Name: Key

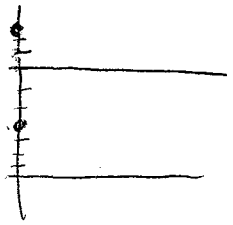
Date: 2/12/18

CC ALGEBRA 2

TROICI

LESSON #7: WRITING A TRIGONOMETRIC MODEL (DAY 2)

Do Now:



Which statement is *incorrect* for the graph of the function $y = -3\cos\left[\frac{\pi}{3}(x-4)\right] + 7$?

b

$\frac{2\pi}{\frac{\pi}{3}} = 2\pi \cdot \frac{3}{\pi} = 6$ ✓

1) The period is 6. ✓
2) The amplitude is 3. ✓
3) The range is [4,10]. ✓
4) The midline is $y = -4$.

$y = 7$!

$-3+3 = 10$

$7-3 = +4$

1. The tide at a boat dock can be modeled by the equation $y = -2\cos\left(\frac{\pi}{6}t\right) + 8$, where t is the number of hours past noon and y is the height of the tide, in feet.

   a. For how many hours between $t = 0$ and $t = 12$ is the tide at least 7 feet?

   $10.5 - 2.5 = 8$ hours

   b. How many hours does it take for the tide to reach its maximum height?

   6.5 hours

   c. What is the maximum height of the tide in feet?

   10 feet

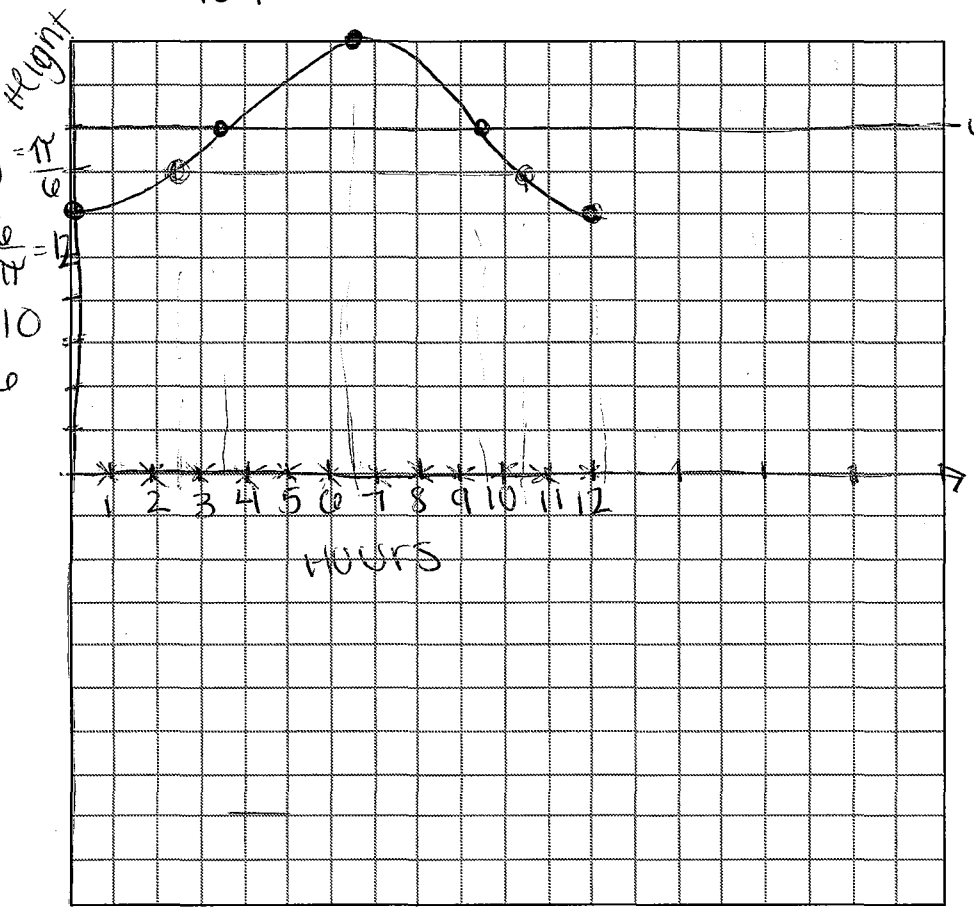
amp = 2

frequency = $\frac{\pi}{6}$

period = $2\pi \cdot \frac{6}{\pi} = 12$

max = 8 + 2 = 10

min = 8 − 2 = 6



WINDOW

Xmin	0
Xmax	12
Xscl	1
Ymin	6
Ymax	10
Yscl	1

2. The average annual snowfall in a certain region is modeled by the function $S(t) = 10\cos\left(\frac{\pi}{5}t\right) + 20$, where S represents the annual snowfall, in inches, and t represents the number of years since 1970.

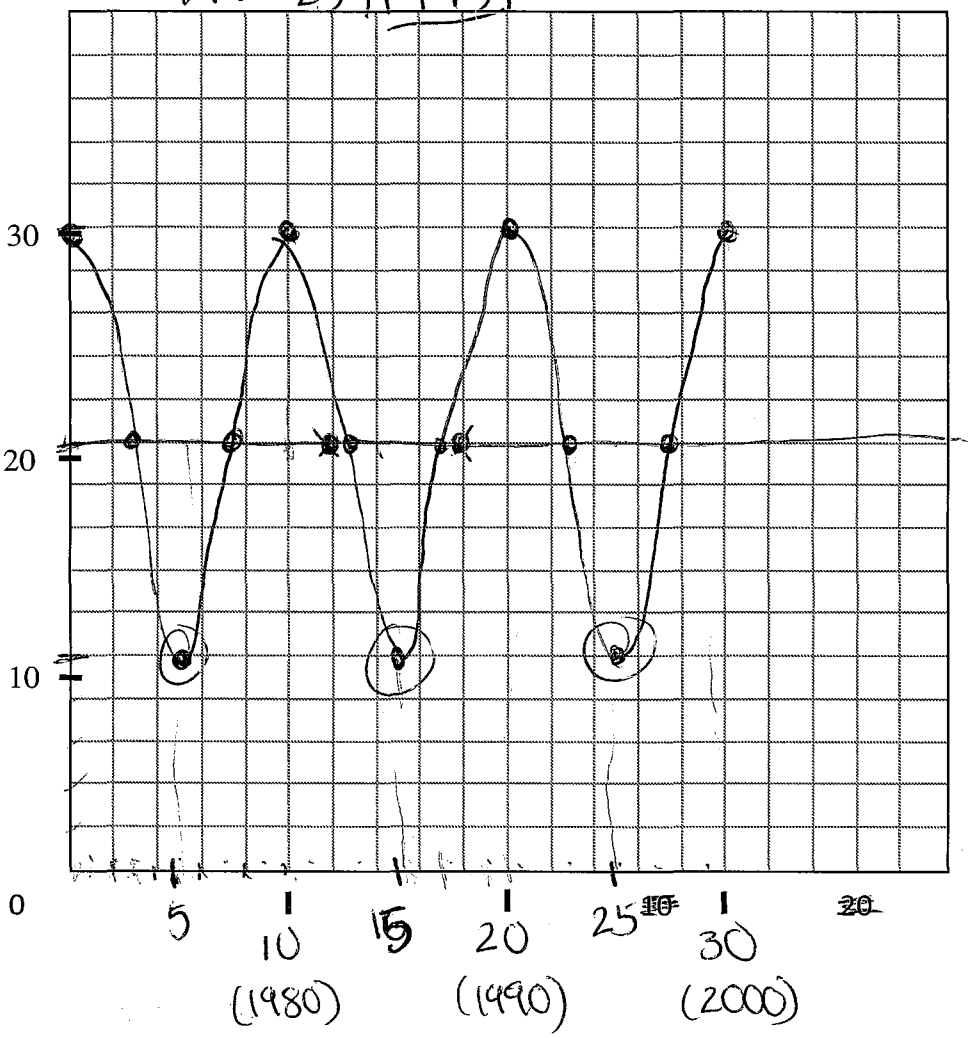
   a. What is the minimum annual snowfall, in inches, for this region? $20 - 10 = \boxed{10}$

   b. Find the period of the function.

   $\frac{2\pi}{\frac{\pi}{5}} = 2\pi \cdot \frac{5}{\pi} = \boxed{10}$ curve by 10

   c. In which years (there is more than one) between 1970 and 2000 did the minimum amount of snow fall?

$1970+5=\boxed{1975}$
$1970+15=\boxed{1985}$
$1970+25=\boxed{1995}$



WINDOW

Xmin	0
Xmax	30
Xscl	~~10~~ 2
Ymin	10
Ymax	30
Yscl	2

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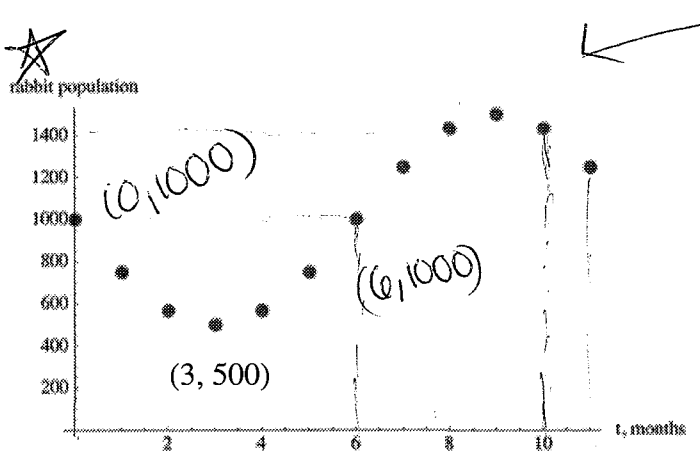
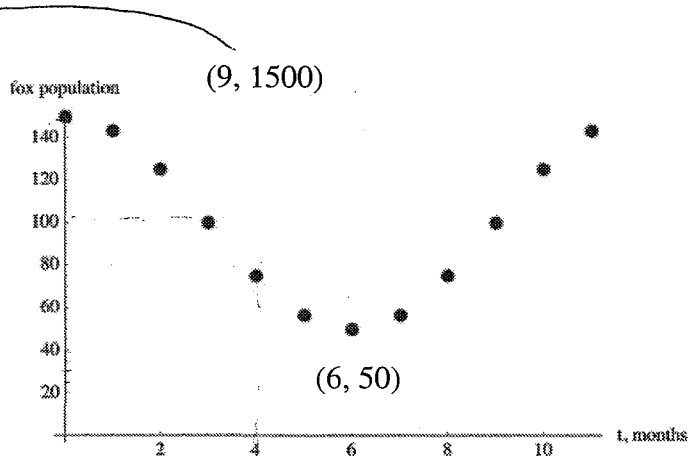
LAB #4

