Name:

**Mystery of the Missing Housefly worksheet**

Open the Math Bench module and work your way through pages 1 to 5. Starting at page 6 record your answers to the questions below:

**Part I: Exponential Growth**

1. Write an equation for the process.
2. What are the initial conditions (N0, r)?
3. Iterate the equation for 14 months – use excel (see the *Exponential Growth* worksheet). What is your final population size?
4. Graph the population dynamics with a numeric y-axis– use excel. Roughly sketch the figure below.



1. Now graph the population dynamics on a semi-log graph. Roughly sketch the figure below.



**Part II: Examining Assumption 1: All offspring survive long enough to reproduce**

1. Using the model equation: Nt = 120Nt-1, add in 99% mortality. Record your equation below.
2. Iterate the equation for 14 months – use excel (see the *Exponential Growth* worksheet). What is your final population size?
3. Use excel and graph the population dynamics (see the *Exponential Growth* worksheet). Examine the figure with both a numeric and logarithmic scale on the y-axis. Compare your graphs to those produced in part 1. How do your figures compare?

**Part III: Examining Assumption 2: All flies have the same number of offspring**

1. Using the the “**Logistic Growth Discrete”** worksheet, enter the values for r, K and N0 for the houseflies in the appropriate cells. We will use the initial conditions that you recorded in Part I question 2 above (N0=3, r=2), and set K to 100. Roughly sketch your plot below.



1. Now plot the growth of the fly population versus time on a semi-log plot. Roughly sketch the plot below.



1. Explain why the shape of the semi-log plot differs for the exponential and logistic models.

**Part IV: Examing Logistic Growth and Discrete versus Continuous models.**

1. Enter the initial conditions provided on the mathbench module for the elephant, mice and gypsy moth populations into the appropriate cells in the Logistic Growth **Discrete** worksheet. Describe the kind of population growth that you observe for each species.
2. Now enter the initial conditions for the elephant, mice and gypsy moth populations into the cells in the “Logistic Growth **Continuous”** worksheet. Describe the kind of population growth that you observe for each species.

1. How does the ∆N change over time? When is ∆N at its maximum?

1. How do the figures from the Logistic Growth Continuous worksheet differ from those produced when plotting using the Discrete formula? Why might this be?

**Part V: How does disturbance affect a population?**

1. Using the MathBench applet Disturbance=death, try to eliminate the fly population. Were you able to eliminate the fly population without setting r=0? Why or why not?