circ}}$$

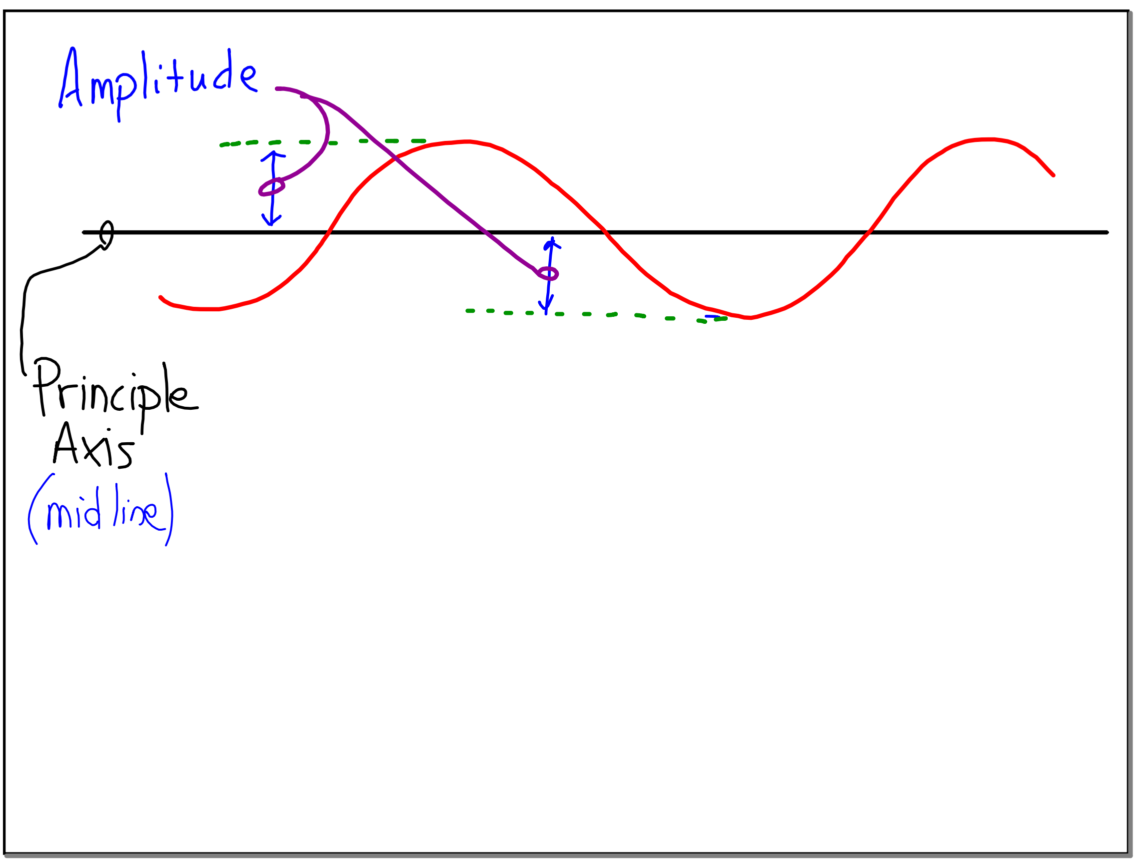
$$= \frac{\overset{1}{\cancel{90}}\pi}{\underset{4}{\cancel{360}}}$$

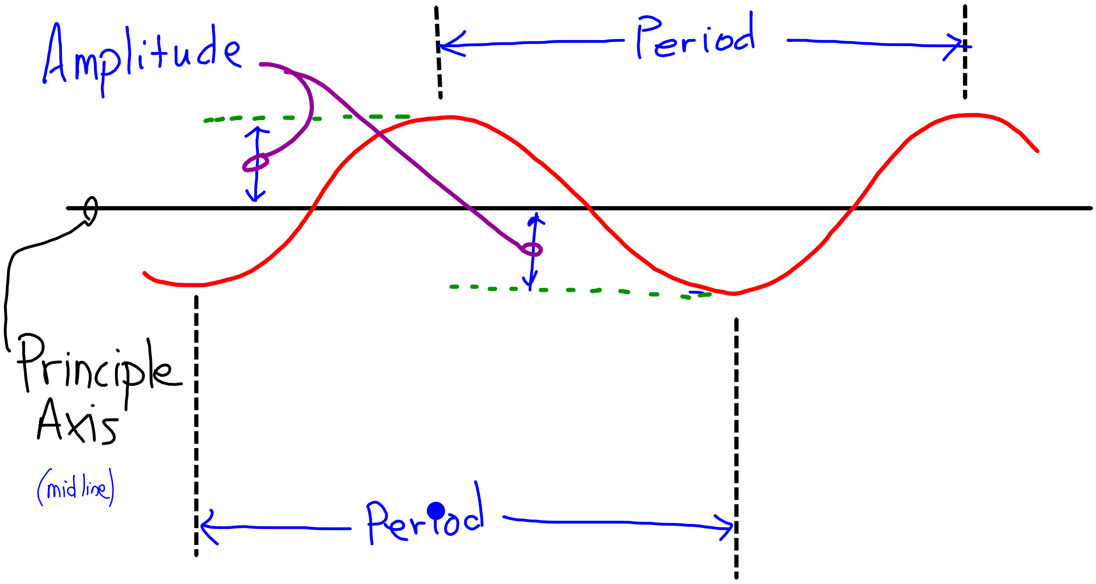
Apply the fundamentals of Transformations to Sine and Cosine functions