1. Given below are two graphs that show the populations of foxes and rabbits in a national park over a 12 month period. The maximum and minimum points are given.





a. Examine both graphs, why it is appropriate to model the number of rabbits and foxes using a trigonometric function.

The population follows a cyclic pattern

b. Find an appropriate trigonometric function (equation) that models the number of rabbits, r(t), as a function of time, with t in months.

$y = 500 \sin(.52x + 3.14) + 1000$

c. Find an appropriate trigonometric function (equation) that models the number of foxes, f(t), as a function of time, with t in months.

2. Stephanie had observed that the number of squirrels she sees varies sinusoidally over the course of a year. She found that the equation $S(t) = -30\cos\left(\frac{\pi}{6}t\right) + 50$ provided a good model for the average number of squirrels, $S(t)$, Stephanie sees per month where t represents the number of months since December 1.

a. What is the period of the function? Justify your answer.

$2\pi \cdot \frac{6}{\pi} = 12$

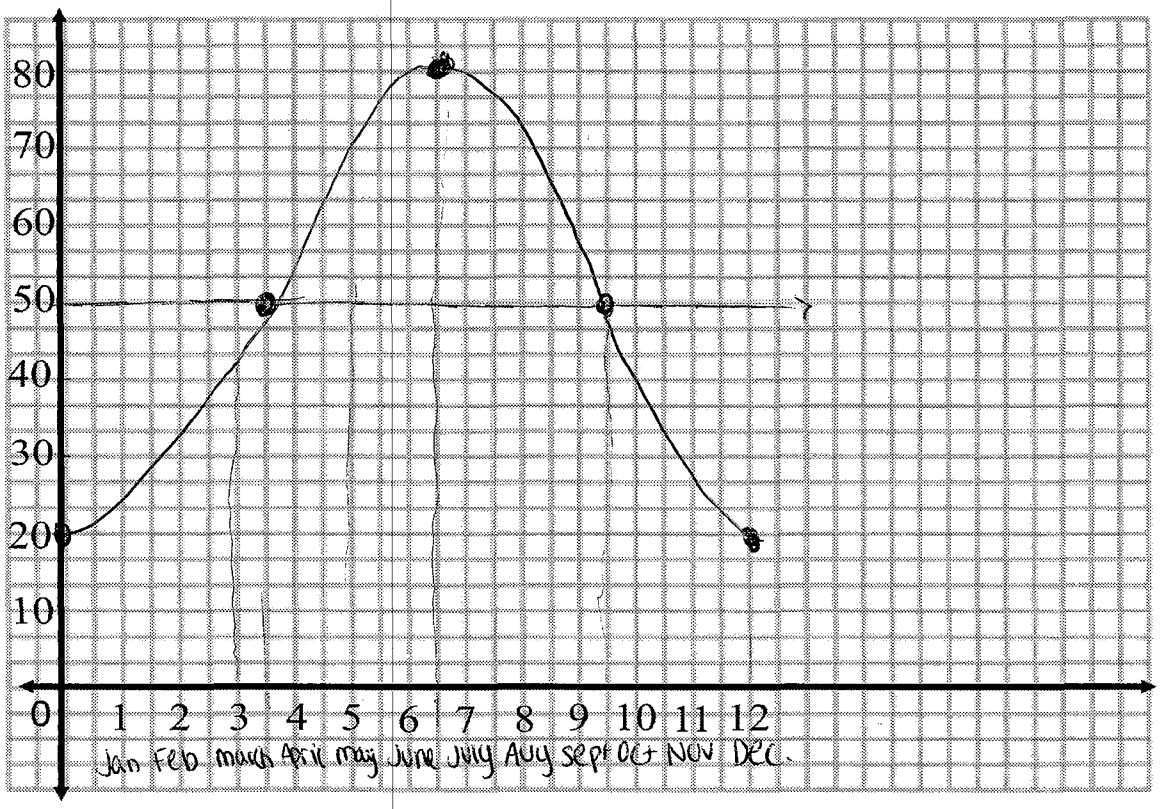
b. Graph this function. Use your calculator to help you!

c. When did Stephanie see the most squirrels?

Between June + July

d. How many squirrels did she see then?

80



WINDOW

Xmin	0
Xmax	12
Xscl	1
Ymin	0
Ymax	80
Yscl	10

e. What is the average number of squirrel that Stephanie saw on March 1? On May1?

≈ 43 ≈ 70