

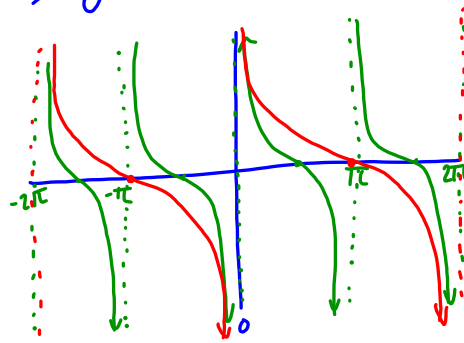
Homework Questions?

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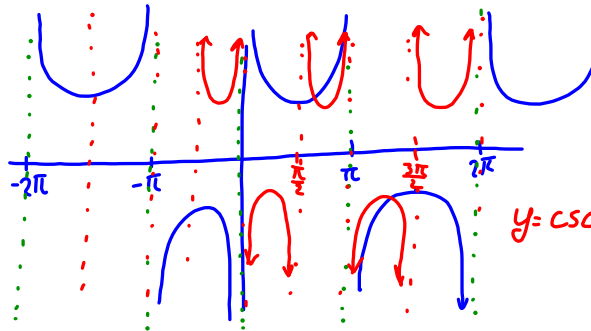
a) $y = \cot\left(\frac{x}{2}\right)$

$\cot(x)$
period: π

$\cot\left(\frac{1}{2}x\right)$
period: 2π



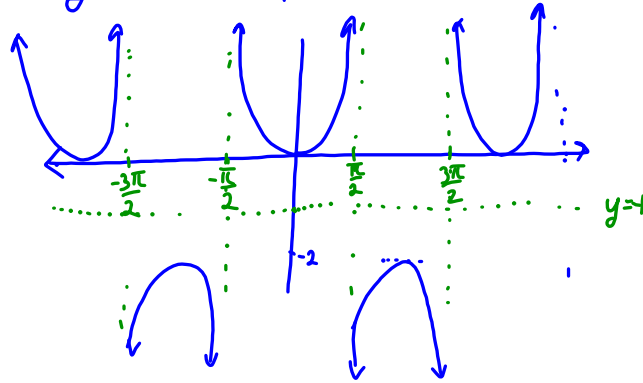
b)



$y = \csc\left(2\left(x + \frac{\pi}{2}\right)\right)$

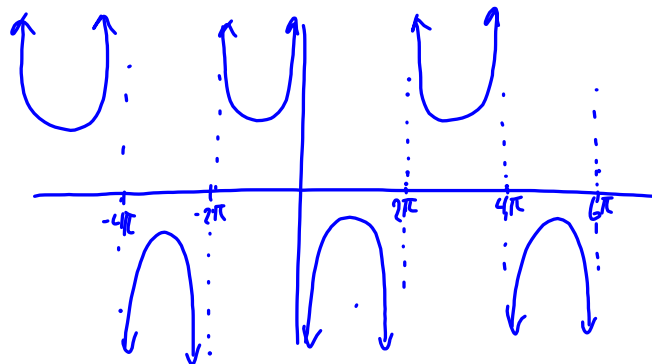
c)

$y = \sec x - 1$



d)

$y = \csc\left(\frac{1}{2}x + \pi\right)$
 $= \csc\left(\frac{1}{2}(x + 2\pi)\right)$

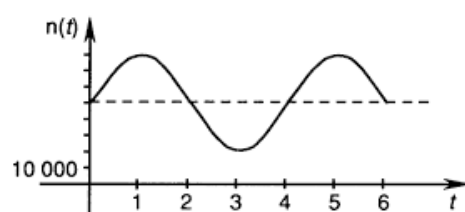


Lesson 6.06 - Modelling with Trigonometric Functions



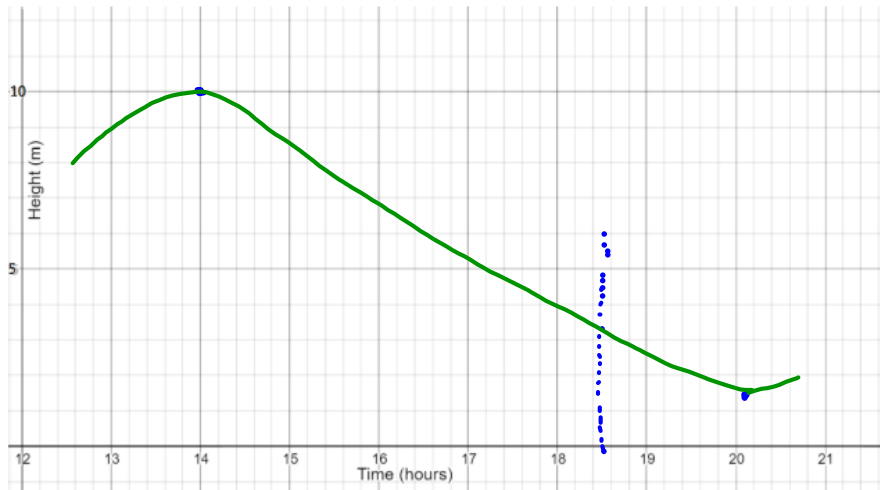
Learning Goals:

