Name: _____ Date: _____

5.4 Graphing and Modelling With $y = a \sin [k(x - d)] + c$ and $y = a \cos [k(x - d)] + c$

BLM 5–9

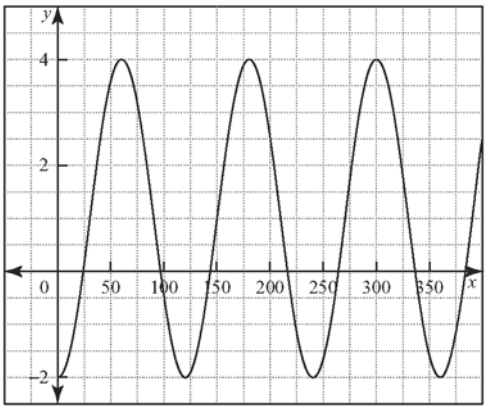
1. a) Describe the transformations that must be applied to the graph of the function $f(x) = \cos x$ to obtain the graph of the function $g(x) = 2 \cos 2x - 2$.
b) State the domain and range of $f(x)$ and $g(x)$.
c) Determine the equation of the function $h(x)$ if $h(x)$ is $g(x)$ translated 45° to the left.

2. A sinusoidal function has an amplitude of 2 units, a phase shift of 30° to the right, a period of 120°, and is translated 3 units up.
a) Model this information using a sine function.
b) Model this information using a cosine function.

3. Consider the function $f(x) = 5 \sin [2(x - 30°)] - 5$.
a) Determine the period, amplitude, phase shift, and vertical shift with respect to the function $y = \sin x$.
b) What are the maximum and minimum values of $f(x)$?
c) Determine the first three x-intercepts to the right of the origin.
d) Use the first x-intercept to the right of the origin and the period of the function to find the first x-intercept to the left of the origin.
e) Determine the y-intercept of the function.

4. Consider the function $f(x) = 10 \sin [3(x + 60°)] - 4$.
a) Describe each step in the transformation from the function $g(x) = \sin x$.
b) State the domain and the range of $f(x)$ and $g(x)$.
c) Create a graph showing both $f(x)$ and $g(x)$ for 0° to 360°.

5. Consider the graph shown.



a) Determine the equation of a sine function that matches the graph.
b) Determine a cosine function that matches the graph.

6. a) Sketch the graph of $y = \cos x$ over two cycles.
b) Use the graph from part a) to sketch the function $y = \sqrt{\cos x}$.
c) Use your graph from part b) to sketch the graph of $y = \sqrt{\cos x - 1}$.

7. Determine the domain and range of each graph in question 6.

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