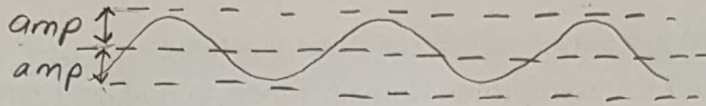


Key Terms/Vocabulary

Amplitude: Amplitude is the height from the centre line (median line) to the maximum (or to the minimum).



$$\text{amp} = \frac{\text{max} - \text{min}}{2}$$

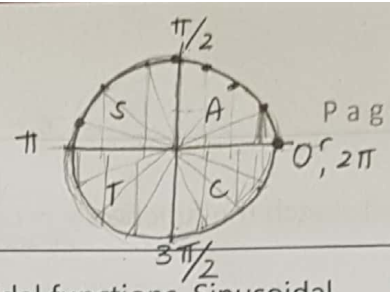
Period: The period is how far is the maximum to the next maximum; or from a minimum to the next minimum
 → how long it takes for one complete cycle.



Phase Shift: how far the function is shifted horizontally from its usual position.
 (i.e. horizontal translation).

Periodic Function: A function that repeats itself over a regular cycle/intervals of its domain
 Ex: ECG

* Sinusoidal Function: a smooth curve that fluctuates back and forth like a sine graph. A curve that oscillates repeated up and down from the centre line



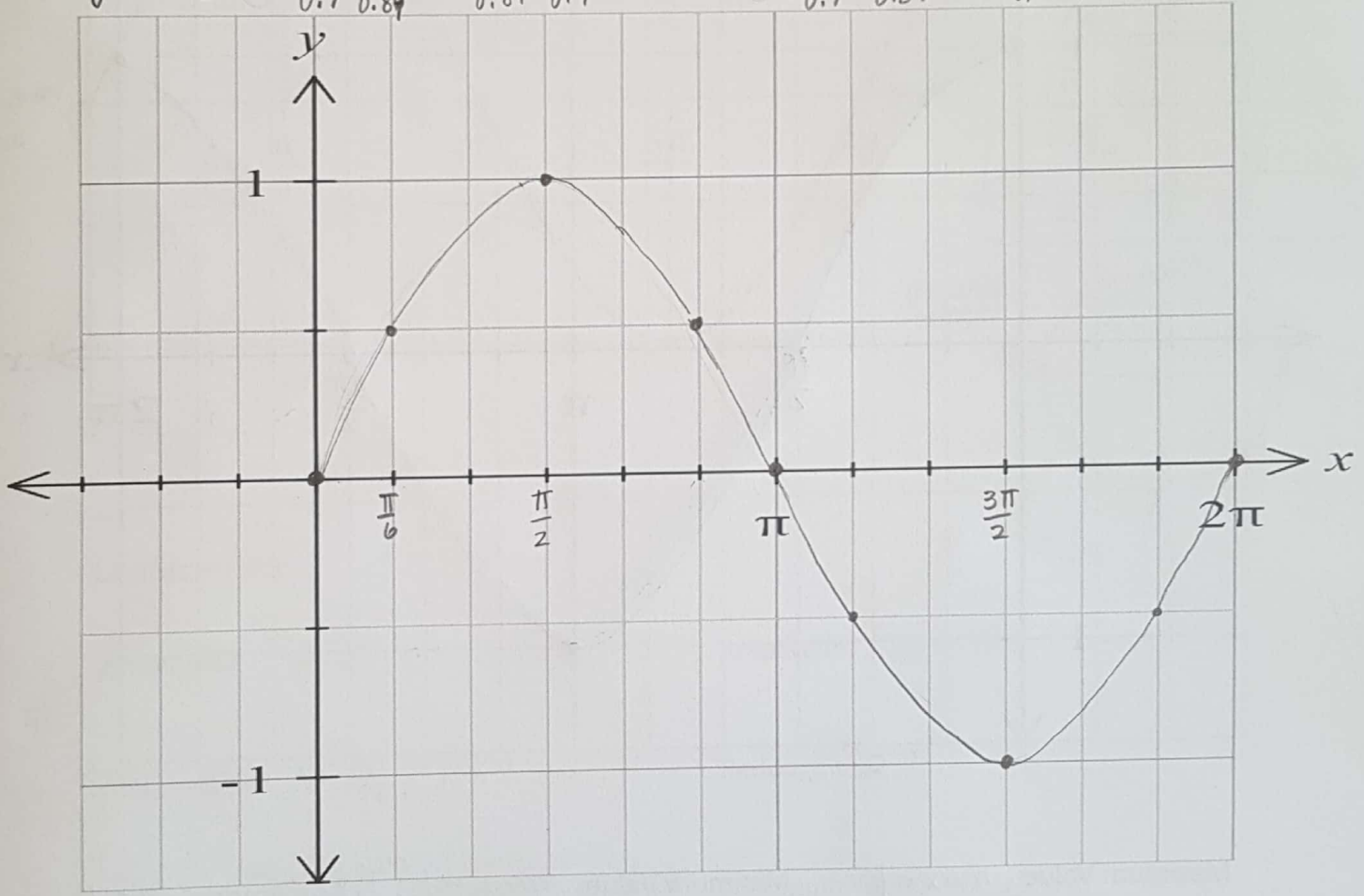
Lesson 1: Graphs of $y = \sin x$ and $y = \cos x$

