

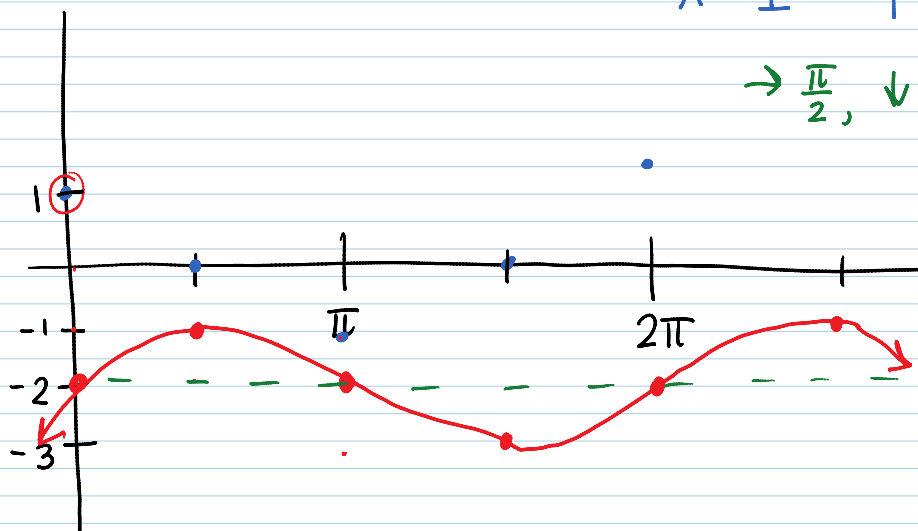
More Transformations!

Opener!

Sketch one period of the graph $y = \cos(x - \frac{\pi}{2}) - 2$

$$A = 1 \quad P = \frac{2\pi}{1} = 2\pi$$

$$\rightarrow \frac{\pi}{2}, \downarrow 2$$



Reflections!

$$y = -a \sin b(x-h) + k, \quad y = -a \cos b(x-h) + k$$

when a is negative: flips over the x-axis

*NOTE: the amplitude is still positive & will always be!! * Amplitude = $|a|$

Ex: $y = -2 \cos x \Rightarrow$

- ① Amplitude: 2
- ② Period: $\frac{2\pi}{1} = 2\pi$
- ③ transformations \Rightarrow flip over the x-axis

Graph!

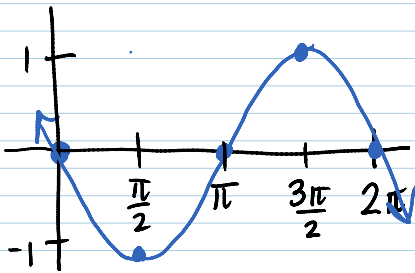
① $y = -\sin x$ $A = 1$

② $y = -\cos x$ $A = 1$

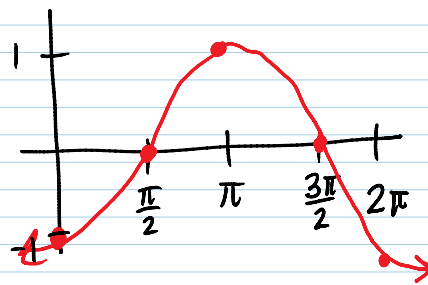
③ $y = -\tan x$ $\frac{\pi}{1} = \pi$

Graphs:

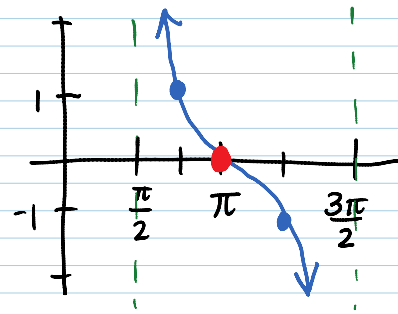
① $y = -\sin x$ $A=1$
 $P=2\pi$



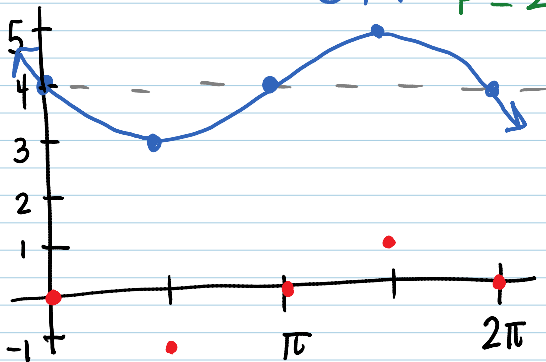
② $y = -\cos x$ $A=1$
 $P=2\pi$



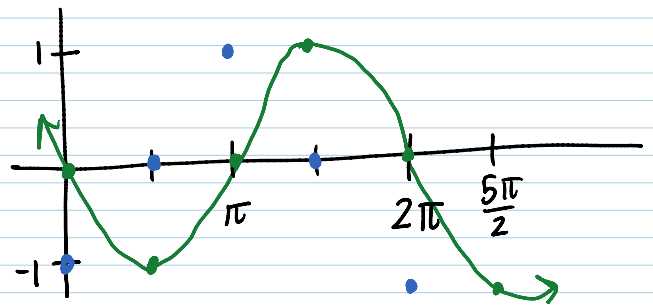
③ $y = -\tan x$ $\frac{\pi}{b} = \pi$



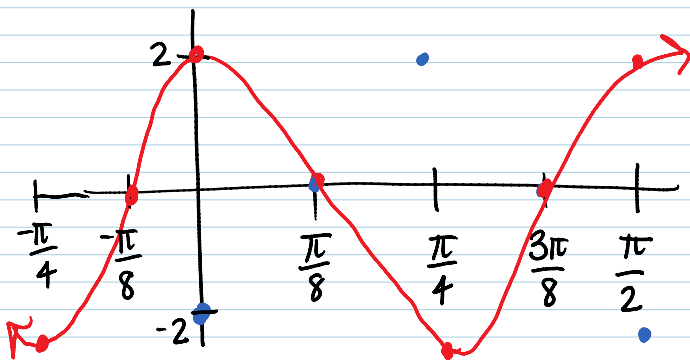
④ $y = -\sin x + 4$ ① FLIP $A=1$
② $\uparrow 4$ $P=2\pi$



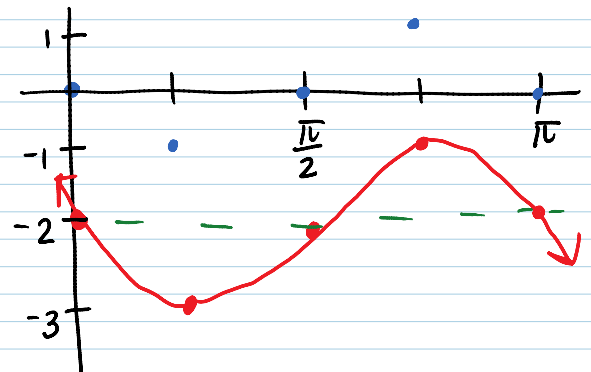
⑤ $y = -\cos(x - \frac{\pi}{2})$ ① FLIP $A=1$
② $\rightarrow \frac{\pi}{2}$ $P=2\pi$



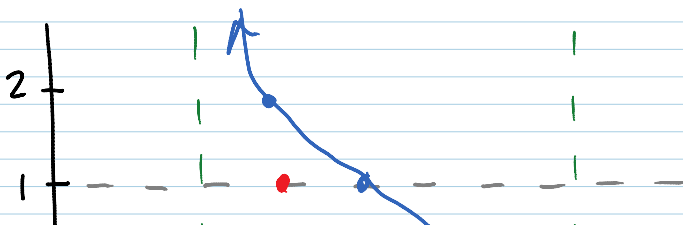
⑥ $y = -2\cos 4(x + \frac{\pi}{4})$ ① FLIP $A=2$
② $\leftarrow \frac{\pi}{4}$ $P = \frac{2\pi}{4} = \frac{\pi}{2}$



⑦ $y = -\sin 2x - 2$ ① FLIP $A=1$
② $\downarrow 2$ $P = \pi$



⑧ $y = -\tan 2x + 1$ ① FLIP $P = \frac{\pi}{2}$
② $\uparrow 1$



⑨ $y = -3\cos(x - \pi) + 4$ ① FLIP $A=3$
② $\uparrow 4$ $P=2\pi$
③ $\rightarrow \pi$

