

Name: _____ Date: _____ Period: _____

Fox and Rabbit Lab: Limits to Population Growth

Objective: This activity will illustrate how a population is dependent on limiting factors. A *limiting factor* is factor that causes the growth of a population to decrease. In this lab we will be simulating a meadow in which there is a population of rabbits and a population of foxes. The rabbits feed on the grass while the foxes prey on the rabbits. The meadow can only support a maximum of 100 rabbits. This is due to the carrying capacity of the meadow. *Carrying capacity* is the number of individuals who can be supported in a given area within the natural resources limits.

Materials: Fox and Rabbit cards, table top (the meadow), data table and graph.

Instructions: READ ALL INSTRUCTIONS BEFORE YOU BEGIN!!

1. STEP 1:

- a. Create a meadow. Tape off a 61 cm square section on your table top.
- b. Start with 3 rabbits in the first generation. Place them in the meadow.
- c. Start with 1 fox in the first generation.
- d. Standing 2 feet from the desk, toss the fox into the meadow.
- e. If the fox touches the rabbit they are considered "captured" and must be removed from the meadow.
- f. For a fox to survive it must capture 3 rabbits, if not, it dies of starvation and must be removed from the meadow.

2. STEP 2:

- a. Repeat Step 1 going through a maximum of 15 generations.

3. STEP 3:

- a. Create a line graph using the graph paper provided.
- b. Make sure to label according to the directions.

4. Additional Rules:

- a. For every 3 rabbits that the foxes capture, the fox reproduces 1 pup. This pup is added to the next generation.
- b. Each fox must be tossed one at a time into the meadow.
- c. A rabbit cannot be shared by 2 foxes.
- d. Each time there are no foxes left for the next generation, 1 new fox immigrates into the meadow.
- e. To calculate the next generation of foxes: (number of old foxes + pups = new generation). If no foxes left see letter d above.
- f. To calculate the next generation of rabbits: (multiple remaining rabbits by 2). The meadow can only support a MAX of 100 rabbits, any beyond that will starve.
- g. If all the rabbits are captured then 3 new ones will immigrate into the meadow.

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RABBITS

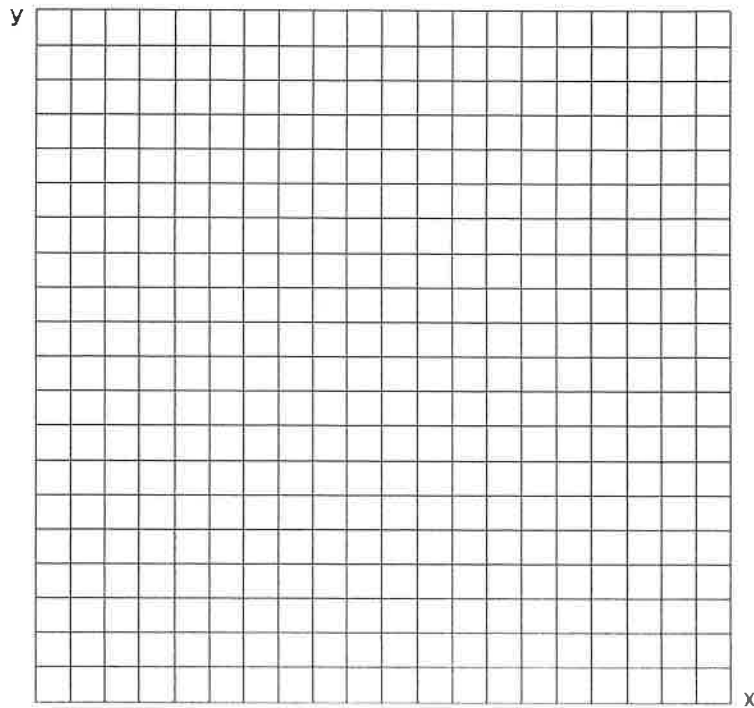
A	B	C	D	E	F	G
Generation	Start (must be < than 100)	Captured	Remaining (B-C)	Total for next generation (D x 2)	Starved = # > than 100	Next generation (E-F)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

FOXES

H	I	J	K	L
Start	Starved (If eat <2 rabbits)	Alive (H-I)	New Pups Born	Next Generation or Immigration (old + new pups)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Graph your results- use the number at the **START** of each generation for box **FOXES** and **RABBITS**. USE A **LINE GRAPH**.

- Label the y-axis: number of animals
- Label the x-axis: generations
- Use one color line for rabbits and one color for foxes and include a key
- Put a TITLE on your graph



DATA ANALYSIS:

1. In this activity, which animal is the predator?
2. Which animal is the prey?
3. Which animal population increased first?
4. What is the definition of a limiting factor?
5. What was the limiting factor for the fox in this simulation?
6. What was the limiting factor for the rabbit?
7. As the rabbit population increased, what happened to the fox population?
8. Define carrying capacity.
9. What is the carrying capacity for rabbits in the meadow?

CONCLUSION:

Write a **summative paragraph** that explains what you would predict for each of the following scenarios. For each one, you must also explain your reasoning.

- What if – once the fox population crashed to 0, foxes are locally extinct and no immigrants will recolonize the area?
- What if – once the rabbit population crashes to 0, rabbits are locally extinct and no immigrants will recolonize the area?
- What if – surviving rabbits each produce 2 offspring, instead of just 1 (and foxes remain the same as original)?
- What if – surviving foxes each produce 2 offspring, instead of just 1 (and rabbits remain the same as original)?