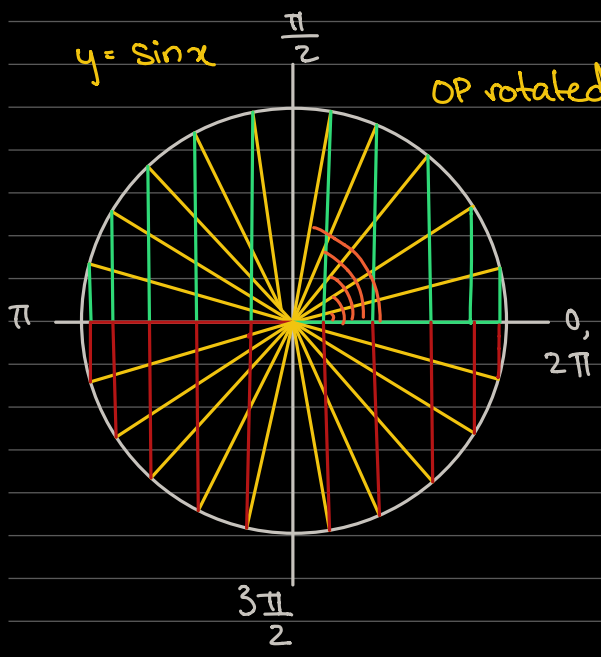
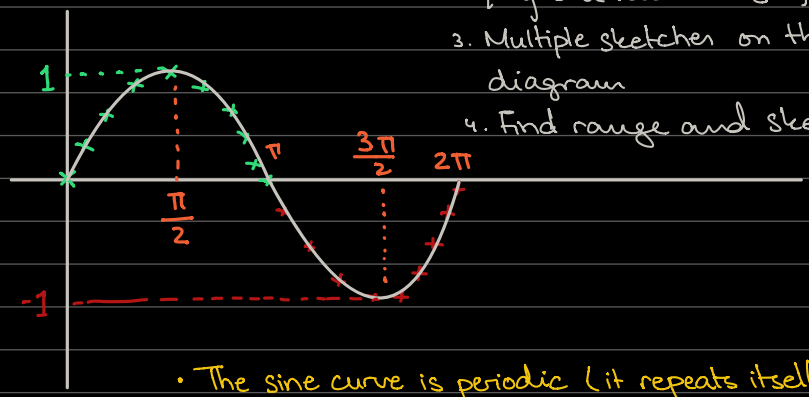
# TRIG GRAPHS

Trig general syllabus:
1. Basic Angles
2. $y = a\sin bx + c$, $y = a\cos bx + c$, $y = a\tan bx + c$
3. Multiple sketches on the same diagram
4. Find range and sketch

$y = \sin x$



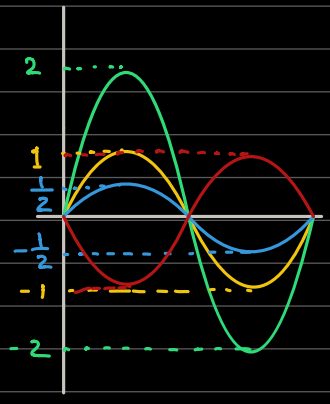




- The sine curve is periodic (it repeats itself after 360°)
- $\sin\theta$ is a function
- $\sin\theta$ does not have an inverse
- range of $\sin\theta \Rightarrow -1 \leq \sin\theta \leq 1$

## Transformation of the Sine curve

$y = a \cdot \sin bx + c$

$y = \sin x$
$y = 2\sin x$
$y = \frac{1}{2}\sin x$
$y = -2\sin x$

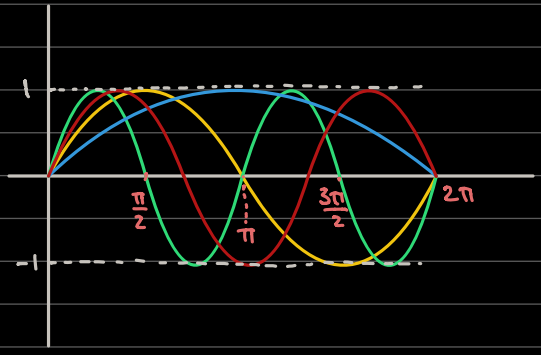



- "a" is the amplitude of the graph
- Stretches / compresses graph vertically

$y = a \cdot \sin bx + c$

"b" = number of curves you can fit between 0° and 360°

$y = \sin x$
$y = \sin 2x$
$y = \sin \frac{1}{2}x$
$y = \sin \frac{3x}{2}$
↳ period = 240°



