Trigonometric Transformations   Name_____ *Key*_____

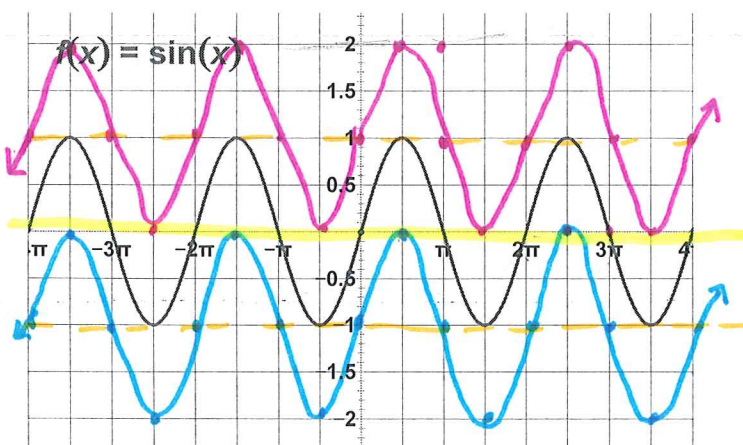Supp Alg 14. 2   Date_____

Use a graphing calculator to complete the following.

1. Sketch the graphs of $y = \sin\theta + 1$, $y = \sin\theta - 1$ using different colors and label the graph with the equation.

$y = 1$ is midline
for $y = \sin\theta + 1$
and max
bound for
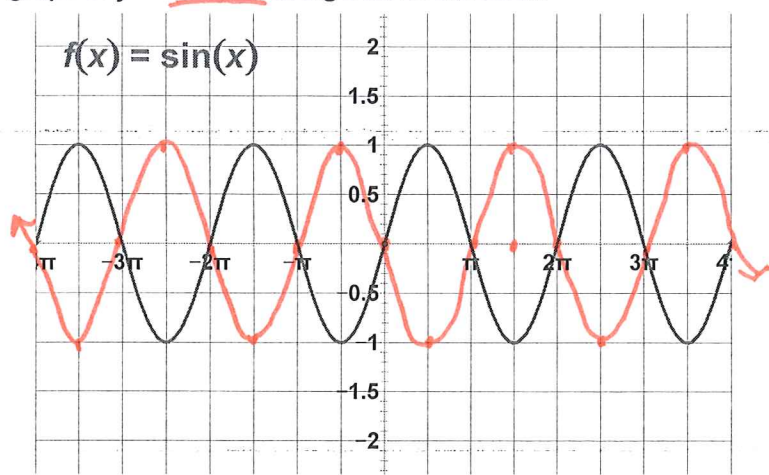$y = \sin\theta$ →

$f(x) = \sin(x)$

← $y = -1$ is midline
for $\sin\theta - 1$ and
minimum bound
for $y = \sin\theta$

b). Describe the transformations that occurred using +1 and -1.

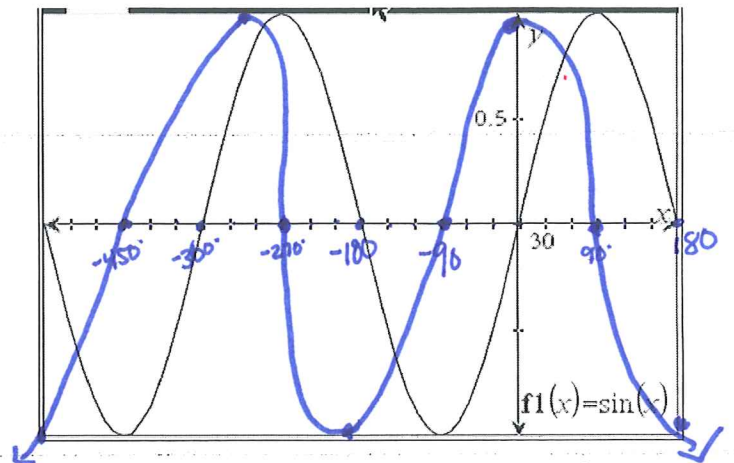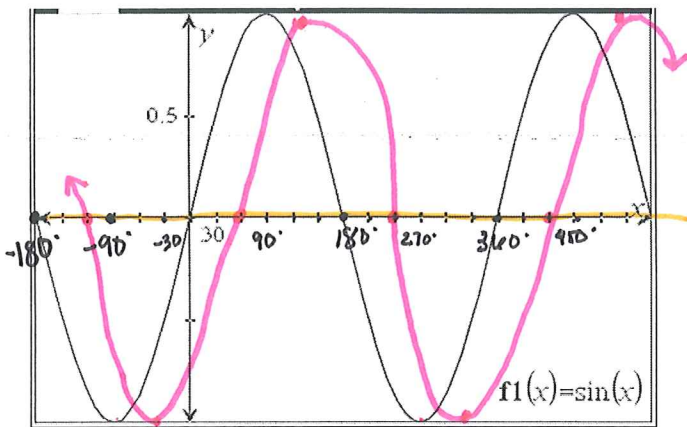the (+1) shifts all pts up one unit
the (-1) shifts all pts down one unit

2. a). Sketch the graph of $y = -\sin\theta$ using a different color.

$f(x) = \sin(x)$

b). Describe the transformation that occurred from having a negative coefficient.

The sine wave was reflected over the
x-axis.

3. a). Sketch the graphs of $y = \sin(\theta - 60^o)$, $y = \sin(\theta + 90^o)$ using different colors and label the graph with the equation.

f1(x)=sin(x)

f1(x)=sin(x)

b). Describe the transformations that occurred using -60 and 90. This transformation is called a **phase shift.**

-60° shifts graph to the right 60°

$+90^\circ$ shifts graph to left 90°

These transformations hold true for both the cosine and tangent functions as well. To summarize

$$y = A \sin B(\theta - C) + D$$

← vertical shift up or down.