The graphs of $y = \sin x$ and $y = \cos x$ are called sinusoidal functions. Sinusoidal functions have a maximum and a minimum value that are the same distance from the centre line (midline) of the graph.

y-value in the unit circle

We will sketch the function $y = \sin x$ using a table of values for the domain $0 \leq x \leq 2\pi$.

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
$\sin x$ <i>y-values</i>	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0
		0.7	0.87			0.87	0.7				-0.7	-0.87		-0.87	-0.7		



Maximum Value: $\max = 1$

Minimum Value: $\min = -1$

Amplitude: $a = 1$

Period: $P = 2\pi$

y-intercept: $y_{int} = 0$

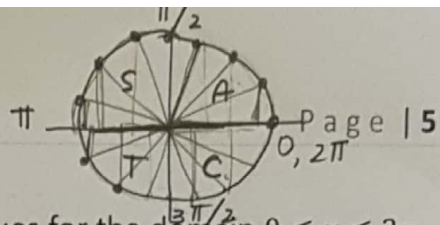
x-intercepts: $0, \pi, 2\pi$

Domain: $[0, 2\pi]$

Range: $[-1, 1]$

$0 \leq x \leq 2\pi$

$-1 \leq y \leq 1$

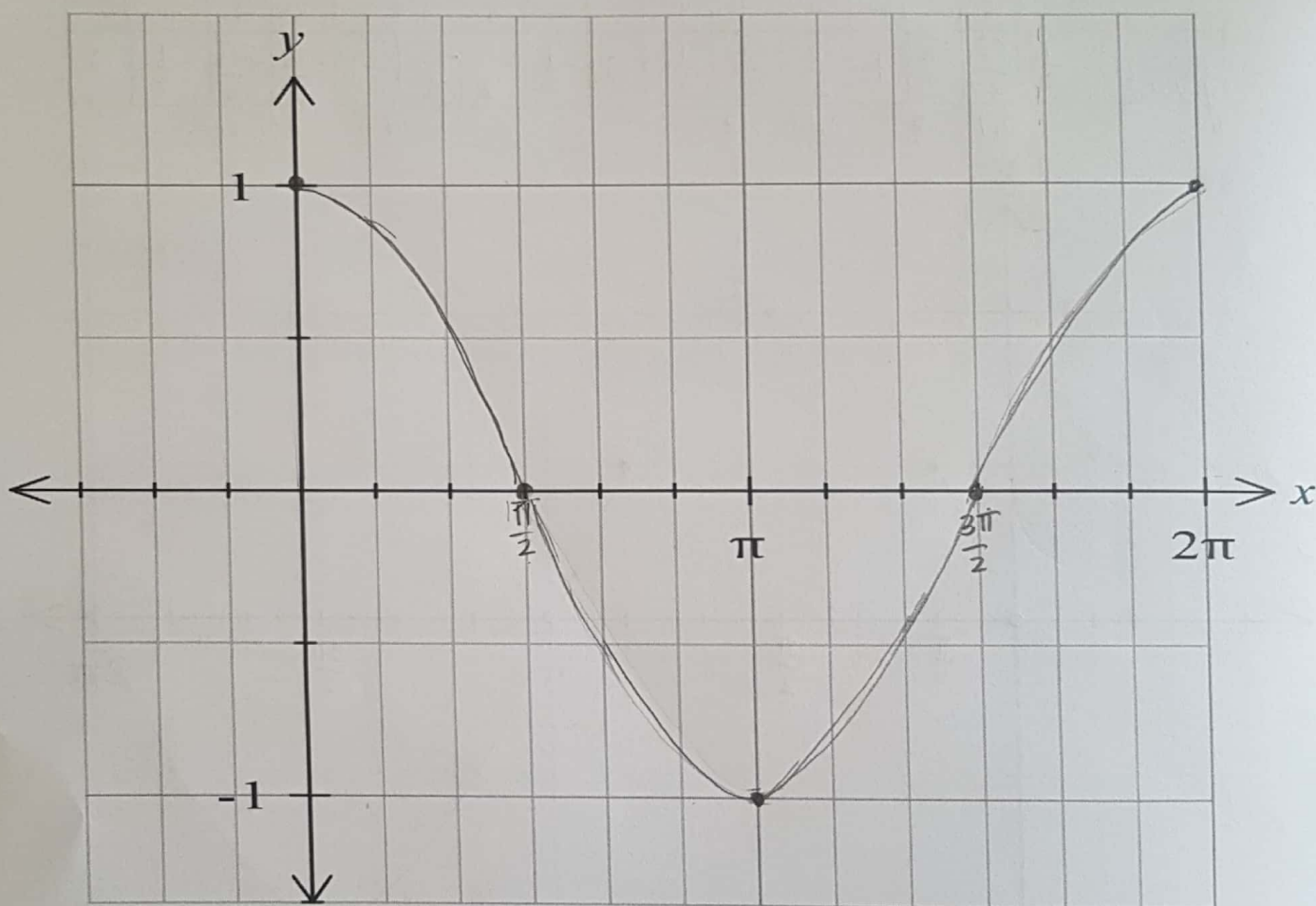


x -values on unit circle

We will sketch the function $y = \cos x$ using a table of values for the domain $0 \leq x \leq 2\pi$.

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1

0.87 0.7



Maximum Value: $\max = 1$

Minimum Value: $\min = -1$

Amplitude: $a = 1$

Period: 2π

y-intercept: $y = 1$

x-intercepts: $\frac{\pi}{2}, \frac{3\pi}{2}$

Domain: $[0, 2\pi]$

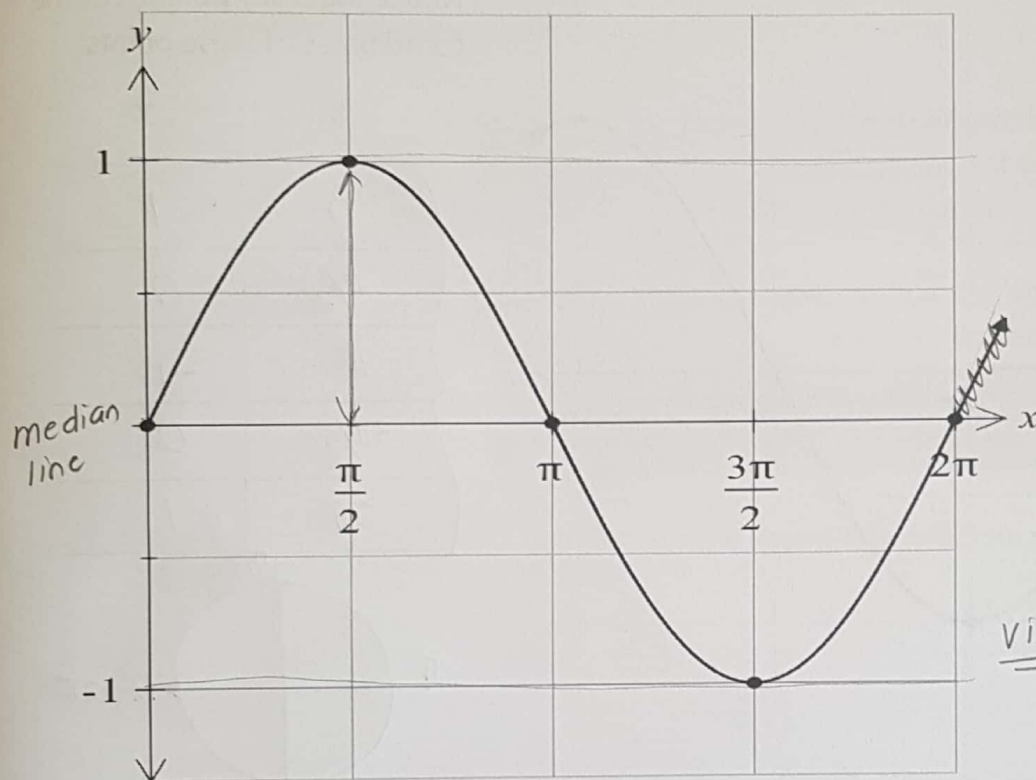
Range: $[-1, 1]$

$0 \leq x \leq 2\pi$

$-1 \leq y \leq 1$

Characteristics of the graph of $y = \sin x$

The graph of $y = \sin x$ over the domain $0 \leq x \leq 2\pi$ is shown below.