Aim




NOTES
Principle Axis
(mid line)


Amplitude
Principle Axis
(mid line)



No NOTES

$$y = \sin(x)$$

$$\sin\cancel{(x)}-h$$

$$\sin(x-h)$$

How would you shift the function up **k** *units ?*

How would you shift the function right **h** *units ?*

How would you vertically stretch or shrink the function ?

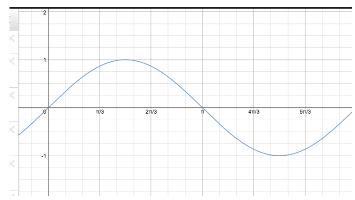
General Equation:

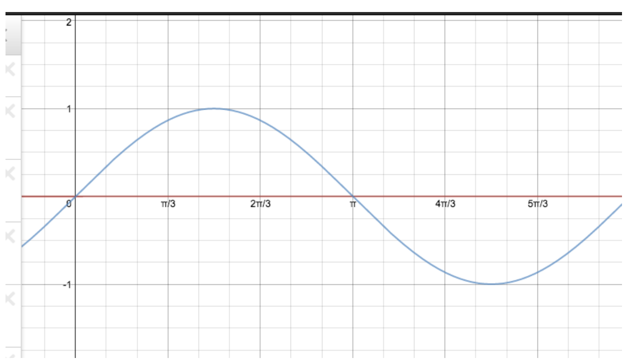
$$y = a \sin(x - h) + k$$

midline

principle axis

$|a|$ amplitude





https://www.desmos.com/calculator/oiuok7oy3x

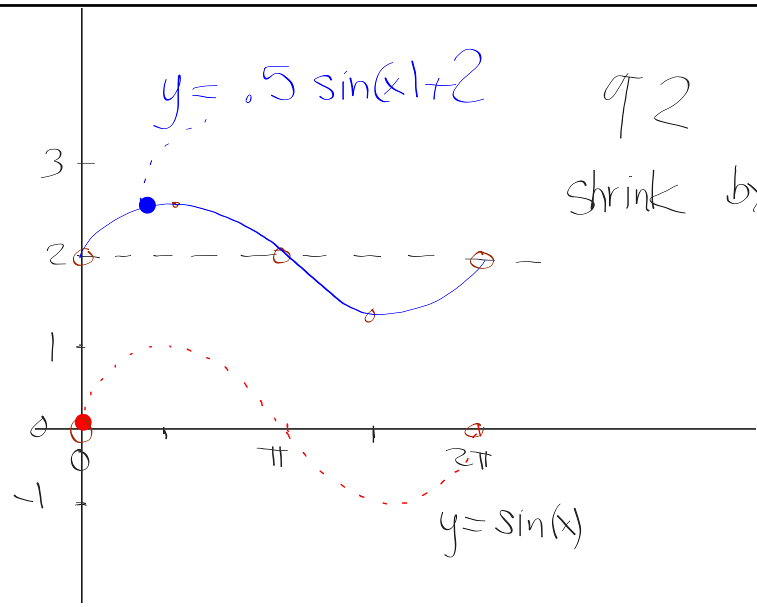
https://www.desmos.com/calculator/ac1n2gzubx handout

A

Write an equation for the following transformation and sketch its graph.

