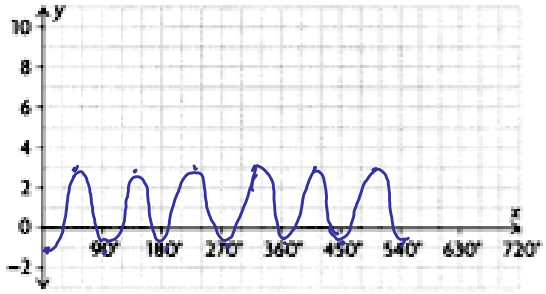
Lesson Notes 8-5 Equations of Sinusoidal Functions

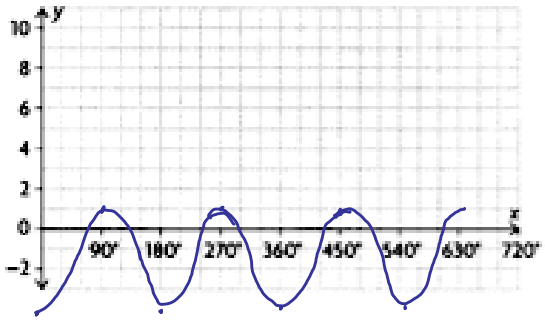
Using a graphing calculator, graph the following equations on the grid provided.

midline y=1 amplitude 2 range $-1 \le y \le 3$ period 90°

$y = 2\sin 4(x - 30^\circ) + 1$




$y = 3\cos 2(x + 90^\circ) - 2$




y = −2, 3, $-5 \le y \le 1$, 180°

A sinusoidal function of the form y = asinb(x – c) + d or y = acosb(x – c) + d has the following characteristics:

- The value of ___a___ is the amplitude
- The value of ___b___ is the number of cycles in 360°, or 2π.

  The period is 360°/b, or 2π/b.
- The value of ___c___ indicates the horizontal translation that has been applid to the graph of y = sinx or y = cosx. The graph is shifted to the right if c is positive and to the left if c is negative.
- The equation of the midline is y = ___d___.
- The maximum value is ___d+a___ and the minimum value is ___d−a___.

**Example 1:** Consider the graph of y = 5 cos(½x) – 3. Describe the graph of the function by stating the amplitude, equation of the midline, range, and period, as well as the relevant horizontal translation of y = cosx.

amp = 5 mid. = y = −3 range $-8 \le y \le 2$ (−3−5, −3+5)

period: $\frac{360}{\frac{1}{2}} = 720°$ no shift (x)

**Example 2:** Consider the graph of y = 4cos3(x – 60˚). Describe the graph of the function by stating the amplitude, equation of the midline, range, and period, as well as the relevant horizontal translation of y = cosx.

amp: 4 midline: $y=0$ range: $-4 \le y \le 4$

period: $\frac{360}{3} = 120$ hor. shift: 60° right

**Example 3:** Which equation describes this graph best?

i) y = 4sin3(x – 30˚) + 1 (ii) y = 3sin3(x – 30˚) + 1

iii) y = 4sin2(x + 30˚) + 2 (iv) y = 2sin0.5(x – 180˚) + 4