Name _____ Period_____Date_____

ADDITIONAL INVESTIGATION

Predator-Prey Interactions

Predation is a density-dependent limiting factor—it is affected by the number of individuals in a given area. For example, the population of a predator can be limited by the amount of prey available. The opposite is true as well. The population of a prey species can be affected by changes in its predator population. If the predator population declines, the population of the prey may increase as a result of less pressure from predators.

Scientists have been studying predator-prey interactions for many years, collecting data about both the predator and prey populations over time. In some cases, a cyclical pattern of rising and falling population numbers emerges between a predator and its prey population.

Scientists have found that this pattern exists in as many as 30 percent of predator-prey populations studied. In some cases, the cycle may occur over a long period, such as ten years. In other cases, one cycle of both populations rising and falling may take only months.

In this lab, you will graph and analyze population data for a predator and its prey that was collected previously under laboratory conditions. You will also graph and analyze data collected for a prey population in which the predator was removed.

PROBLEM

How do predator-prey interactions affect population numbers of both the predator and the prey?

SCENARIO

Two species of mites, one which preys on the other, were housed together in a laboratory experiment, along with a realistic amount of food for the prey. The numbers of both populations were monitored. Table 1 contains population data for *Eotertranychus sexmaculatus,* the species of mite that is prey for *Typhlodromus occidentalis.*

MATERIALS

- pencil
- ruler

PROCESS SKILLS

- Graphing Data
- Predicting
- Analyzing Data

PROCEDURE

1. Use the data in Table 1 to construct a line graph with two *y*-axes that shows the changes in the *Eotertranychus* population. Be sure to correctly label both the *x*-axis and each *y*-axis. Label *x*-axis as "Day" and *y*-axis at left as "Prey"; the *y*-axis at right as "Predator." Since you will have to graph large numbers, try using unit intervals of 200 for the Prey and Predator axes and unit intervals of 20 for the Days axis.

TABLE 1. POPULATION DATA FOR EOTERTRANYCHUS

Day	Number of Eotertranychus
5	100
10	200
15	600
20	1100
25	1400
30	800
35	600
40	280
45	200
50	200
55	220
60	225
65	250
70	300
75	410
80	500
85	875
90	1590
95	1800
100	1900
105	2100
110	1750
115	1350

120	850
125	500
130	500
135	600
140	750
145	700
150	800
155	1200
160	1800
165	1900
170	1770
175	1700
180	1800
185	1675
190	1320
195	610
200	200
205	50
210	0

2. Use a pencil to draw a line on the graph that shows your prediction of how you think the population of *Typhlodromus* changed based on how their prey population changed.
3. Table 2 contains the real population data for *Typhlodromus.* Use the data to graph the changes in the predator population on the same graph you made in Step 1. Note that the scale for the predator differs from the scale for the prey.

TABLE 2. POPULATION DATA FOR TYPHLODROMUS

Day	Number of Typhlodromus
10	2
15	4
20	12
25	28
30	38

35	29
40	18
45	15
50	9
55	8
60	7
65	3
70	2
75	2
80	4
85	6
90	6
95	17
100	19
105	21
110	29
115	25
120	36
125	22
130	6
135	5
140	12
145	5
150	1
155	1
160	1
165	1
170	2
175	3
180	8
185	19

190	30
195	47
200	31
205	9
210	0

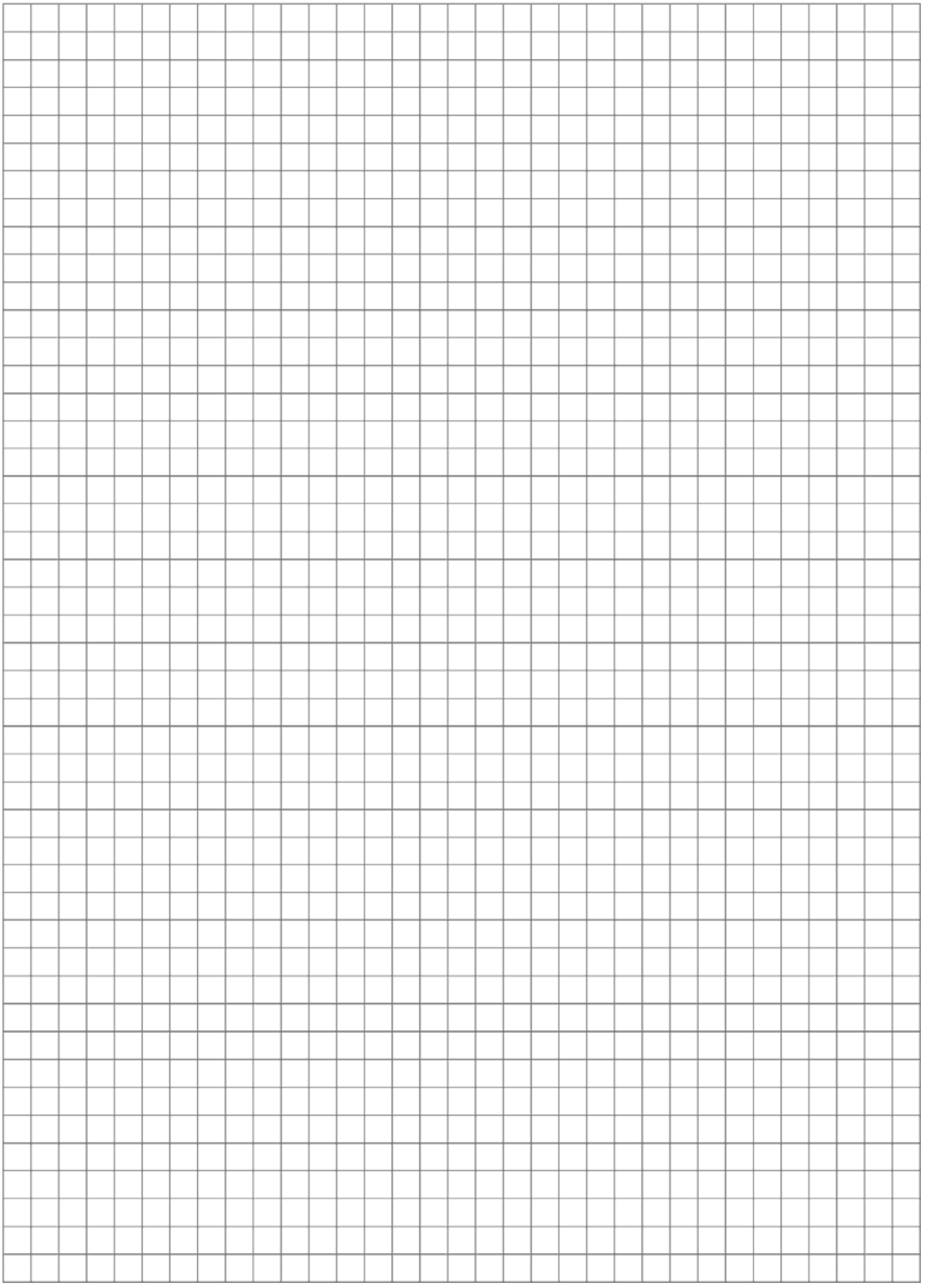
4. Table 3 contains data about a population of Kaibab mule deer in Arizona in which all predators were removed. Use the data in Table 3 to construct a new graph that shows the changes in the population.

TABLE 3. POPULATION DATA FOR KAIBAB MULE DEER

Year	Number of Mule Deer
1900	2900
1905	8000
1910	20,000
1915	42,500
1920	79,000
1923	100,000
1930	10,000
1935	6200
1940	5000

