

Unit 3 (4.3) Graphing Trig. Functions – Parent Functions

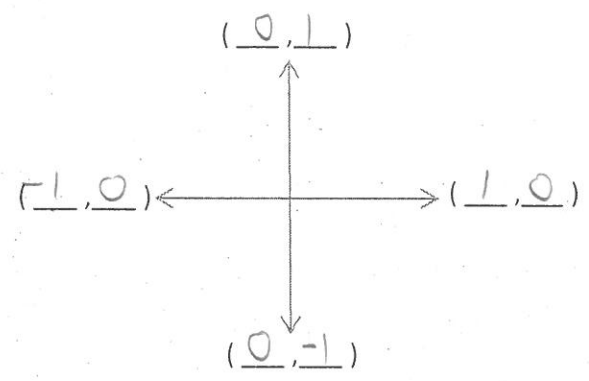
Objective: To understand the properties and characteristics of the parent graphs of the basic trigonometric functions

Parent Graph/Function

simplest graphs of trig functions
(no translations)

- Using the idea of the unit circle, label the quadrantal angles with the appropriate ordered pairs.

(cos, sin)
tan = $\frac{\sin}{\cos}$



- Using the information from above, list the 5 critical points for: $y = \sin \theta$.

critical points:
zeroes, max, min

$\sin 0^\circ = 0$ $\sin 90^\circ = 1$ $\sin 180^\circ = 0$
 $\sin 270^\circ = -1$ $\sin 360^\circ = 0$

cycle – Shortest piece of the graph that repeats itself

period – horizontal length of the cycle (# of degrees)

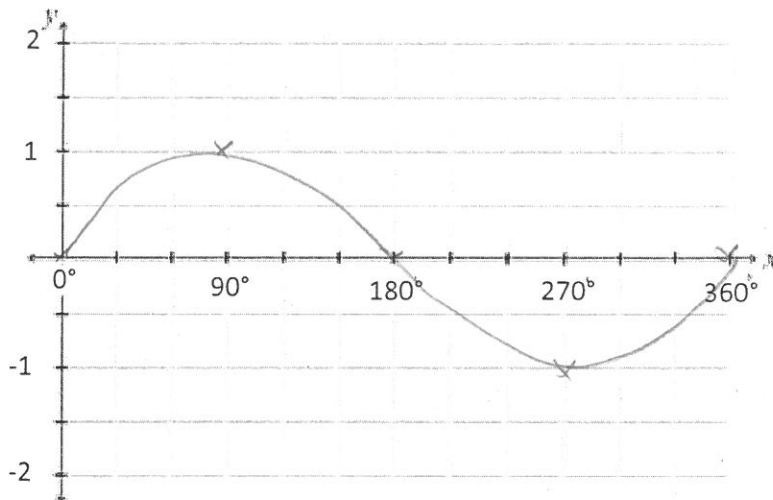
amplitude – height from midline to max or min (Not max to min!)

sinusoidal axis (mid-line) – horizontal reference line
 "middle of the graph" ($\frac{1}{2}$ way btw max & min)

Unit 3 (4.3) Graphing Trig. Functions – Parent Functions

- Using the critical points, graph the sine function.

$$y = \sin \theta$$



Domain: all reals
 $(-\infty, \infty)$

Range: $-1 \leq y \leq 1$
 $[-1, 1]$

Zeros: $0^\circ, 180^\circ, 360^\circ, \dots$
 $0^\circ + 180^\circ n$

Period: 360°

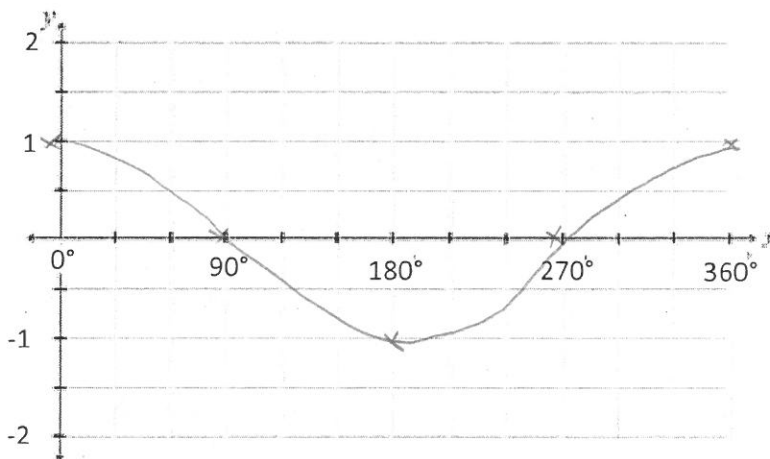
Amplitude: 1

Sinusoidal axis:
 $y = 0$

- Using the 5 critical points, this time graph the cosine function.

