§6.3A: Logistic Growth
"I WILL …
…apply application to define logistic growth problems."

I. Logistic Growth

A. Logistics Differential Equation: ________________ or ________________

B. Logical Growth Model: ________________________________

1. L = Carrying Capacity (Upper Horizontal Limit)
2. K = Proportionality Constant
3. B = Beginning Amount, use the equation: _____________ where P_0 is the initial population

C. Point of Inflection: ______________

Ex 1: Given $\frac{dP}{dt} = P\left(2 - \frac{P}{5000}\right)$ identify the k and L of the equation.	Your Turn: Given $\frac{dP}{dt} = 0.01P(100 - P)$ identify the k and L of the equation.
Ex 2: Using the equation, $y = \frac{4}{1+2e^{-3t}}$ identify the point of inflection and sketch a graph.	Your Turn: Using the equation, $y = \frac{8}{1+2e^{-2t}}$ identify the point of inflection and sketch a graph.

Ex 3: A state game commission releases 40 elk into a game refuge. After 5 years, the elk population is 104. The commission believes that the environment can support no more than 4000 elk. The growth rate of the elk population, p, is: $\frac{dP}{dT} = kP\left(1 - \frac{P}{4000}\right)$, $40 \leq p \leq 4000$ where t is the number of years.

(a) Write a model for the elk population in terms of t.

(b) Estimate the elk population in 15 years.

(c) Find the limit of the model as $t \to \infty$.

Ex 4: Suppose the population of bears in a national park grows according to the logistic differential equation, $\frac{dP}{dT} = 5P - 0.002P^2$, where P is the number of bears at time t in years. Find the limit of the model as $t \to \infty$ where $P(0) = 100$.

Your Turn: Ten grizzly bears were introduced to a national park 10 years ago. There are 23 bears in the park at the present time. The park can support a maximum of 100 bears. Assuming a logistic growth model, when will the bear population reach 50? 75? 100?

Ex 5: In a particular town of 100,000 residents, 20,000 watched about a viral video on the Internet. The rate of growth of the spread of information was jointly proportional to the amount of people who had not watched it. If 50% watched it after one hour, how long does 80% of the population watched the viral video?

Assignment: Worksheet