Pre-Calculus 12 Enriched Trigonometry

# Sketching Trigonometric Functions

$y = A\sin(B(x - C)) + D$ or $y = A\cos(B(x - C)) + D$

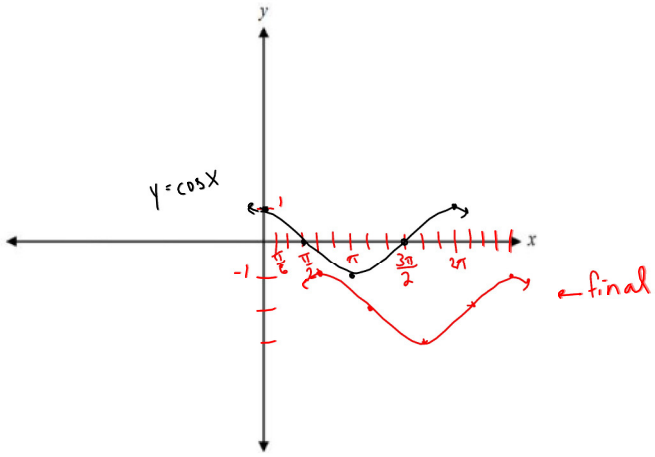
A – Vertical stretch/compression ($|A| = amp$)
B – Horizontal stretch/compression $\left(p = \frac{2\pi}{|B|}\right)$ ↑ period
C – Phase Shift (left/right)
D – Displacement (up/down)

**Ex.**1) Sketch $y = \cos\left(x - \frac{2\pi}{3}\right) - 2$

↑ right $\frac{2\pi}{3}$

$\frac{4\pi}{6}$

Starts at max




**Ex.** 2) Sketch the graph of at least one period of the function $y = -2\sin(4x)$.

Mult y-values of 1 and -1 by (-2)

min -2
max 2

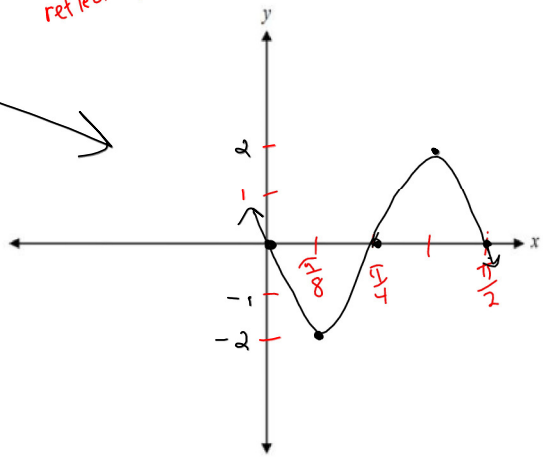
reflected

mult by 4

period $= \frac{2\pi}{|B|}$

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

$= \frac{\pi}{2}$




med min med max med

$\frac{\pi}{2} \div 4$

$\frac{\pi}{8}$ ← scale

affect max and min

**Ex.** 3) Sketch $y = 2\sin(2(x-\pi)) + 1$

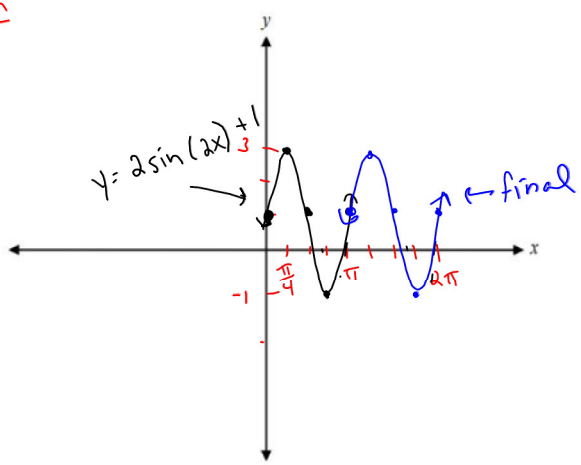
max 3
min −1
med 1

$\text{med} = \frac{\text{max} + \text{min}}{2}$
$= \frac{3 + (-1)}{2}$
$= 1$

period $= \frac{2\pi}{2}$
$= \pi$

$\pi \div 4$
$\frac{\pi}{4}$ ← scale

right $\pi$ units (or $\frac{4\pi}{4}$)




**Ex. 4)** Sketch the graph of $y = 2\sin\frac{1}{2}\left(x - \frac{\pi}{3}\right) - 1$ for $0 \le x \le 4\pi$.

max 1
min −3
med −1

period $= \frac{2\pi}{\frac{1}{2}}$
$= 4\pi$

$4\pi \div 4$
$\pi$ ← scale