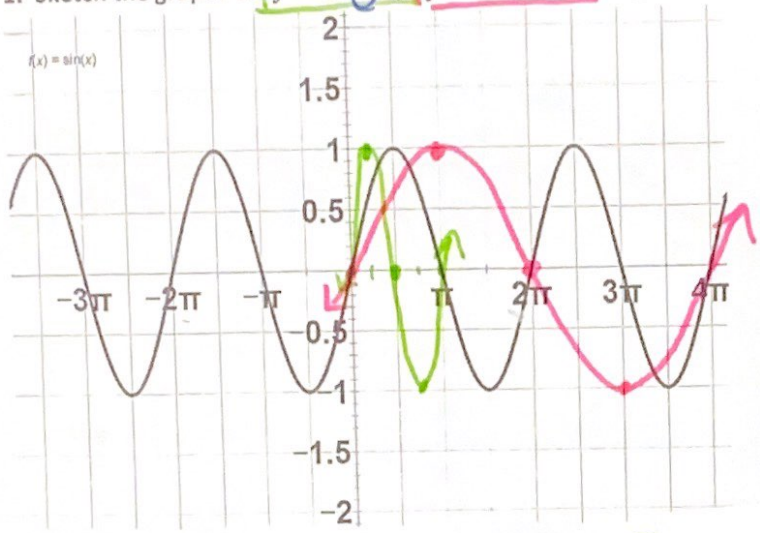
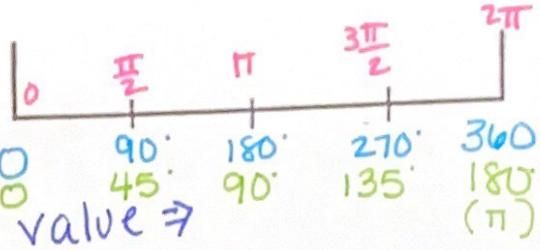
Notes: Periods and Phase Shifts

1. Sketch the graphs of $y = \sin 2\theta$, $y = \sin 0.5\theta$ using different colors and label the graph with the equation.





B value ⇒ Parent Period / B = New Period

360/2 = 180°

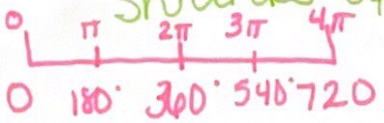
5 key pts need to happen between 0-180 now.

b). Describe the transformations that occurred. $y = \sin 2\theta$ Amp: 1 Per: π=180° V.S: ✓ P.S. ✓

Shrinks w/ b = 2

360 ÷ 0.5 = 720°

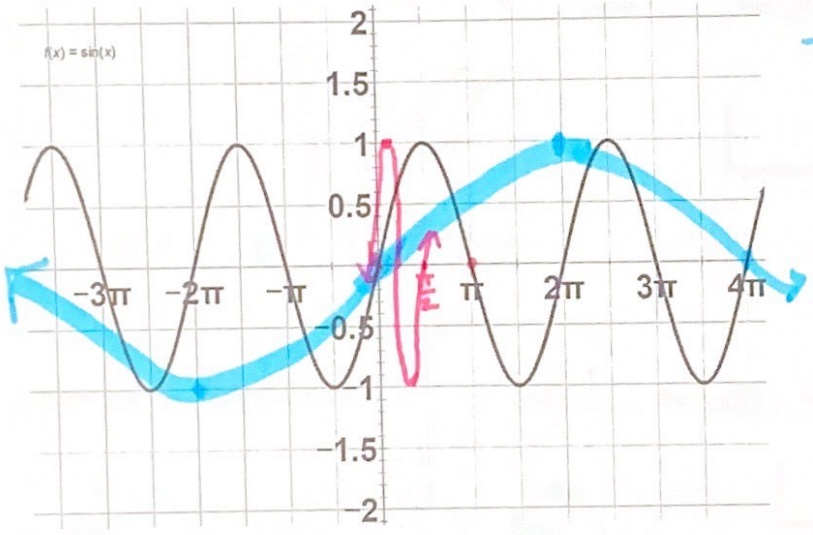
0 − 4π Stretches



$y = \sin \frac{1}{2}\theta$

Amp = 1, Period: 4π or 720°

2. a). Sketch the graph of $y = \sin \frac{1}{4}\theta$ using a different color. $y = \sin 4\theta$ using a different color.