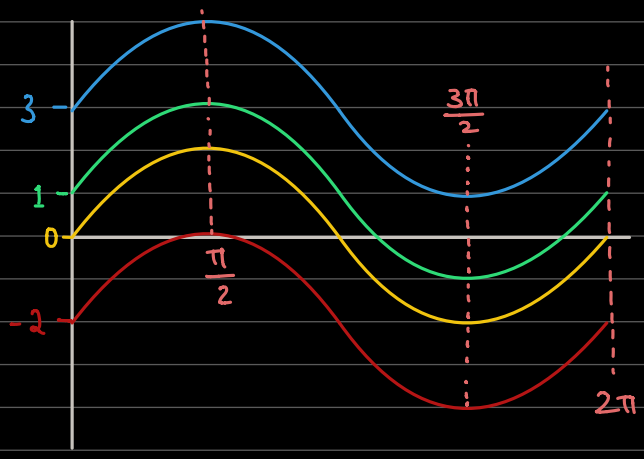

$$\text{New period} = \frac{\text{Original period}}{b}$$

- Stretches / compresses graph horizontally

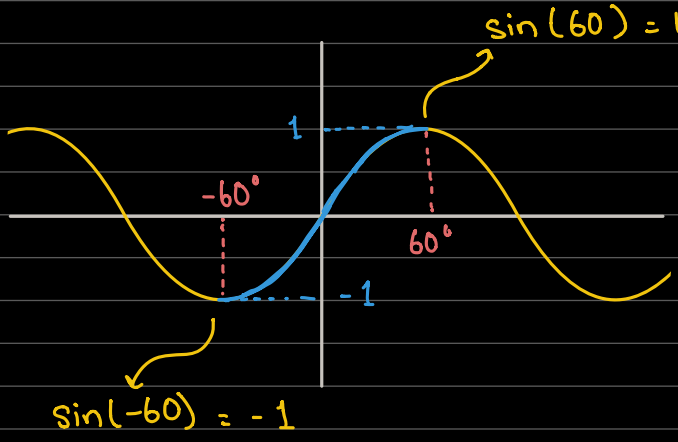
$y = a \cdot \sin bx + c$

"c" shifts the curve vertically

$y = \sin x$
$y = \sin x + 1$
$y = \sin x + 3$
$y = \sin x - 2$




Why $\sin(-\theta) = -\sin\theta$

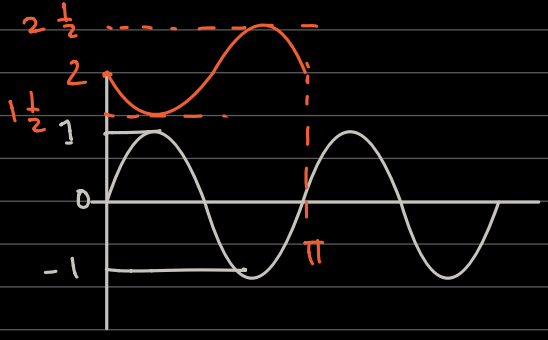



Therefore, $\sin(-60) = -\sin(60)$

# Range and Sketching

Given $y = -\frac{1}{2}\sin 2x + 2$ for the domain $0 \leq x \leq 360$

(i) find range
(ii) sketch




$-1 \leq \sin 2x \leq +1$

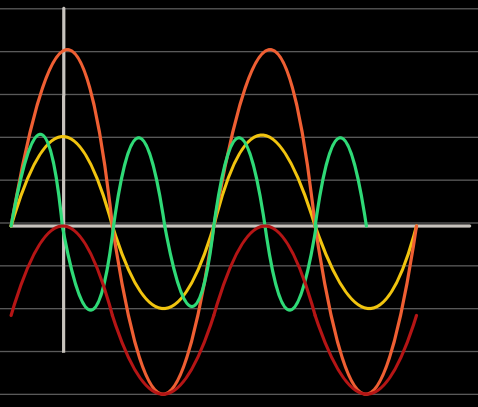
$-\frac{1}{2} \leq \frac{1}{2}\sin 2x \leq +\frac{1}{2}$