$$\begin{aligned} \cos 0^\circ &= 1 \\ \cos 90^\circ &= 0 \\ \cos 180^\circ &= -1 \\ \cos 270^\circ &= 0 \\ \cos 360^\circ &= 1 \end{aligned}$$

$$y = \cos \theta$$



Domain: all reals
 $(-\infty, \infty)$

Range: $-1 \leq y \leq 1$
 $[-1, 1]$

Zeros: $90^\circ, 270^\circ, \dots$
 $90^\circ + 180^\circ n$

Period: 360°

Amplitude: 1

Sinusoidal axis:
 $y = 0$

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- Using the information from page 1, how would you find $\tan \theta$?

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

- How do we graph the value when it is undefined?

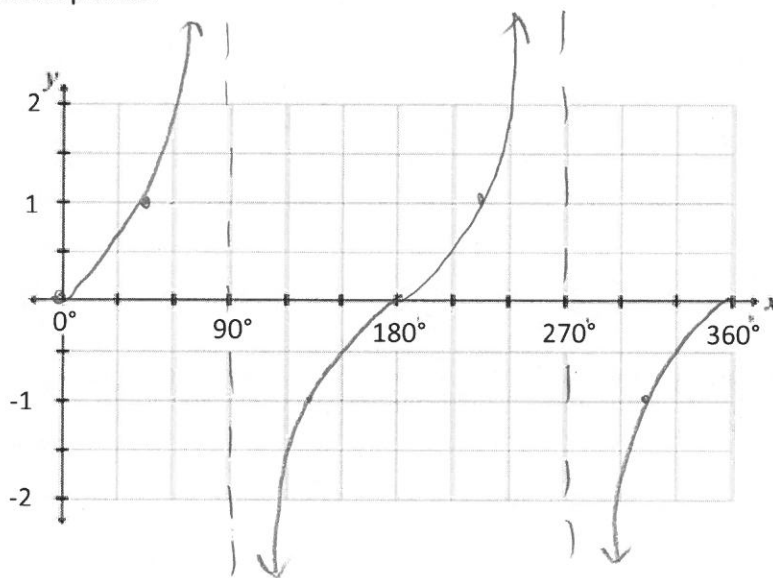
asymptote

vertical dashed line

- Graph the tan function using the critical points.

$$y = \tan \theta$$

$\tan 0^\circ = 0$
 $\tan 90^\circ = \text{undefined}$
 $\tan 180^\circ = 0$
 $\tan 270^\circ = \text{undefined}$
 $\tan 360^\circ = 0$



Domain: all reals or $(-\infty, \infty)$ except $90^\circ + 180^\circ n$

Range: all reals or $(-\infty, \infty)$

Zeros: $0^\circ, 180^\circ, 360^\circ, \dots$
 $0^\circ + 180^\circ n$

Period: 180°

Amplitude: None

Sinusoidal axis: $y = 0$

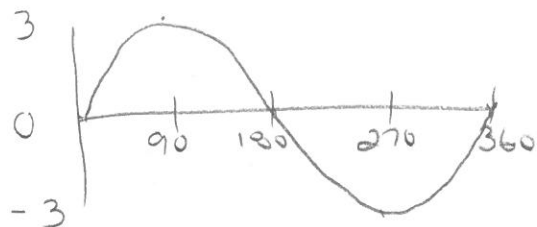
***Think back to the Ferris Wheel Activity.

- What type of function were we graphing? *sine*
- Where do you think the sinusoidal axis was? *middle of the wheel $y = 30$*
- What do you think the amplitude was? *radius 25 ft*
- What do you think the period was? *20 seconds*
** not always degrees **

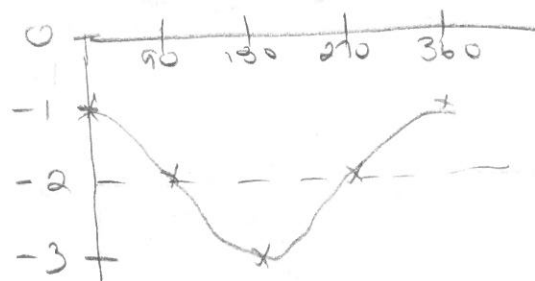
Unit 3 (4.3) Graphing Trig. Functions – Parent Functions

Try these:

1. Graph one cycle of the sine curve with amplitude of 3.



2. Graph one cycle of the cosine curve with a midline at $y = -2$.



3. Graph one cycle of the sine curve with amplitude of 5, midline at $y = 4$, and a reflection.