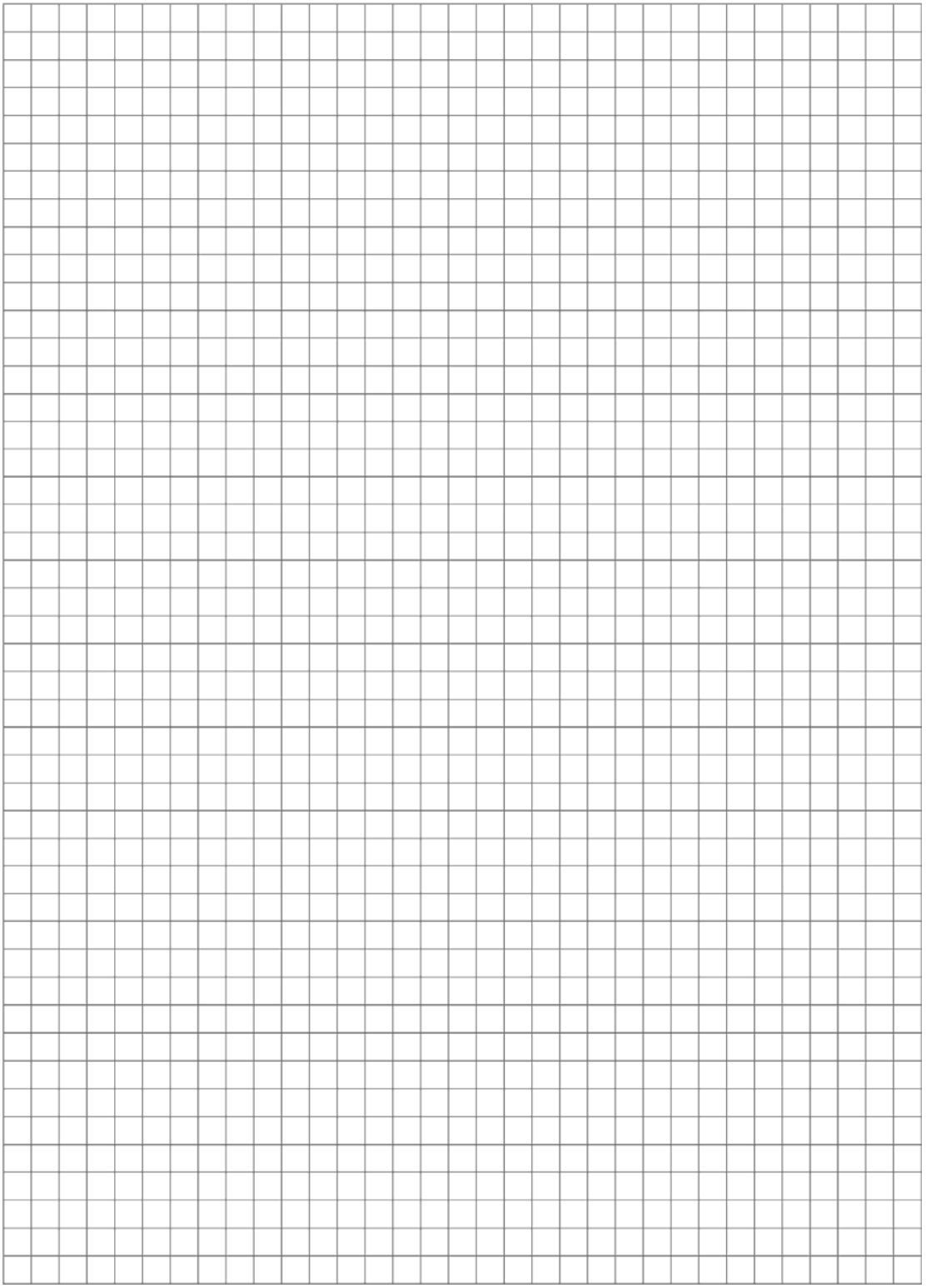
Name _____ Period_____Date_____

Predator-Prey Interactions *continued*



Name _____ Period_____Date_____

Predator-Prey Interactions *continued*



ANALYZE AND CONCLUDE

1. **Compare** How did your prediction of the population changes in Typhlodromus compare to the actual data?

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2. **Describe** How did the population of *Typhlodromus* change in relation to the population of *Eotertranychus?* Approximately how long is one cycle of rising, falling, and rising again (a) in population number and (b) in this predator-prey interaction?

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3. **Predict** How would the following changes would affect the population numbers in the *Typhlodromus-Eotertranychus* system:

   (a) the addition of another predator species that also preys on *Eotertranychus*

   (b) the addition of another species that *Typhlodromus* will also eat

   (c) cutting the *Eotertranychus* food source in half

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4. **Evaluate** What type of growth does the graph for the Kaibab deer show? Why did the population crash?

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