$\frac{2\pi}{(\frac{1}{4})} = \frac{2\pi}{1} \cdot \frac{4}{1} = 8\pi$ New period

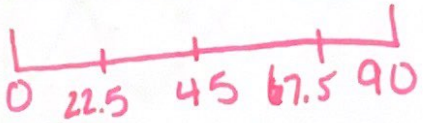
Flip it! for $y = \sin \frac{1}{4}\theta$

Key pts: 0, 2π, 4π, 6π, 8π

Period = 8π

b). Describe the transformation that occurred. Amp: ____ Per: ____ V.S: ✓ P.S. ✓

$\frac{2\pi}{4} = \frac{\pi}{2} = 90°$



So $y = \sin 4\theta$ has a Period of 90° (or $\frac{\pi}{2}$)

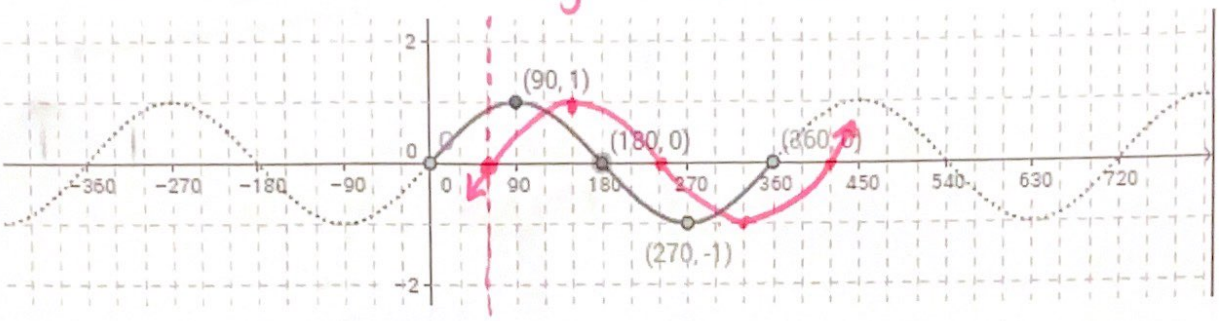
Amp = 1

Period: 90° or $\frac{\pi}{2}$

3. a). Sketch the graph $y = sin(\theta - 60°)$ Right 60°

Amp: 1 Per: 360° V.S: / P.S. Right 60

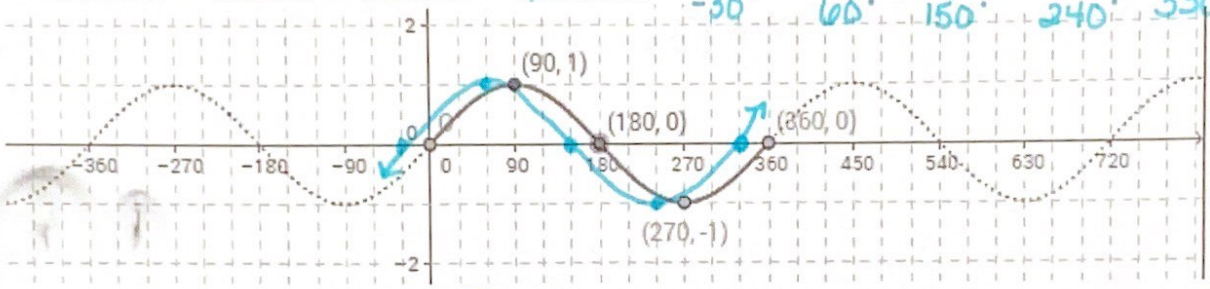
60° 150° 240° 330° 420°



b). Sketch the graph $y = sin(\theta + 30°)$

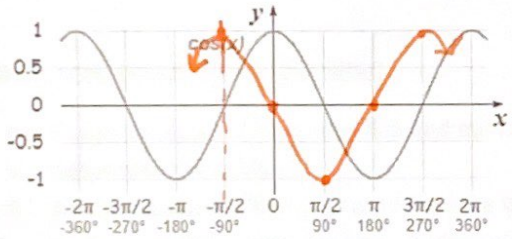
