**Name(s) _____ Date _____**

## Using Technology to Graphically Analyze the Predator-Prey Relationship

The goal of this activity is to use *Microsoft Excel* to manipulate & analyze a working model of the predator-prey relationship, using the Lotka-Volterra Equations:

**Lotka-Volterra Equations [using rabbits (as prey) and foxes (as predators)]:**

- ***The change in Prey Population over Time = r*H - a*P*H***
- ***The change in Predator Population over Time = b*P*H - m*P***

  - *r* is the natural growth rate of rabbits in the absence of predation,
  - *m* is the natural death rate of foxes in the absence of food (rabbits),
  - *a* is the death rate per encounter of rabbits due to predation,
  - *b* is the reproduction rate of predators per 1 prey eaten
  - *H* is the population size of the prey (herbivores) at any given time
  - *P* is the population size of the predators at any given time

Directions:

- *First, complete the Prediction Section below.*
- *Then open the supplied "Lotka-Volterra Model" Spreadsheet using MS Excel.*
- *Finally, use the "Scroll Bars" found above the Predator and Prey Population columns to manipulate their respective values. Then complete the questions on Side 2.*

**Prediction Section**

1. Hypothesize what will happen to the predator population (increase or decrease) if you increase the prey population? Explain.

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2. Hypothesize what will happen to the prey population (increase or decrease) if you increase the predator population? Explain.

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**Analysis Section**

*Use the Scroll Bars to manipulate the spreadsheet model (as indicated) and answer the following questions.*

1. What happened to the predator population (increased or decreased) when you increased the prey population? Provide <u>two specific examples</u> of predator & prey values to support your answer. Be sure to compare areas that are within the same range of the x-axis. (Note: Ignore the initial values for predator & prey, as they are not manipulated by the equation.)

2. What happened to the prey population (increased or decreased) when you increased the predator population? Provide <u>two specific examples</u> of predator & prey values to support your answer. Be sure to compare areas that are within the same range of the x-axis. (Note: Ignore the initial values for predator & prey, as they are not manipulated by the equation.)

3. *Reset the Prey and Predator initial population fields to the original values (of 85 and 15, respectively).* Leaving the prey population constant, is it possible for you to manipulate the predator population in order to exceed the prey population throughout the entirety of the graph? Explain why such a phenomenon would be difficult to achieve (base upon your understanding of ecology).