

Sinusoidal Equations + What they tell us

Example: $y = \overset{\text{Amp}}{3} \sin\left(\overset{\frac{360^\circ}{P}}{4}(x - \overset{\text{PS}}{10})\right) - \overset{\text{SA}}{6}$ (functional form)

$$y + 6 = 3 \sin(4(x - 10))$$

$$\overset{\text{Amp}}{3}(y + \overset{-6}{\text{SA}}) = \overset{\text{SA}}{\sin}\left(\overset{\frac{360^\circ}{P}}{4}(x - \overset{\text{PS}}{10})\right)$$
 (transformational form)

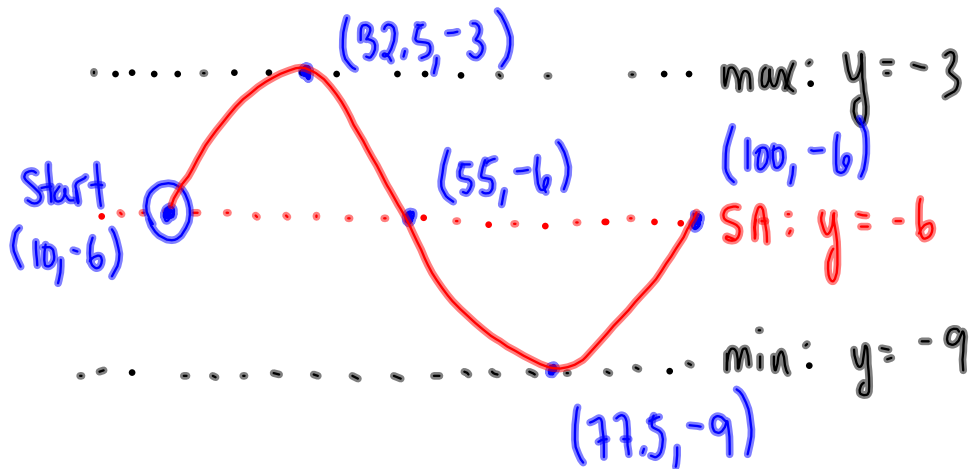
Starts going up through the SA

Parameters: Amp: 3

SA: $y = -6$

Period: $\frac{360}{P} = 4 \Rightarrow P = \frac{360}{4} = 90^\circ$ (Jump = $\frac{90}{4} = 22.5^\circ$)

PS: 10° (start of graph)



Example: $y = 5 \cos(0.5(x+7)) + 200$ ← functional form

$y - 200 = 5 \cos(0.5(x+7))$

$\frac{1}{5}(y - 200) = \cos(0.5(x+7))$ ← transformational form

Labels in equations: Amp (5), 360/p (360/0.5), PS (-7), SA (+200)

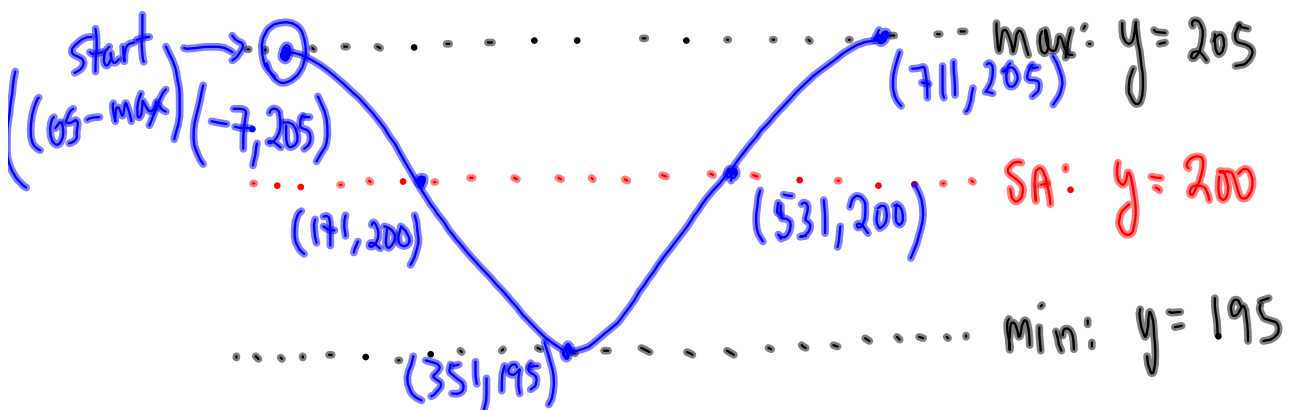
Parameters:

Amp: 5

SA: $y = 200$

Period: $\frac{360}{p} = 0.5 \Rightarrow \frac{360}{0.5} = 720^\circ$ (jump: $\frac{720^\circ}{4} = 180^\circ$)

PS: -7 (cosine \Rightarrow start at a max!)