$2 - \frac{1}{2} \leq \frac{1}{2}\sin 2x + 2 \leq 2 + \frac{1}{2}$

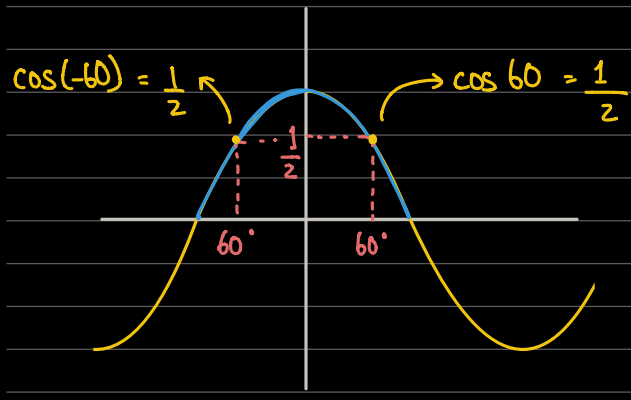
$\frac{3}{2} \leq \frac{1}{2}\sin 2x + 2 \leq \frac{5}{2}$

## The cosine graph

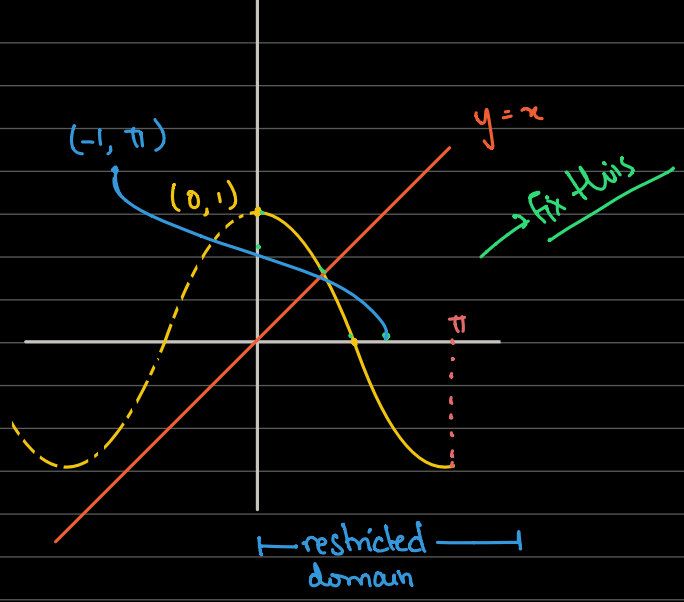
$y = \cos x$
$y = 2\cos x$
$y = \cos 2x$
$y = \cos x - 1$



