Date: _____

Today's Learning Goal(s):

By the end of the class, I will be:

a) ready for the Unit 6 Summative.

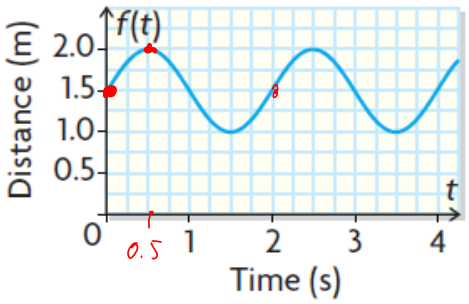
Last day's work: pp. 398-401 #1 – 4, 6, 7, 9 [13]
(*on following screens*)

1d, 3, 4

Today's Homework Practice includes:

pp. 404-405 #1 – 3, 6, 8 – 10, 12, 13

p. 398 **Distance Between the Tail Light and the Curb**



$a = \frac{max - min}{2}$ $= \frac{2-1}{2}$ $= \frac{1}{2}$ $= 0.5$

$c = \frac{max + min}{2}$ $= \frac{2+1}{2}$ $= \frac{3}{2}$ $= 1.5$

$k = \frac{360}{2} = 180$

$\therefore y = 0.5 \sin(180x) + 1.5$

or

$y = 0.5 \cos(180(x - 0.5)) + 1.5$

1. The load on a trailer has shifted, causing the rear end of the trailer to swing left and right. The distance from one of the tail lights on the trailer to the curb varies sinusoidally with time. The graph models this behaviour.
   a) What is the equation of the axis of the function, and what does it represent in this situation?
   b) What is the amplitude of the function, and what does it represent in this situation?
   c) What is the period of the function, and what does it represent in this situation?
   d) Determine the equation and the range of the sinusoidal function.
   e) What are the domain and range of the function in terms of the situation?
   f) How far is the tail light from the curve at $t = 3.2$ s?

p. 398

2. Don Quixote, a fictional character in a Spanish novel, attacked windmills because he thought they were giants. At one point, he got snagged by one of the blades and was hoisted into the air. The graph shows his height above ground in terms of time.

a) What is the equation of the axis of the function, and what does it represent in this situation?

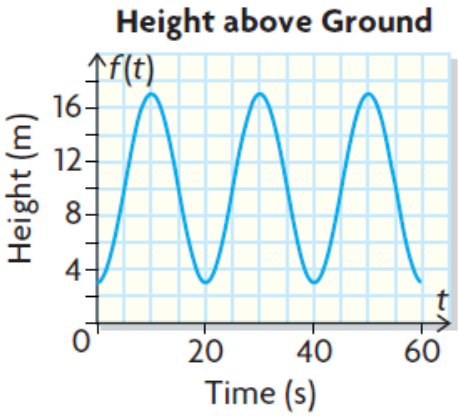
b) What is the amplitude of the function, and what does it represent in this situation?

c) What is the period of the function, and what does it represent in this situation?

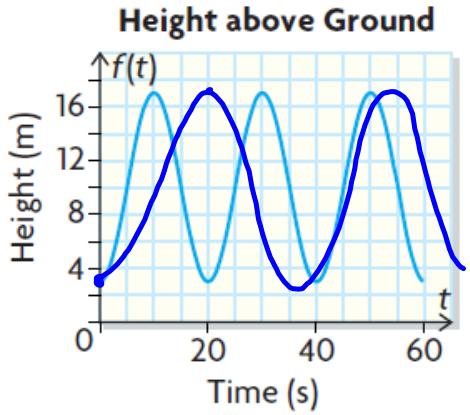
d) If Don Quixote remains snagged for seven complete cycles, determine the domain and range of the function.

e) Determine the equation of the sinusoidal function.

f) If the wind speed decreased, how would that affect the graph of the sinusoidal function?

