The Graphs of Primary Trigonometric Functions

Activity

1. Complete the following table of values (2 significant figures), graph the function, and list the properties by filling in the blanks.

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
$y=\sin\theta$	-1	-0.87	-0.5	0	0.5	0.87	1	0.87	0.5	0	-0.5	-0.87	-1	-0.87	-0.5	0

Domain: $\{\theta \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid |y| \leq 1\}$

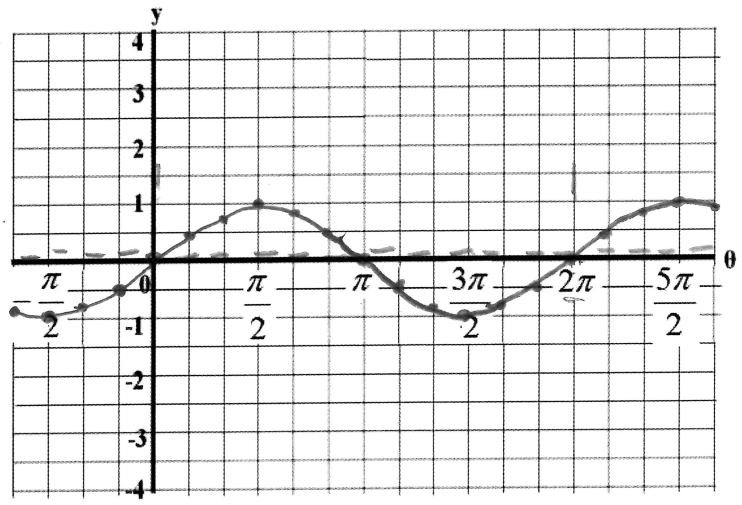
Maximum: $y=1$

Minimum: $y=-1$

Amplitude: 1

Axis of Equilibrium: $y=0$

Period: $T=2\pi$



2. Complete the following table of values (2 significant figures), graph the function, and list the properties by filling in the blanks.

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
$y=\cos\theta$	0	0.5	0.87	1	0.87	0.5	0	-0.5	-0.87	-1	-0.87	-0.5	0	0.5	0.87	1

Domain: $\{\theta \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid |y| \leq 1\}$

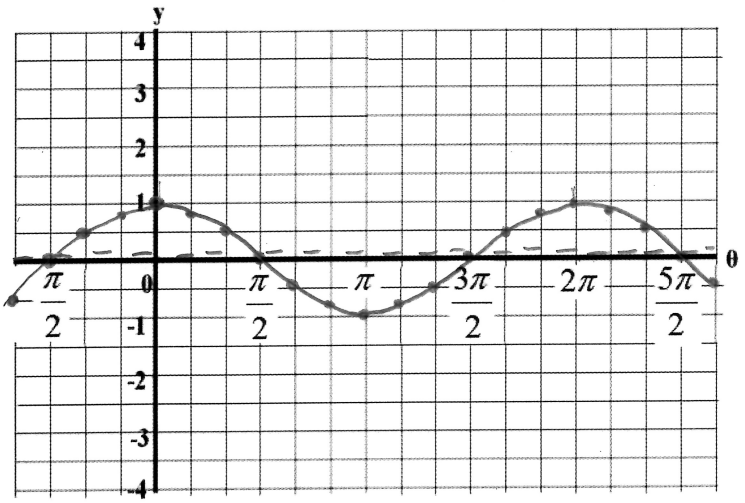
Maximum: $y=1$

Minimum: $y=-1$

Amplitude: 1

Axis of Equilibrium: $y=0$

Period: $T=2\pi$



$\frac{\sin\theta}{\cos\theta} = \frac{\frac{y}{r}}{\frac{x}{r}} = \frac{y}{r} \div \frac{x}{r} = \frac{y}{r} \cdot \frac{r}{x} = \frac{y}{x} = \tan\theta$

Significant Figures

3. Complete the following table of values (2 ~~decimal places~~s), graph the function, and fill in the blanks.
Hint: Use the table of values for $y = \sin\theta$ and $y = \cos\theta$ to determine some of these entries.

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
$y = \tan\theta = \frac{\sin\theta}{\cos\theta}$	Und.	-1.73	-0.58	0	0.58	1.73	Und.	-1.73	-0.58	0	0.58	1.73	Und.	-1.73	-0.58	0

Domain: $\{\theta \in \mathbb{R} \mid \theta \neq \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}, \ldots\}$

Range: $\{y \in \mathbb{R}\}$

Maximum: None

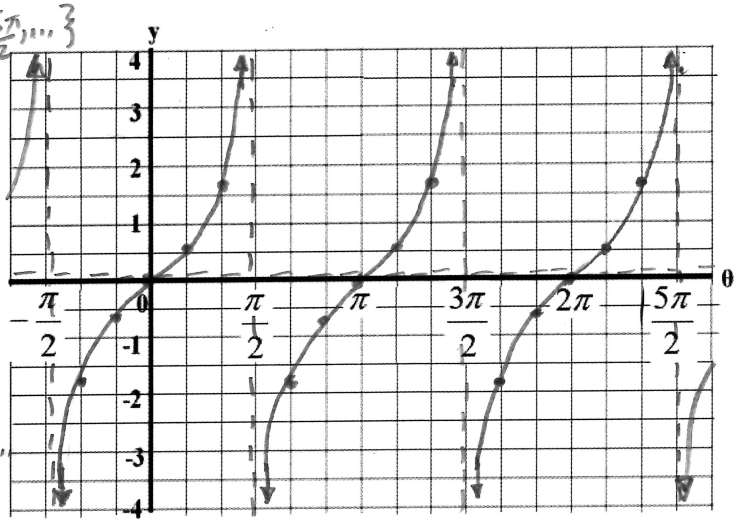
Minimum: None

Axis of Equilibrium: $y = 0$

V. Asymptotes: $\theta = \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}, \ldots$

θ - intercepts: $0, \pm\pi, \pm 2\pi, \pm 3\pi, \ldots$

Period: $T = \pi$



Homework

1. Why will a calculator return an error when computing $\sin^{-1}(3)$?

2. Why will a calculator return an error when computing $\tan\left(\frac{\pi}{2}\right)$?

3. Solve the following equations for θ; $0 \le \theta \le 2\pi$. Give an exact value.

a) $\sin\theta = \frac{\sqrt{3}}{2}$ b) $\cos\theta = -\frac{1}{\sqrt{2}}$ c) $\tan\theta = -\sqrt{3}$

4. Determine the exact value for each expression below.

a) $\sin\left(\frac{2\pi}{3}\right)$ b) $\tan\left(-\frac{\pi}{4}\right)$ c) $\cos\left(\frac{19\pi}{6}\right)$

5. A sticker is placed on the edge of a wheel that has a radius of 25 cm. The wheel does $4\frac{3}{8}$ rotations.

a) Determine the total angular rotation of the wheel in radians.
b) What is the total distance travelled by the sticker; hint --> use the equation $a = r\theta$.