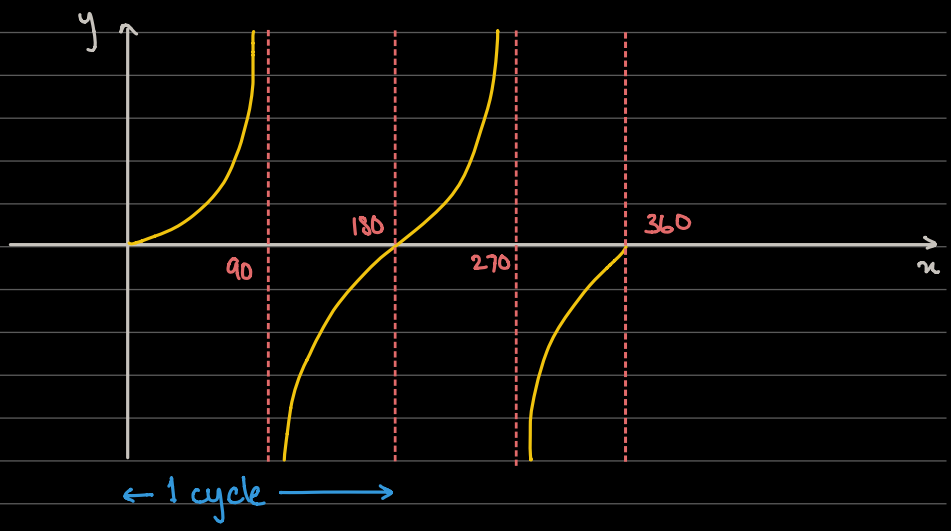
## Why $\cos(-\theta) = \cos\theta$




## Inverse of $y = \cos x$


(-1, π)
(0, 1)
y = x
Fix this
π
restricted domain

$y = \tan x$



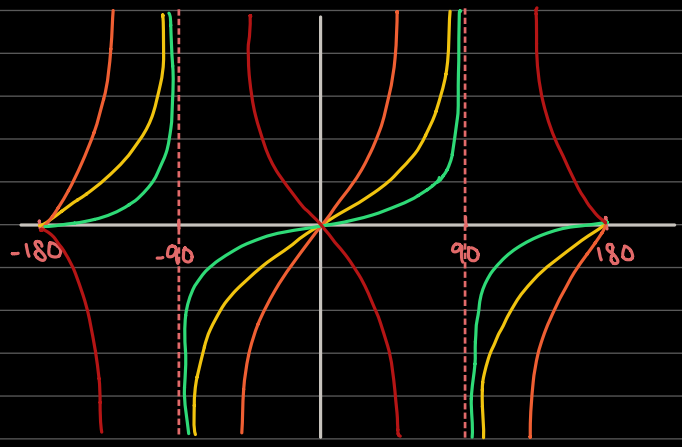

← 1 cycle →

- period of tan curve is 0° – 180°
- tan curve is a function
-

"a" makes the curve steeper or flatter

$y = a\tan bx + c$

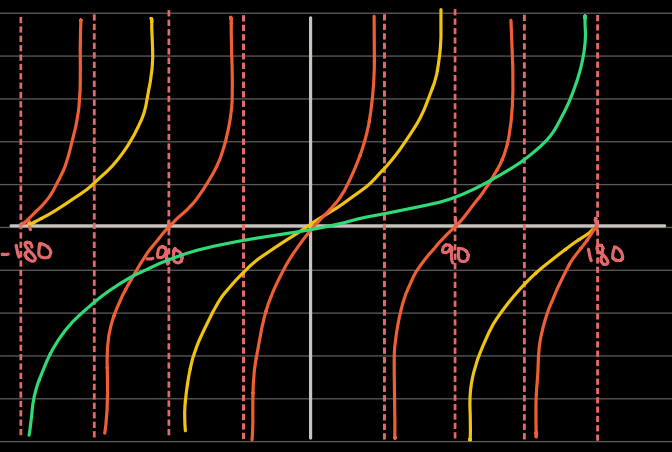
$y = \tan x$
$y = 2\tan x$
$y = \frac{1}{2}\tan x$
$y = -2\tan x$




$y = a\tan bx + c$

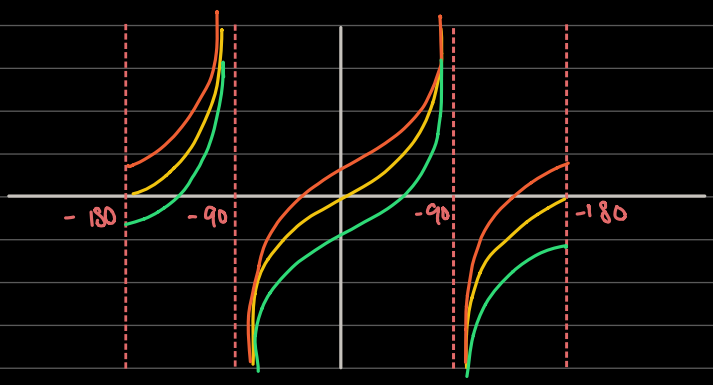
"b" is the number of curves

$y = \tan x$
$y = \tan 2x$
$y = \tan \frac{1}{2}x$



$y = a\tan bx + c$

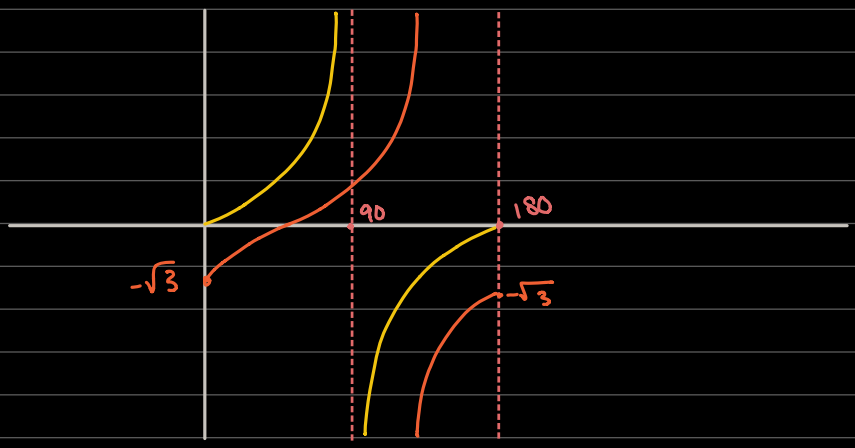
$y = \tan x$
$y = \tan x + 1$
$y = \tan x - 1$




## Horizontal shift

$y = \tan(\theta - a)$

$y = \tan\theta$
$y = \tan(\theta - 60°)$




## Inverse of tan

$y = \tan x$