Name: ______________________________ Date: ____________________

Chapter 2 Test

1. The point (0, 0) is on the graph defined by
A $y = \cos x$
B $y = \sin x$
C both (a) and (b)
D none of the above

2. a) Copy and fill in the following table of values, using a calculator. Express the values to four decimal places, where necessary.

x	$y = \cos x$
0°	
30°	
60°	
90°	
120°	
150°	
180°	

b) Are there any duplicate values? Explain.
c) How would your answer to part b) help you extend the table to 360°?
d) Explain what would happen if you extended the table past 360°.
e) Why does it make sense that the period of $y = \sin x$ and $y = \cos x$ are both 360°?

3. For the graph defined by $y = \sin x$ for the interval $0 \le x \le 360°$, complete the following questions.
a) State the x-intercepts of the graph for this interval.
b) For what value(s) of x does the function reach its maximum?
c) For what value(s) of x does the function reach its minimum?

4. a) Sketch two full cycles of the graph defined by $y = \sin (x + 90°)$.
b) What other function represents the graph from part a)? Explain why this occurs.

5. a) For what two values of x do the graphs of $y = \sin x$ and $y = \cos x$ intersect for the interval $0 \le x \le 360°$?
b) Use the unit circle to explain why this makes sense.

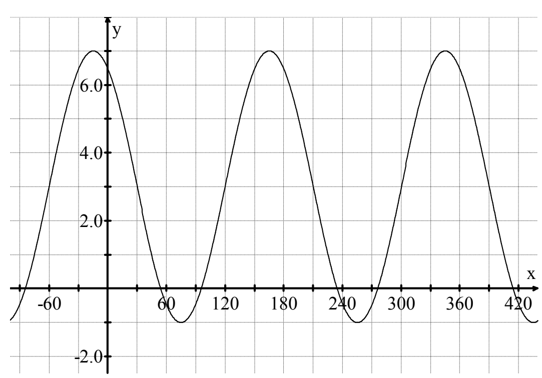
6. For the graph defined by $y = \sin (x - 30°)$, answer the following questions.
a) What are the first three positive x-intercepts?
b) Explain how the answer from part a) can be used to help you draw the graph.

7. For the graph defined by $y = 5 \cos [2(x - 45°)]$, answer the following questions.
a) State the period, amplitude, and phase shift.
b) Describe a possible set of steps involved in graphing the function.

8. The centre of a Ferris wheel is 10 m off the ground. Its radius is 9 m.
a) If a car on the Ferris wheel starts in the 3:00 position, determine an equation for its height relative to the centre of the Ferris wheel.
b) Rewrite the equation, letting h represent the height of the car relative to the ground, in metres.

9. A cosine function has a range defined by $\{y \in \mathbb{R} \mid -4 \le y \le 0\}$, and it passes through the origin and the point (180, –4).
a) Draw a possible sketch of this function.
b) Write an equation representing the function.
c) Are there any other graphs and corresponding equations that match the given conditions? Explain your reasoning.

10. Write the equation of a sine function that represents the graph shown.



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11. Consider the graphs defined by

$f(x) = 5 \cos (2x)$ and $g(x) = -5 \cos \left(\frac{x}{2}\right)$.

a) How are they alike?
b) How are they different?
c) Sketch the graphs of both $f(x)$ and $g(x)$ on the same set of axes.

12. For each of the following functions

i) state the period, amplitude, horizontal and vertical shift, and range
ii) sketch two cycles of the function

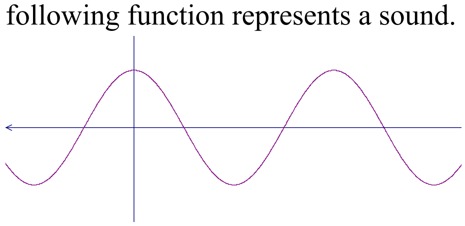
a) $f(x) = 5 \sin (2x - 90°) + 1$
b) $f(x) = -3 \cos \left(\frac{x}{3}\right) - 2$

13. A certain cosine function

- has a range of $\{y \in \mathbb{R} \mid -1 \le y \le 5\}$
- has a period of 180°
- passes through the point (30°, 5)

a) Draw a sketch of the function.
b) State an equation representing the function.

14. Sound waves can be represented by trigonometric functions. Suppose the following function represents a sound.



a) How would the graph change if the sound was made louder? Explain your reasoning.
b) How would the graph change if the sound had a higher pitch? Explain.

15. You can write $f(x) = (\sin x)^2$ as $f(x) = \sin^2 x$.

a) State the domain and range for $f(x) = \sin^2 x$. Explain how you determined the range.
b) Create a table of values and use it to sketch the graph of $f(x)$.
c) State the period of the function.

16. Consider the graph defined by $y = \cos x$.

a) Rewrite the equation after being transformed so the period is 1.
b) Modify the equation from part a) so the graph would have a period of 50.
c) A pebble is caught in a tire of radius 0.4 m. The tire rotates once every 10 s.

i) For a function representing the horizontal distance from the centre of the tire, what would be the period of this function, in seconds?
ii) State the amplitude of the function.
iii) Write an equation representing this function. Assume the pebble starts in the 3:00 position.

17. The table gives the approximate hours of daylight in Thunder Bay, Ontario, for the first and fifteenth of each month for a year.

Hours of Daylight Per Day Thunder Bay, Ontario			
Date	**h/day**	**Date**	**h/day**
Jan 1	8.2	Jul 1	15.8
Jan 15	8.6	Jul 15	15.5
Feb 1	9.3	Aug 1	14.8
Feb 15	10.1	Aug 15	14.1
Mar 1	10.9	Sep 1	13.2
Mar 15	11.7	Sep 15	12.4
Apr 1	12.7	Oct 1	11.5
Apr 15	13.5	Oct 15	10.7
May 1	14.4	Nov 1	9.7
May 15	15.0	Nov 15	9.0
Jun 1	15.6	Dec 1	8.4
Jun 15	15.9	Dec 15	8.1

a) What would be the independent variable for this data?
b) State the length of one full period. Explain your reasoning.
c) State the range of this data.
d) Explain how the answer to part c) can be used to determine the amplitude and vertical shift.
e) Plot the points. Use graphing technology if it is available. Determine an equation that represents this data.

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