Amplitude distance from midline to max or min.

If A is Negative it is reflected over the x-axis.

"Period" length that it takes for graph to repeat is found by $\frac{360}{B}$ or $\frac{2\pi}{B}$

horizontal shift right or left

Right = $(\theta - 30)$
Left = $(\theta + 30)$

Steps to graphing without a calculator:
1. Graph the new midline, max line and minimum if applicable.
2. Determine the period.
3. Apply any phase shifts & graph following the patterns of the parent function.
    Sine = midline, max, midline, minimum, midline
    Cosine = max, midline, minimum, midline, max
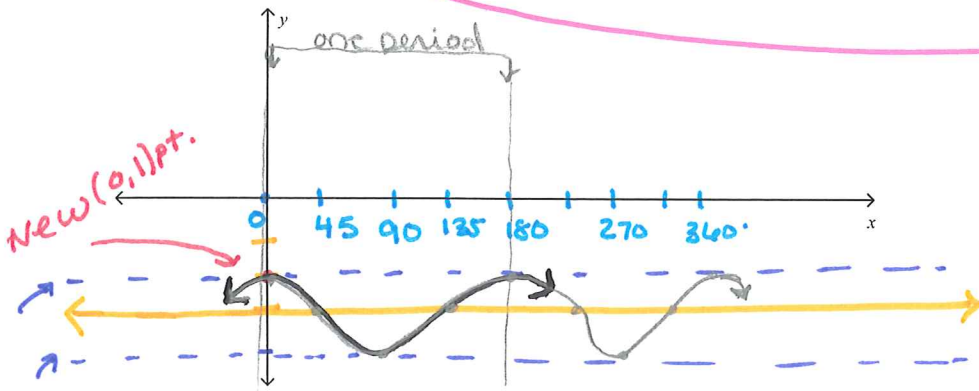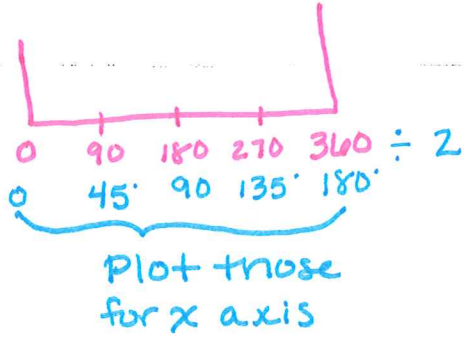   Tangent = midline, asymptote, midline

14.2 Notes and Examples Day 1 continued......

Let's try to graph some functions without our calc. State the amplitude, period, vertical shift, and phase shift.

Ex1 $y = \cos 2\theta - 3$ (b)

$\frac{360}{2} = 180°$

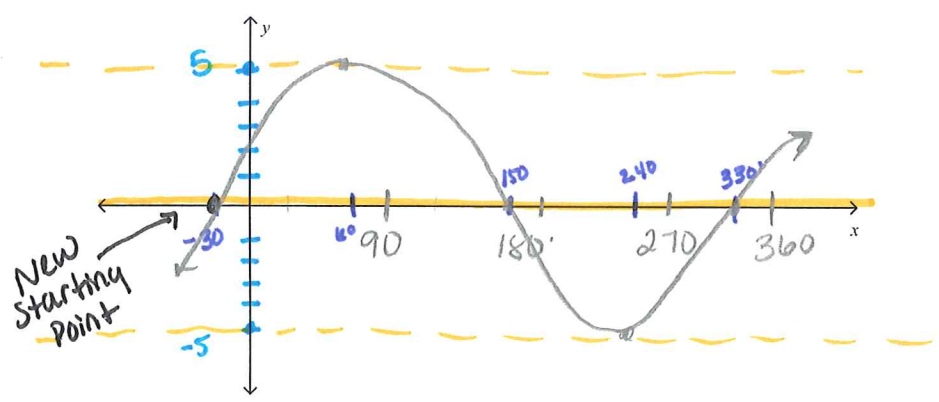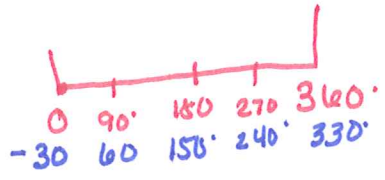Parent of $\cos\theta$ starts at $(0,1)$

Amp: **1**   Per: ____   V.S: **down 3** P.S. **0**

$0 \quad 90 \quad 180 \quad 270 \quad 360 \div 2$
$0 \quad 45° \quad 90 \quad 135° \quad 180°$

Plot those for x axis

one period

New $(0,1)$ pt.

$0 \quad 45 \quad 90 \quad 135 \quad 180 \quad 270 \quad 360°$

New midline because moved down 3

Amp = 1 ∴ only go up one + below one for the min + max

Ex 2 $y = 5\sin(\theta + 30°)$

Amp: **5**   Per: **360**   V.S: **0**   P.S. **left (30°)**

$0 \quad 90° \quad 180 \quad 270 \quad 360°$
$-30 \quad 60 \quad 150° \quad 240° \quad 330°$

5

New Starting Point

$-30 \quad 6° 90 \quad 180° \quad 150 \quad 270 \quad 240 \quad 330° \quad 360$

-5

No Amp b/c tan does not have max + min

Ex3 $y = \frac{1}{2}\tan\frac{1}{4}\theta - 1$

$180(\frac{1}{4}) = 720°$

Amp: **NO AMP**   Per: ____   V.S: **down 1** P.S. **0**

| asymptote

$0 \quad 90° \quad 180$
$0 \quad 360° \quad 720$

$720 \quad 1080 \quad 1440°$ New x axis