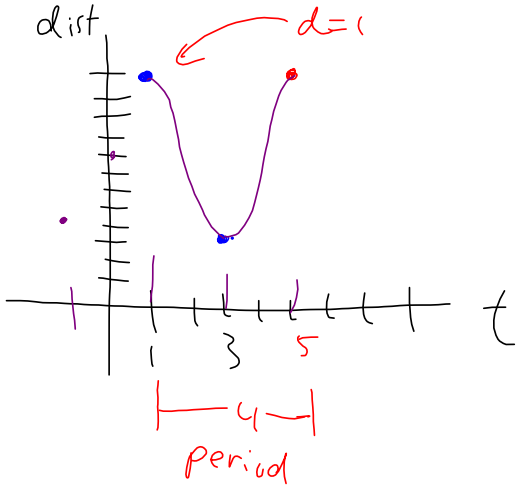


f)



f) If the wind speed decreased,
the period would be longer, and therefore,
the graph would be horizontally stretched.

p. 399 **3.** Chantelle is swinging back and forth on a trapeze. Her distance from a vertical support beam in terms of time can be modelled by a sinusoidal function. At 1 s, she is the maximum distance from the beam, 12 m. At 3 s, she is the minimum distance from the beam, 4 m. Determine an equation of a sinusoidal function that describes Chantelle's distance from the vertical beam in relation to time.



$c = \frac{max + min}{2}$ $a = \frac{max - min}{2}$

$= \frac{12+4}{2}$ $= \frac{12-4}{2}$

$= \frac{16}{2}$ $= \frac{8}{2}$

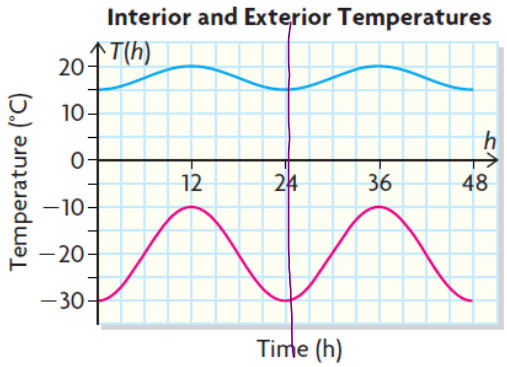
$= 8$ $= 4$

$k = \frac{360^\circ}{4}$

$= 90$

$d = 4\cos(90(x-1)) + 8$

p. 399 **4.** The interior and exterior temperatures of an igloo were recorded over a 48 h period. The data were collected and plotted, and two curves were drawn through the appropriate points.



b) $D: \{t \in \mathbb{R} \mid 0 \le t \le 48\}$

$R: \{T \in \mathbb{R} \mid 15 \le T \le 20\}$

$R = \{T \in \mathbb{R} \mid -30 \le T \le -10\}$

a) How are these curves similar? Explain how each of them might be related to this situation.

b) Describe the domain and range of each curve.

c) Assuming that the curves can be represented by sinusoidal functions, determine the equation of each function.

Blue (Interior)

$a = \frac{\text{max} - \text{min}}{2} = \frac{20 - 15}{2} = 2.5$

$c = \frac{\text{max} + \text{min}}{2} = \frac{20 + 15}{2} = 17.5$

$k = \frac{360^\circ}{24} = 15$

$\therefore T(t) = -2.5\cos(15t) + 17.5$

Pink:

$a = \frac{-10 - (-30)}{2} = \frac{20}{2} = 10$

$c = \frac{-10 + (-30)}{2} = \frac{-40}{2} = -20$

$\therefore T(t) = -10\cos(15t) - 20$

p. 399 **6.** Milton is floating in an inner tube in a wave pool. He is 1.5 m from the bottom of the pool when he is at the trough of a wave. A stopwatch starts timing at this point. In 1.25 s, he is on the crest of the wave, 2.1 m from the bottom of the pool.

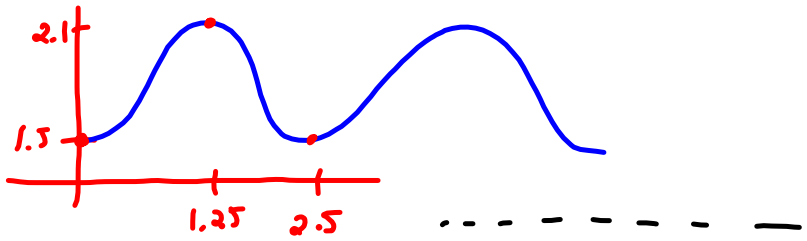
a) Determine the equation of the function that expresses Milton's distance from the bottom of the pool in terms of time.

b) What is the amplitude of the function, and what does it represent in this situation?