Example : $y = -200 \cos\left(\frac{360}{12}(x-4)\right) + 3$

Amp: 200 $\frac{360}{P}$ PS: 4 SA: $y=3$

graph starts at min

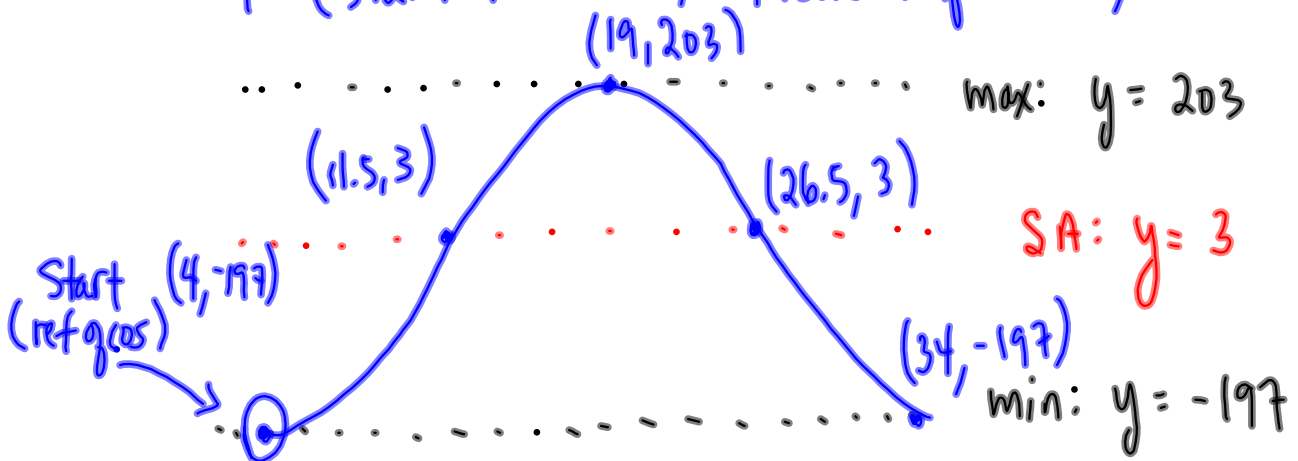
Parameters:

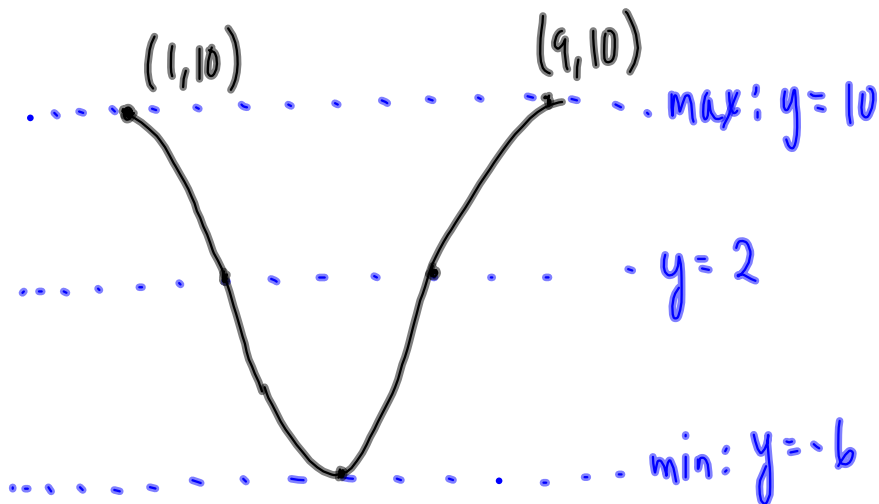
Amp: 200

SA: $y=3$

Period: $\frac{360}{P} = 12 \Rightarrow \frac{360}{12} = 30^\circ$ (jump is $\frac{30^\circ}{4} = 7.5^\circ$)

PS: 4 (start at a min \Rightarrow reflection of cosine)



Example 4Parameters:

Amp: 8

SA: $y=2$

Period: 8

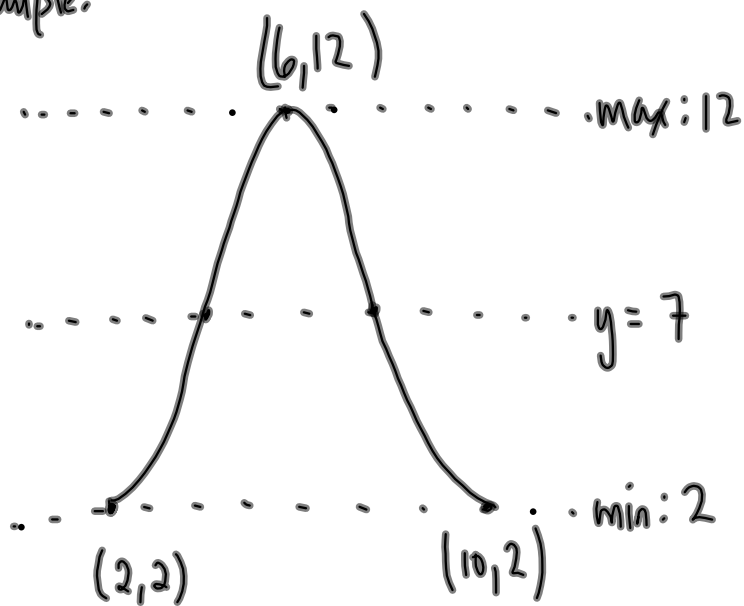
PS: 1 (cos)

$$\frac{1}{\text{Amp}} (y - \text{SA}) = \cos \left(\frac{360}{P} (x - \text{PS}) \right)^{\circ}$$

$$\frac{1}{8} (y - 2) = \cos \left(\frac{360}{8} (x - 1) \right)^{\circ}$$

$$\frac{1}{8} (y - 2) = \cos (45 (x - 1))^{\circ}$$

Example:

Parameters:

Amp: 5

SA: $y = 7$

Period: 8

PS: 2 (-cos)
(starts at min)

$$\frac{1}{5}(y-7) = -\cos\left(\frac{360}{8}(x-2)\right)^\circ$$

$$\frac{1}{5}(y-7) = -\cos(45(x-2))^\circ$$