Writing Sine and Cosine Equations Based off of Graphs

$$y = a\sin(bx + c) + d \qquad y = a\cos(bx + c) + d$$

1. Find the period → and in turn find the "b" value
   2 ways:
   - Look to see how far the graph travels before it starts to repeat itself
   - Identify the measurement from max to max or from min to min

- To find b, using the period, solve $\frac{2\pi}{b}$ =period

2. Find the d value→ $\frac{max+min}{2}$

3. Find the c value → where your starting point is, you can choose this

4. Find the amplitude (a value)→ measure the distance from the x axis to the max or from the x axis to the min $\frac{max-min}{2} = amplitude$

- Remember, the x axis isn't always the most basic x axis where y=0→ if the graph is shifted the x axis is in a new place. You can easily see this by splitting the graph in half horizontally
- How to know if the a value is positive or negative: based off of your c value you picked (starting point- which you can change as you want to write different equations)

	Sine	Cosine
$a > 0$	Intercept (c), max, intercept, min	Max, intercept, min, intercept
$a < 0$	Intercept (c), min, intercept, max	Min (c), intercept, max, intercept