Amp: 1 Per: 360° V.S: 0 P.S. left 30°

-30° 60° 150° 240° 330°



c.) Sketch the graph $y = cos(\theta + \frac{\pi}{2})$ left $\frac{\pi}{2}$

Amp: 1 Per: 2π V.S: / P.S. left $\frac{\pi}{2}$

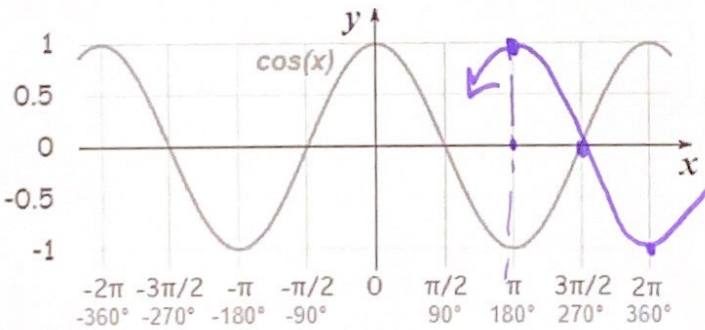


0 $\frac{\pi}{2}$ π $\frac{3\pi}{2}$ 2π

$-\frac{\pi}{2}$ 0 $\frac{\pi}{2}$ π $\frac{3\pi}{2}$

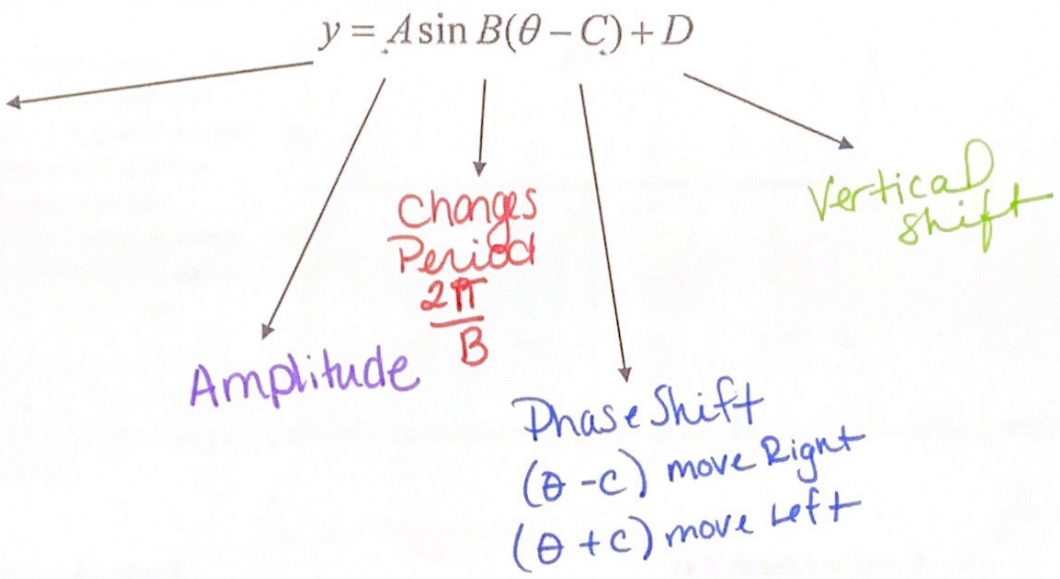
d.) Sketch the graph $y = cos(\theta - \pi)$ Right π

Amp: 1 Per: 2π V.S: / P.S. Right π



π $\frac{3\pi}{2}$ 2π $\frac{5\pi}{2}$ 3π

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



Steps to graphing without a calculator:

4. Graph the new midline, max line and minimum if applicable.
5. Determine the period.
6. 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