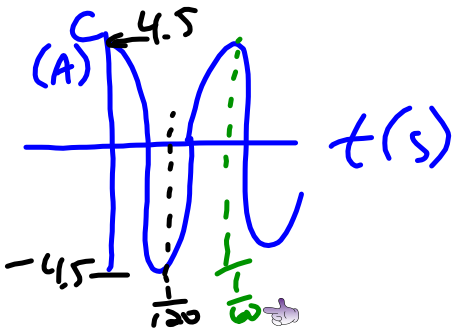
c) How far above the bottom of the pool is Milton at $t = 4$ s?

d) If data are collected for only 40 s, how many complete cycles of the sinusoidal function will there be?

e) If the period of the function changes to 3 s, what is the equation of this new function?



p. 400 **7.** An oscilloscope hooked up to an alternating current (AC) circuit shows a sine curve. The device records the current in amperes (A) on the vertical axis and the time in seconds on the horizontal axis. At $t = 0$ s, the current reads its first maximum value of 4.5 A. At $t = \frac{1}{120}$ s, the current reads its first minimum value of -4.5 A. Determine the equation of the function that expresses the current in terms of time.



$a = 4.5$

$c = 0$

$d = 0$

$b = \frac{360^\circ}{\frac{1}{60}}$

$= 360 \div \frac{1}{60}$

$= 360 \times 60$

$= 21600$

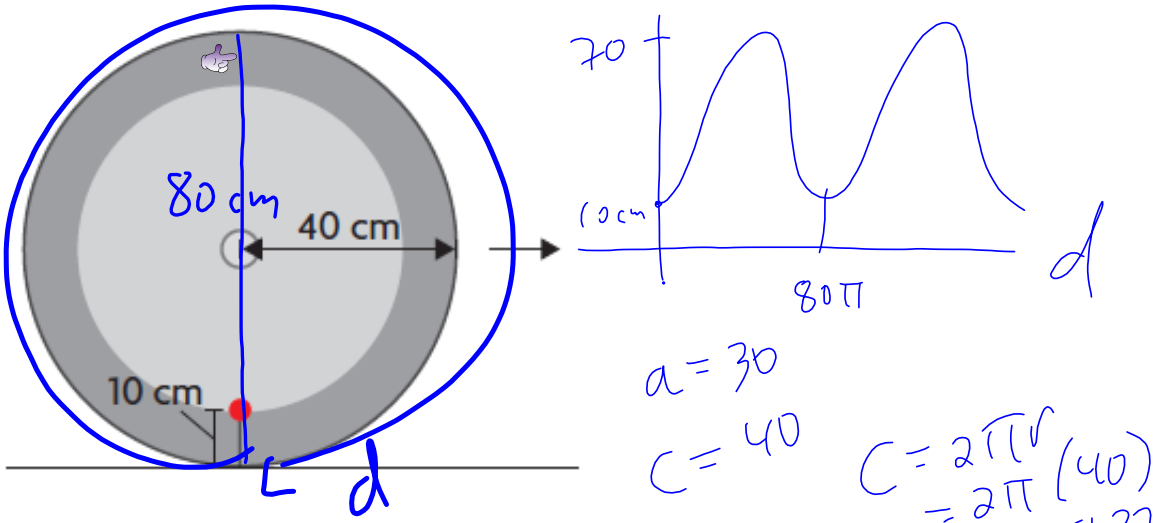
$A = 4.5\cos(21600t)$

p. 400 **9.** A paintball is shot at a wheel of radius 40 cm. The paintball leaves a circular mark 10 cm from the outer edge of the wheel. As the wheel rolls, the mark moves in a circular motion.

a) Assuming that the paintball mark starts at its lowest point, determine the equation of the sinusoidal function that describes the height of the mark in terms of the distance the wheel travels.

b) If the wheel completes five revolutions before it stops, determine the domain and range of the sinusoidal function.

c) What is the height of the mark when the wheel has travelled 120 cm from its initial position?



$a = 30$

$c = 40$

$C = 2\pi r$
$= 2\pi(40)$
$\doteq 251.32$

$y = -30\cos\left(\frac{9x}{2\pi}\right) + 40$

$h(d) = -30\cos(1.43d) + 40$

period $= \frac{360}{80\pi}$
$= \frac{9}{2\pi}$
$\doteq 1.432$

6.R Unit Review

Date: _____

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 398-401 #1 – 4, 6, 7, 9 [13]

Today's Homework Practice includes:

pp. 404-405 #1 – 3, 6, 8 – 10, 12, 13