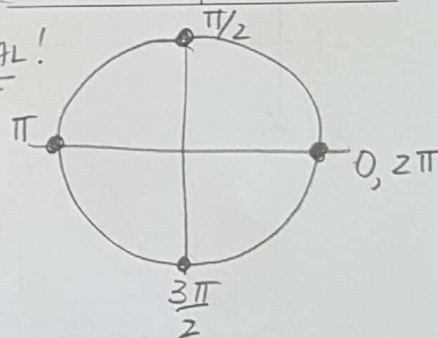


For $y = \sin x$

Notice the 5 key points. List the coordinates of these points:

x	y
0	0
$\pi/2$	1
π	0
$3\pi/2$	-1
2π	0

VISUAL!



Characteristics:

y-intercept: $y = 0$

Amplitude: $a = 1$

x-intercepts: $x = 0, \pi, 2\pi$

Period: $P = 2\pi$

Domain: $[0, 2\pi]$ or $0 \leq x \leq 2\pi$

Maximum Value: $\max = 1$

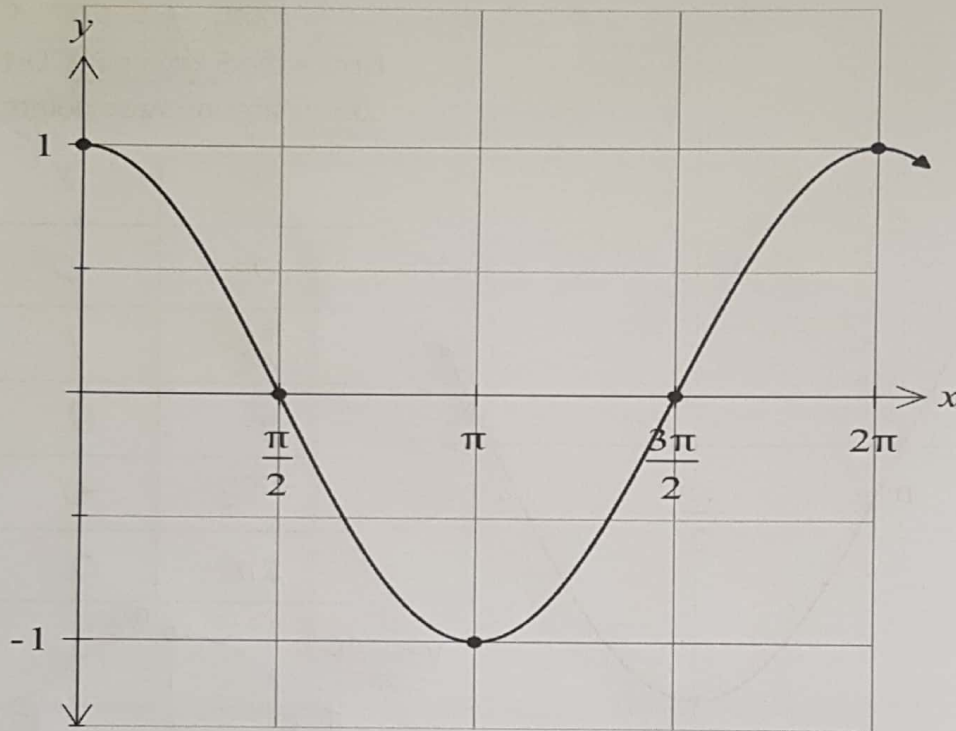
Range: $[-1, 1]$ or $-1 \leq y \leq 1$

Minimum Value: $\min = -1$

Characteristics of the graph of $y = \cos x$

x -coordinates
on unit circle

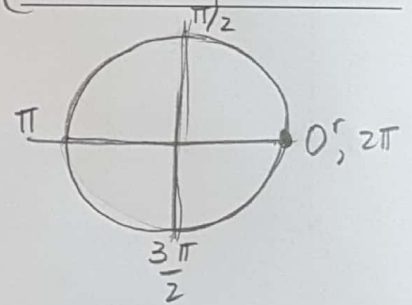
The graph of $y = \cos x$ over the domain $0 \leq x \leq 2\pi$ is shown below.



$$y = \cos x$$

Notice the 5 key points. List the coordinates of these points:

x	y
0	1
$\pi/2$	0
π	-1
$3\pi/2$	0
2π	1



Characteristics:

y-intercept: $y = 1$

Amplitude: $a = 1$

x-intercepts: $x = \frac{\pi}{2}, \frac{3\pi}{2}$

Period: $P = 2\pi$

Domain: $[0, 2\pi]$ or $0 \leq x \leq 2\pi$

Maximum Value: $\max = 1$

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

Minimum Value: $\min = -1$

June 12th: Last day of classes