$y = \sin(x)$

A veritical shift, up 2 units
& vertically shrunk by 0.5



#2

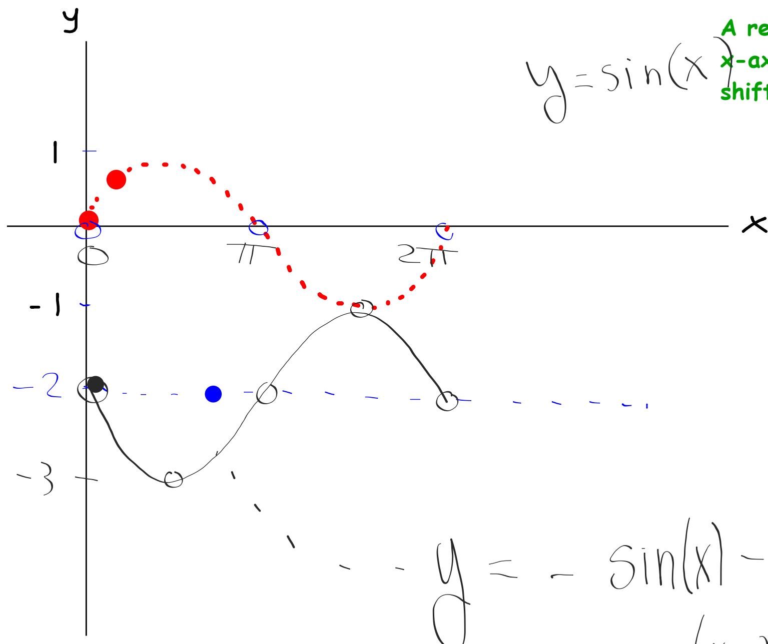
shrink by $\frac{1}{2}$

B $y = \sin(x)$

A reflection across the x-axis and a vertical shift down 2 units

$y = \sin(x)$

A reflection across the x-axis and a vertical shift down 2 units

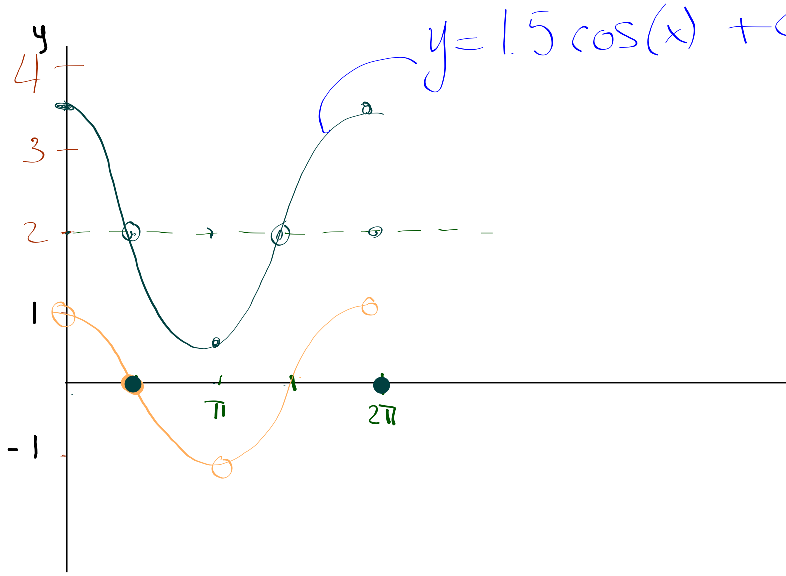


$y = -\sin(x) - 2$

$\cancel{\sin(x-2)}$

③ **Y= cos(x),** Vertically stretched by 1.5 and up 2

$y = 1.5\cos(x) + 2$



Sketch Artists

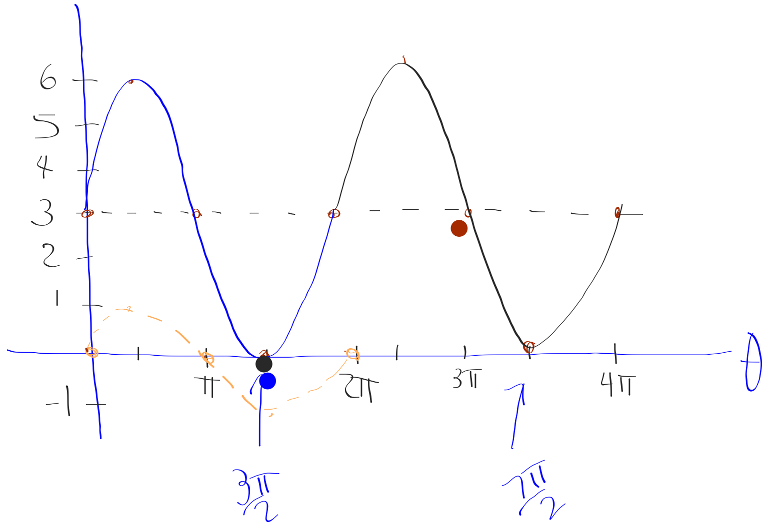
Aim: Sketch cyclic functions w/o a calculator

