Name: _____ Date: _____

BLM 2–4

Chapter 2 Practice Test

1. a) Copy and complete the table of values for $y = \cos x$.

x	$y = \cos x$	
	Exact	**Approximate**
0°		
30°		
45°		
60°		
90°		
120°		
135°		
150°		
180°		
210°		
225°		
240°		
270°		
300°		
315°		
330°		
360°		

b) Graph $y = \cos x$.

c) State any x-intercepts, y-intercepts, intervals of increase, and intervals of decrease for this function.

2. A fountain contains a wheel with a radius of 2 m that turns as water falls over it. Let the origin be at the centre of the wheel. Consider a point on the wheel along the positive x-axis.

a) If the wheel rotates counterclockwise, sketch a graph of the vertical displacement for two rotations of the wheel.

b) Write an equation to model the vertical displacement of the point's motion versus the angle of rotation.

3. Determine the phase shift and vertical translation of each function.

a) $y = 3 \sin (x - 25°) - 7$

b) $y = 4 \sin [6(x + 67°)] + 13$

c) $y = \frac{1}{2} \cos (x + 10°) + 3$

4. The graph of $f(x) = \cos x$ is translated 20 units down and shifted right 38° to obtain $g(x)$. Write an equation for $g(x)$.

5. Determine the amplitude and period of each function, then describe how each function is vertically stretched or compressed and horizontally stretched or compressed with respect to $y = \sin x$ or $y = \cos x$.

a) $y = 4 \sin 3x$ **b)** $y = -5 \cos \frac{1}{4}x$

6. The graph of $f(x) = \sin x$ is reflected in the x-axis, vertically compressed by a factor of $\frac{1}{5}$, and horizontally stretched by a factor of 4 to obtain $g(x)$. Write an equation for $g(x)$.

7. Determine the amplitude, period, phase shift, and vertical translation.

a) $y = 15 \cos [2(x + 7°)] - 6$

b) $y = -\frac{1}{2} \sin [3(x - 40°)] + 2$

8. Consider the function $g(x) = \frac{1}{2} \cos [3(x + 30°)] - 4$.

a) Describe the transformations applied to $f(x) = \cos x$ to obtain $g(x)$.

b) Apply each transformation to sketch the graph of $g(x)$. Show each step.

c) State the domain and range of $g(x)$.

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9. To obtain $g(x)$, $f(x) = \sin x$ is vertically stretched by factor 5, horizontally compressed by factor $\frac{2}{5}$, reflected in the x-axis, translated 9 units up, and shifted right 15°. Write an equation for $g(x)$.

10. The height, h, in metres, above the ground of a rider on a Ferris wheel after t seconds can be modelled by the function $h(t) = 6 \sin [18(t - 4)] + 12$.
a) What is the height of the rider after 5 s?
b) Determine the minimum and maximum heights of the rider.
c) Determine the time required for the Ferris wheel to complete one revolution.

11. A sinusoidal function has amplitude 3, period 720°, and a maximum at (0°, 5).
a) Represent the function with an equation using the cosine function.
b) Represent the function with an equation using the sine function.

12. The heights of a bungee jumper are shown in the table. Timing began when the bungee cord was fully extended, but not stretched.

Time, t (s)	Height, h (m)	Time, t (s)	Height, h (m)
0	110	8	35
1	103	9	60
2	85	10	85
3	60	11	103
4	35	12	110
5	17	13	103
6	10	14	85
7	17	15	60

a) Without graphing, explain why the data appear to fit a sinusoidal function.
b) Determine the amplitude of the function.
c) Determine the period of the function.
d) Write a sine equation to model the jump.

13. Write an equation in the form $y = a \sin kx$ of a sine function that has amplitude 4, period 180°, and a maximum at (45°, 4).

14. When Amy used a graphing calculator to graph $y = \sin x$ and $y = \sin (-x)$, she observed that the graphs were different. However, when she graphed $y = \cos x$ and $y = \cos (-x)$, the graphs appeared the same. Explain why.

15. The table shows the number of Canadians employed in the public sector over time.

Year	Persons (thousands)	Year	Persons (thousands)
1985	2800	1995	2960
1986	2840	1996	2850
1987	2880	1997	2790
1988	2940	1998	2780
1989	2970	1999	2780
1990	3030	2000	2790
1991	3060	2001	3040
1992	3060	2002	3090
1993	3040	2003	3160
1994	3000	2004	3190

Adapted from Statistics Canada: Table 183-0002

a) Draw a scatter plot of the data.
b) Does the relationship appear to be sinusoidal? Explain.
c) Starting from 1985, estimate the amplitude and period.
d) Represent the function with an equation using a sine function.

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