- I can model real life events using trig functions
- I can solve word problems using these models



Example 1 (from textbook):

The tides at Cape Capstan, New Brunswick, change the depth of the water in the harbour. On one day in October, the tides have a high point of approximately 10 m at 2 p.m. and a low point of approximately 1.2 m at 8:15 p.m. A particular sailboat has a draft of 2 m. This means it can only move in water that is at least 2 m deep. The captain of the sailboat plans to exit the harbour at 6:30 p.m. Can the captain safely leave the harbour at this time?



Time (h)	height (m)
14	10
20.25	1.2

$$y = a \cos(k(t - c)) + d$$

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

$$= \frac{10 - 1.2}{2}$$

$$= \frac{8.8}{2}$$

$$= 4.4$$

$$d = \frac{\text{max} + \text{min}}{2}$$

$$= \frac{10 + 1.2}{2}$$

$$= \frac{11.2}{2}$$

$$= 5.6$$

$$c = 14$$

$$k = \frac{2\pi}{\text{period}}$$

$$= \frac{2\pi}{\frac{25}{2}}$$

$$= \frac{4\pi}{25}$$

\therefore

$$y = 4.4 \cos\left(\frac{4\pi}{25}(t - 14)\right) + 5.6$$

$$y = 4.4 \cos\left(\frac{4\pi}{25}(18.5 - 14)\right) + 5.6$$

$$= 2.8 \text{ m}$$

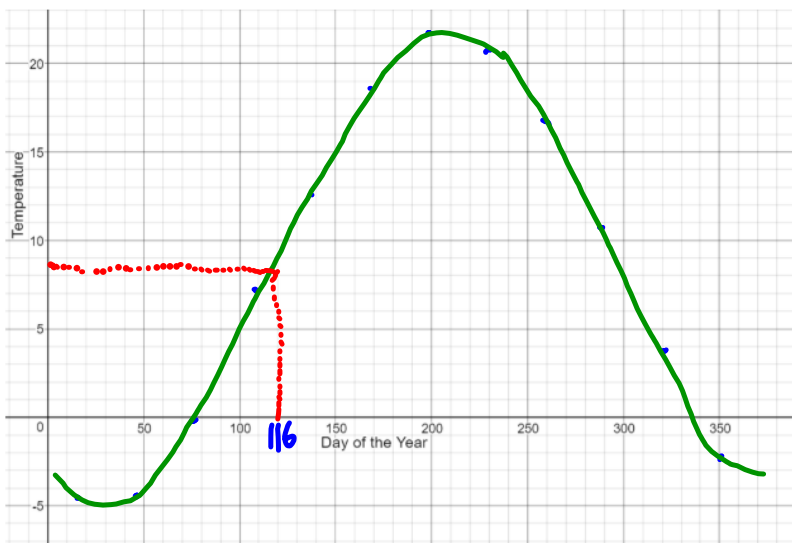
\therefore the captain is safe to leave at 6:30 p.m.

Example 2 (from textbook):

The following table shows the average monthly means of the daily (24 h) temperatures in Hamilton, Ontario. Each month's average temperature is represented by the day in the middle of the month.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day of the Year	15	45	75	106	136	167	197	228	259	289	320	350
oC	-4.8	-4.8	-0.2	6.6	12.7	18.6	21.9	20.7	16.4	10.5	3.6	-2.3

- a) Plot the temperature data for Hamilton, and fit a sinusoidal curve to the points.
- b) Estimate the average daily temperature in Hamilton on the 200th day of the year.



$$a = \frac{21.9 - (-4.8)}{2}$$

$$= 13.35$$

$$d = \frac{21.9 + (-4.8)}{2}$$

$$= 8.55$$

$$c = 116$$

$$k = \frac{2\pi}{365}$$

$$\therefore y = 13.35 \sin\left(\frac{2\pi}{365}(t - 116)\right) + 8.55$$

$$b) \quad y = 13.55 \sin\left(\frac{2\pi}{365}(200 - 116)\right) + 8.55$$

$$= 22^\circ$$

Homework:

pg. 360-362 #1, 3, 5, 7, 8, 10*, 11* , 13

*Answers in the text are incorrect.

10a) $n(t) = 3.7\cos\left(\frac{2\pi}{365}(t-172)\right) + 12$
change the instruction” from
nth” day to “t-th day”

10b) 9.2 hours. Also, for #

11) remember Example 2?

Also, the “d” value is not 116;
it is approx. 102

How I see math word problems:

**If you have 4 pencils and I
have 7 apples, how many
pancakes will fit on the roof?
Purple, because aliens don't
wear hats.**