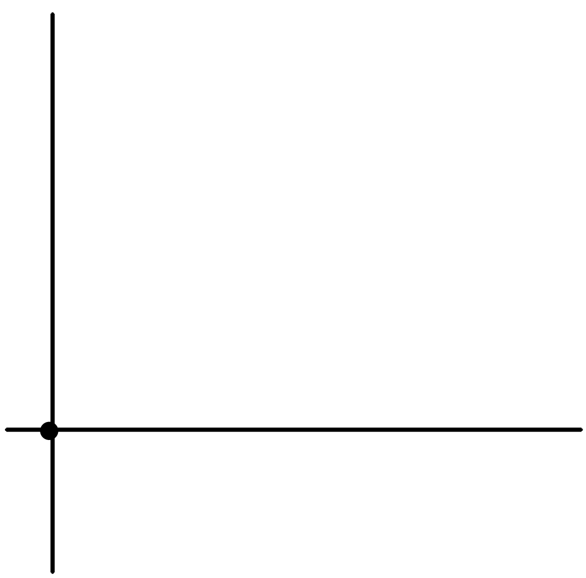
Notes

Sketch - then label intercepts

2 cycles of

$y = 3\sin(x) + 3$





2 cycles of

$y = 3\sin(x) + 3$

intercepts

Verify on GDC

Sketch $y = 50\sin(x) - 200$

$$y = 2\cos(\theta) + 5$$

B. B.

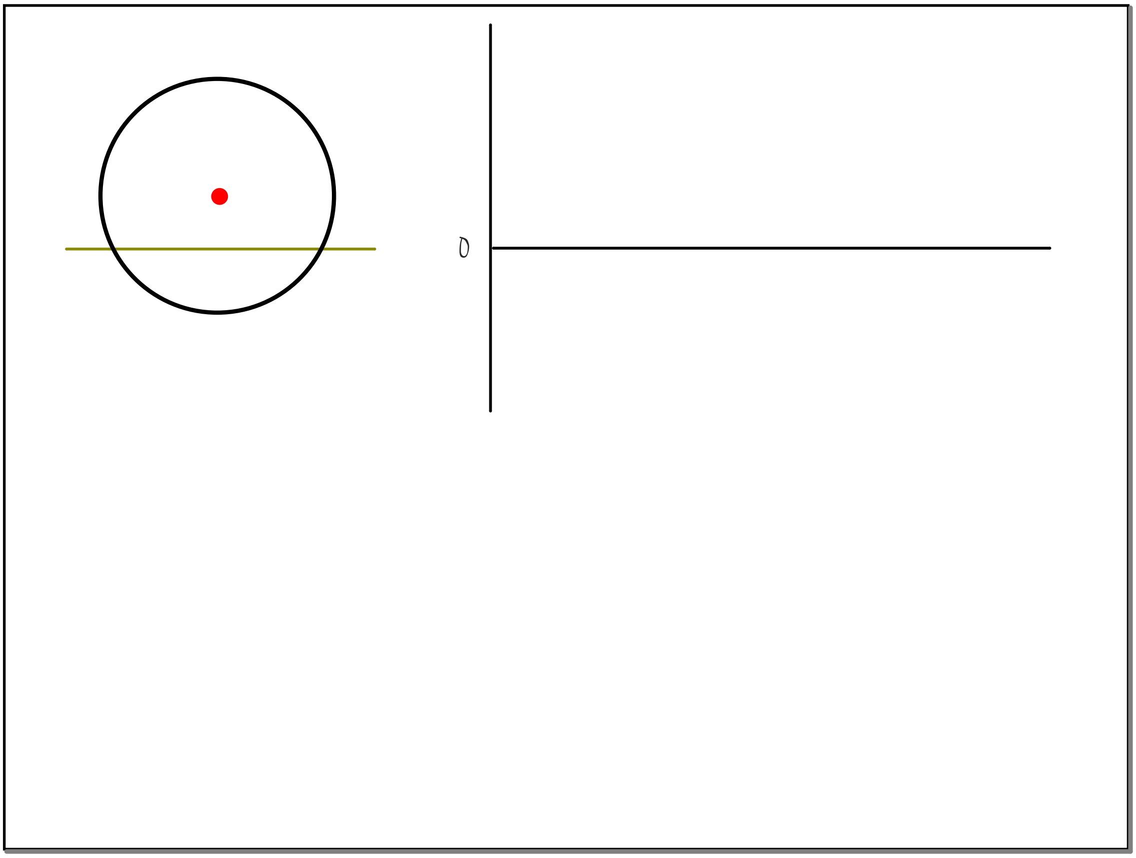
A variation on the screamer

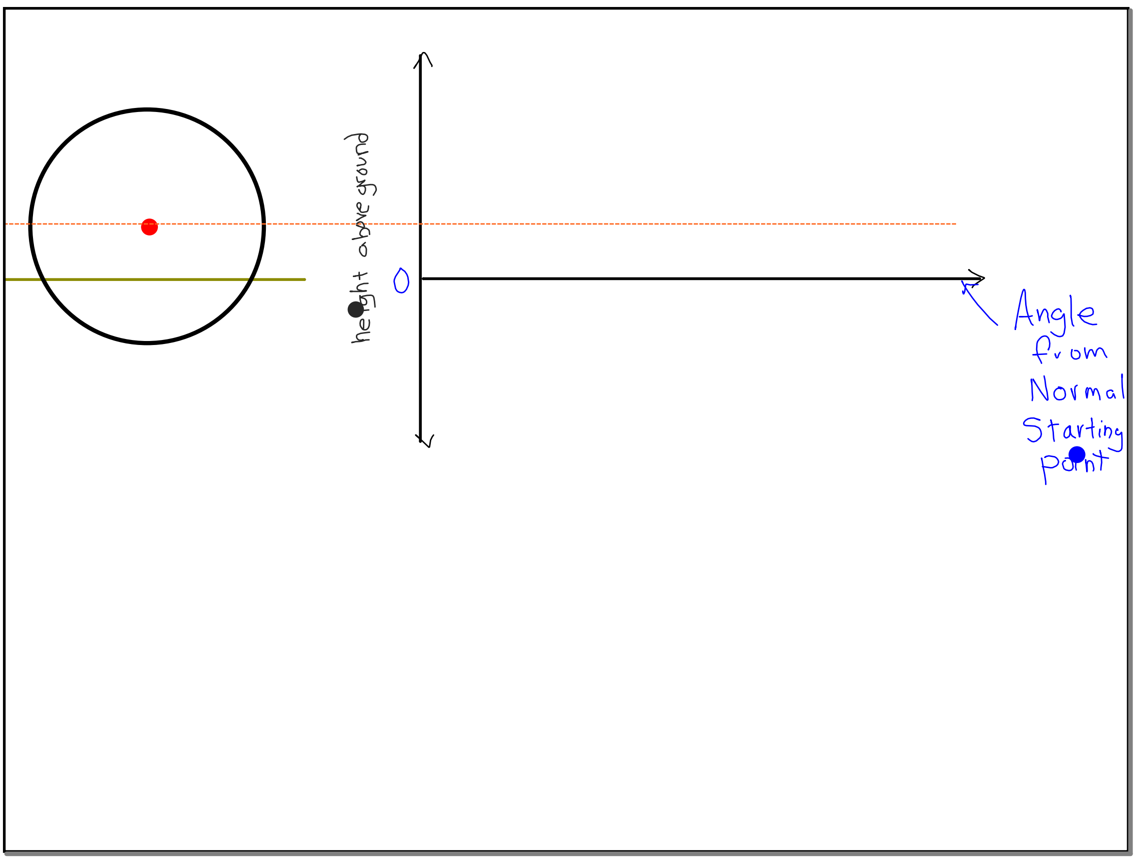
[To apply transformations]

1.

The Amusement Park has decided to imitate *The Screamer* but wants to make it even better. Their ride will consist of a circular track with a radius of 100 feet, and the center of the circle will be 50 feet ABOVE ground. ***It will be called the Screamer Plus***. Passengers will board at the normal spot which will now be 50 feet above ground (riders will climb up stairs to board another words).

Write a function that relates the angle traveled ***from the starting point*** to the height of the rider above or below the ground. (HINT: Draw a diagram to help).


0


height above ground
0
Angle from Normal Starting point

BB

7 . . . . . 116-118, 120, 122-124

AND

take home LCQ which is due tomorrow at the start of class.