

Name _____ Date _____ Period _____

THE FOX AND RABBIT GAME

PURPOSE:

In this game, you will investigate the relationship between a predator and its prey over the course of many generations. You should be able to observe patterns and draw conclusions regarding the pattern of predator and prey population size.

HYPOTHESIS:

If I observe a predator-prey relationship over 35 generations, then the relationship between the predator and prey will be _____.

WORD BANK FOR HYPOTHESES: direct / inverse

RULES OF THE GAME:

You will start the first round with 3 rabbits and 1 fox. The surviving rabbits each produce 1 offspring for the start of the next round. The fox will survive if it captures (lands on) at least one rabbit, but it will only reproduce if it lands on 3 or more rabbits during one drop in one round. If the fox does not land on any rabbits during a round, it dies. A new fox will then immigrate into the meadow. This ensures that there will always be at least 1 fox to start each round. If all of the rabbits are captured during a round, 3 new rabbits will immigrate into the meadow to start the next round. Each round represents one year or generation.

MATERIALS:

- 3" x 3" squares of construction paper (to represent foxes)
- beaker of beans (to represent rabbits)
- painter's tape or masking tape (to mark off the meadow)
- ruler



PROCEDURE:

1. Use the painter's tape or masking tape to outline a 30 x 30 cm square on the lab table. This area will represent the meadow.
2. Randomly distribute 3 rabbits (beans) in the meadow.
3. Take the fox (square of construction paper) and drop it from a height of 20 cm above the rabbits in an effort to catch a rabbit. NOTE: At this point in the activity, there is no way that the fox can catch the 3 rabbits that it needs to survive and reproduce because the rabbits have been distributed throughout the field.

4. Complete Data Table #1 for generation 1. The fox will starve if it did not land on a rabbit. In that case, there would be no surviving fox. Since the fox needs to eat 3 rabbits to produce an offspring, there definitely would be no new baby fox.
5. At the beginning of generation 2, double the rabbits left at the end of generation 1. Be sure to disperse them evenly throughout the meadow. If the original fox died, a new fox will immigrate into the meadow to take its place.
6. Eventually, the rabbit population increases to a level that allows the fox to catch 3 rabbits in a single toss. If the fox catches 3 rabbits, it not only survives but it reproduces too! It has one baby fox for every 3 rabbits that it catches. Therefore, if it catches 6 rabbits it will have 2 babies. *Foxes are not allowed to cheat, but they should try to be efficient. Stupid foxes result in an overabundance of rabbits.*
7. Continue modeling the population of the rabbits and foxes according to the rules listed above. Remember that there are always at least 3 rabbits at the beginning of a generation. If and when the entire rabbit population is wiped out, three new rabbits will immigrate into the meadow. Make sure to fill in Data Table #1 for each generation.
8. Model 35 generations of the fox and rabbit populations.

RESULTS:

Data Table #1: Predator-Prey Simulation Data

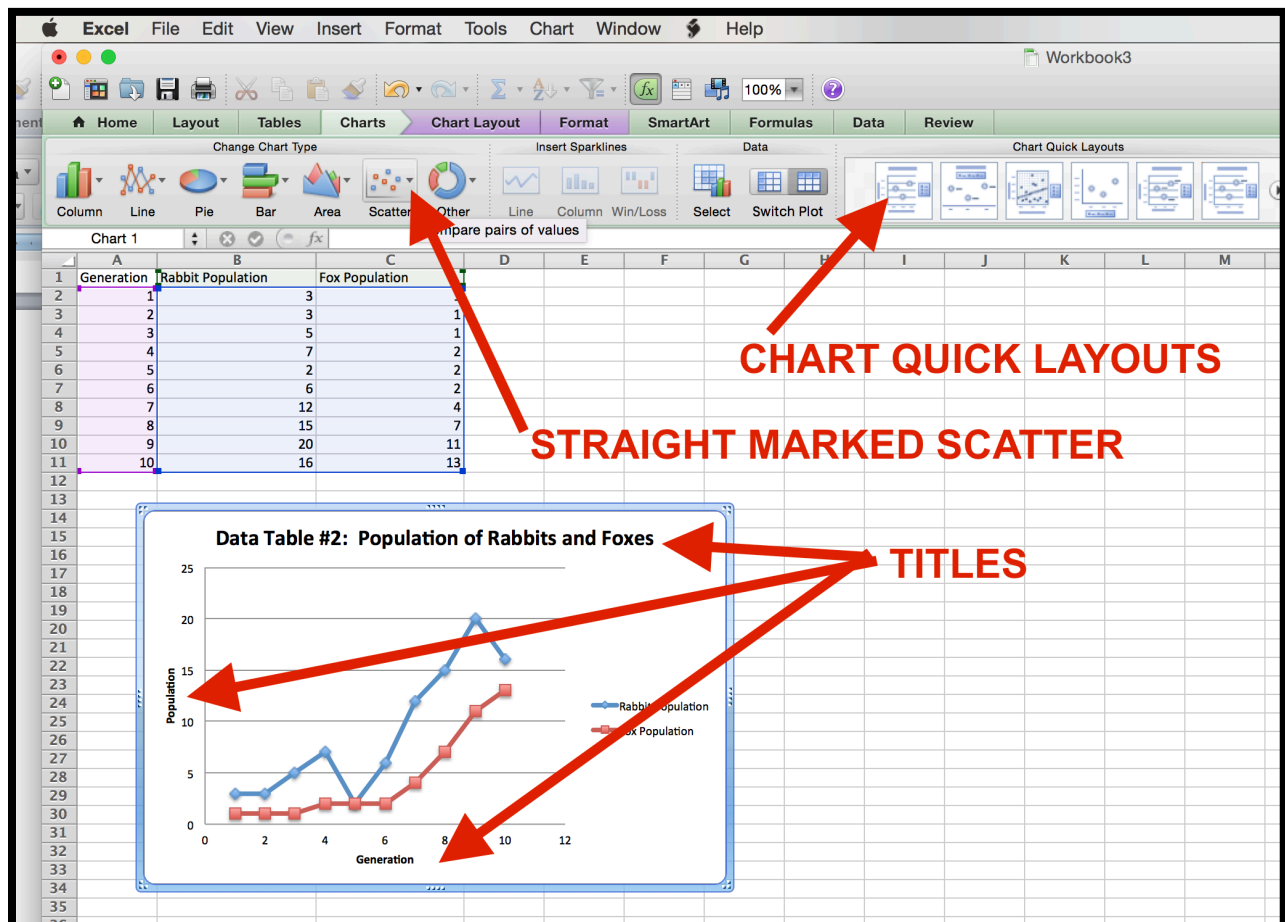
GENERATION	RABBIT Population	FOX Population	Rabbits Caught	Foxes Starved	Foxes Surviving	New Baby Foxes	Rabbits Left
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

GENERATION	RABBIT Population	FOX Population	Rabbits Caught	Foxes Starved	Foxes Surviving	New Baby Foxes	Rabbits Left
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
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34							
35							

Data Table #2: Predator-Prey Simulation Graph

Follow these directions to make the Predator-Prey Simulation Graph:

1. Graph the data using Microsoft Excel. Do not use Google Sheets. Create 3 columns: Generation, Rabbit Population, and Fox Population.
2. After you have entered the data, select all the boxes of your data including the titles and click "Charts" on the ribbon at the top of the window. Then click on the little arrow next to "Scatter". Select "Straight Marked Scatter".
3. Click on the graph that appears. On the ribbon, select the first item under "Chart Quick Layouts". Now you can click on the graph title, X-axis label, and Y-axis label to enter the appropriate information.
4. CONTROL-CLICK on the graph and select "Save as picture". If you are not using your own computer, be sure to email it to yourself or save it to your Google Drive.
5. Use the sample graph below as reference, but be aware that the sample graph only shows 10 generations. Your graph must show all 35 generations. Your version of Microsoft Excel might also look a little bit different from this screenshot.



DISCUSSION:

1. Summarize the pattern you observed between the predator population and the prey population using CLAIM → EVIDENCE → REASONING.
2. Which animal (the predator or the prey) typically has a greater population size? Cite EVIDENCE to support your CLAIM. Provide REASONING to explain why this is usually true.

POST-LAB QUESTIONS:

1. Which phase(s) of the population growth curve is/are evident in this lab? Cite evidence to support your answer.
2. What are some types of limiting factors that can slow down population growth?
3. Is the relationship between the predator and the prey cyclical? In other words, does the relationship follow a cycle? Cite EVIDENCE to support your CLAIM.

QUESTIONS TO HELP YOU WITH YOUR LAB REPORT:

1. Identify the 1 independent variable and the 2 dependent variables for this lab.
2. Was your hypothesis correct? Explain using CLAIM → EVIDENCE → REASONING.
3. Identify 1 or 2 sources of error for this lab. Explain your answer(s).
4. Identify 1 or 2 ways to improve this lab. Explain your answer(s).
5. What conclusion(s) can you draw regarding the relationship between a predator and its prey?

#bioislife

GOOD LUCK ON YOUR FINAL LAB REPORT OF THE YEAR!!!