5.2 Translations of $y=\sin x$ & $y=\cos x$

$y = \sin x + d$ is a vertical translation d units

changes: starting point
min/max
x-ints → sin. axis ints
y-ints range

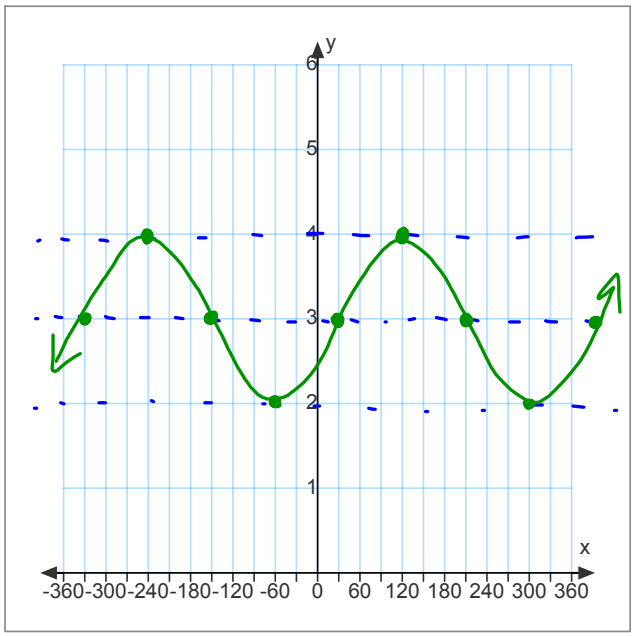
AKA "vertical displacement"

$y = \sin(x - c)$ horizontal translation c units

changes: x-coords of st. pt, x-ints, max, min

AKA "phase shift"

ex) Graph $y = \sin(x-30^\circ)+3$. State D & R.



5 Key Points

SA: $y=3$

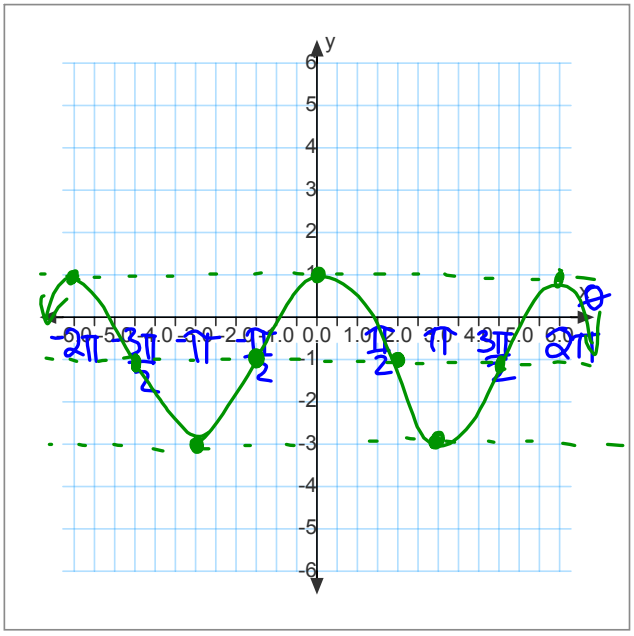
max: 4

min: 2

st. pt. $(30^\circ, 3)$

D: $x \in \mathbb{R}$ R: $2 \le y \le 4$

Ex) Graph $y=-2\cos(\theta+\pi)-1$. State R.



SA: $y=-1$

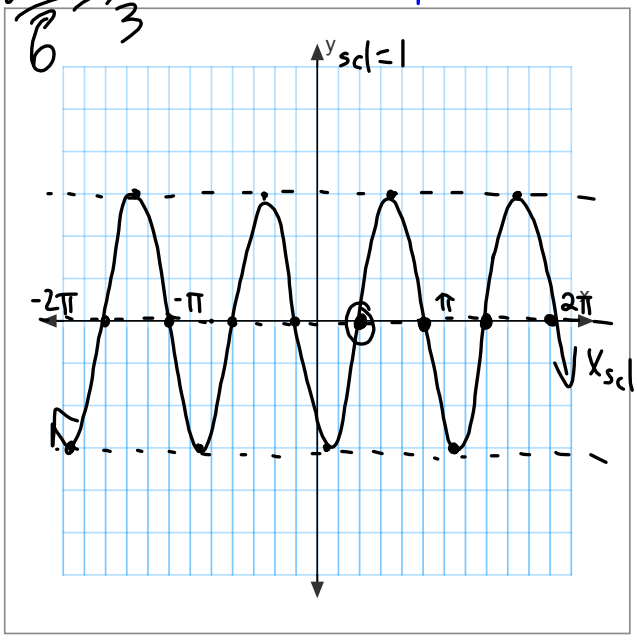
max: +1
min: -3
} amp = 2

This cos curve "starts" at a min (reflection)

Ex) Graph $y = 3\sin\left(2x - \frac{2\pi}{3}\right)$ Factor out the H.S.

$y = 3\sin\left(2\left(x - \frac{\pi}{3}\right)\right)$

$\frac{2\pi}{6} = \frac{\pi}{3}$



SA: $y=0$

max: 3
min: -3
} amp = 3

per $= \frac{1}{2} \times (2\pi) = \pi$

h.s. $= \frac{1}{2}$

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