Activity 4.1

Sine, Cosine and Tangent Graphs

Your Name: 
Partner(s): 1.

Objective: To construct the graphs of the sine, cosine and tangent functions.

Task 1. Plotting Multiples of \( \pi \).

On the number line, mark the points corresponding to \( \frac{\pi}{6} \), \( \frac{\pi}{4} \), \( \frac{\pi}{3} \), \( \frac{\pi}{2} \), \( \frac{2\pi}{3} \), \( \frac{3\pi}{4} \), and \( \frac{5\pi}{6} \), as accurately as possible. This task will help you to complete the remaining tasks of this activity.

![Number line with marked points]

Task 2. Graphing the sine function.

a) State the domain of the sine function:

b) Complete the table of values for \( y = \sin(x) \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>(-\frac{5\pi}{6})</th>
<th>(-\frac{\pi}{2})</th>
<th>(-\frac{\pi}{6})</th>
<th>0</th>
<th>(\frac{\pi}{2})</th>
<th>(\frac{5\pi}{6})</th>
<th>(\pi)</th>
<th>(\frac{7\pi}{6})</th>
<th>(\frac{3\pi}{2})</th>
<th>(\frac{11\pi}{6})</th>
<th>(2\pi)</th>
<th>(\frac{13\pi}{6})</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = \sin(x) )</td>
<td>(-\frac{1}{2})</td>
<td>-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) Plot the points from the table of values for \( y = \sin(x) \) and connect them with a smooth curve.

![Graph of sine function]

d) State the range of the sine function:
Task 3. Graphing the cosine function.

a) State the domain of the cosine function:

b) Complete the table of values for $y = \cos(x)$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$\frac{-4\pi}{3}$</th>
<th>$-\pi$</th>
<th>$-\frac{2\pi}{3}$</th>
<th>$-\frac{\pi}{3}$</th>
<th>0</th>
<th>$\frac{\pi}{3}$</th>
<th>$\frac{2\pi}{3}$</th>
<th>$\pi$</th>
<th>$\frac{4\pi}{3}$</th>
<th>$\frac{5\pi}{3}$</th>
<th>$2\pi$</th>
<th>$\frac{7\pi}{3}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = \cos(x)$</td>
<td>$-\frac{1}{2}$</td>
<td>-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) Plot the points and connect them with a smooth curve.

d) State the range of the cosine function:
Task 4. Graphing the tangent function.

a) State the domain of the tangent function:

b) Complete the table of values for $y = \tan(x)$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$-\pi$</th>
<th>$\frac{-3\pi}{4}$</th>
<th>$\frac{-\pi}{2}$</th>
<th>$\frac{-\pi}{4}$</th>
<th>0</th>
<th>$\frac{\pi}{4}$</th>
<th>$\frac{\pi}{2}$</th>
<th>$\frac{3\pi}{4}$</th>
<th>$\pi$</th>
<th>$\frac{5\pi}{4}$</th>
<th>$\frac{3\pi}{2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = \tan(x)$</td>
<td>0</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) Plot the points. In the case of the tangent function, because there are certain problem input values, which are not in the domain, such as $-\frac{\pi}{2}$, which do not produce any output value (the output is undefined), and because the outputs are either increasing toward $+\infty$ or decreasing toward $-\infty$, as the inputs get closer to these problem numbers, the graph has vertical asymptotes at these input values. Between the asymptotes, the graph should be a smooth curve.

d) State the range of the tangent function: