Steps for graphing Sine and Cosine Functions

Using the basic sine function set-up: \( y = A\sin(Bx + C) \) or \( y = A\cos(Bx + C) \)

1. Identify \( A = \) _____ , \( B = \) _____ , \( C = \) _____

2. Find the Amplitude: \( |A| \)

3. Find the Period: \( \frac{2\pi}{B} \)

4. Find the “increment”: \( \frac{\text{Period}}{4} \)

5. Find the Phase Shift: \( \frac{-C}{B} \) (*remember that this is the \( x_1 \) key point)

6. Find the 5 key points:
   \[
   x_1 = \text{Phase Shift} \\
   x_2 = x_1 + \text{increment} \\
   x_3 = x_2 + \text{increment} \\
   x_4 = x_3 + \text{increment} \\
   x_5 = x_4 + \text{increment}
   \]

7. Identify the appropriate “pattern”:

<table>
<thead>
<tr>
<th>Type</th>
<th>Key Points</th>
<th>( x_1 )</th>
<th>( x_2 )</th>
<th>( x_3 )</th>
<th>( x_4 )</th>
<th>( x_5 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>“sine”</td>
<td>x-intercept</td>
<td>Max</td>
<td>x-intercept</td>
<td>Min</td>
<td>x-intercept</td>
<td></td>
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<tr>
<td>“- sine”</td>
<td>x-intercept</td>
<td>Min</td>
<td>x-intercept</td>
<td>Max</td>
<td>x-intercept</td>
<td></td>
</tr>
<tr>
<td>“cosine”</td>
<td>Max</td>
<td>x-intercept</td>
<td>Min</td>
<td>x-intercept</td>
<td>max</td>
<td></td>
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<tr>
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<td>Min</td>
<td></td>
</tr>
</tbody>
</table>

8. Plot information on the X-Y coordinate system.

   *If there is a constant number tacked onto the end of the equation, then this would indicate a vertical shift. You would simply move the graph up or down the appropriate number of units.

Ex. \( y = 3\cos(2x + 1) - 5 \)
   Notice the “\(-5\)” tacked on the end of the function – this indicates a vertical shift – down 5 units. To graph this function you would initially ignore the “\(-5\)” at the end and use steps #1 – 8 to graph the function \( y = 3\cos(2x + 1) \). After you get this graph, you would shift the graph down 5 units.