Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Limiting Factors Mini-Lab

Certain factors within an environment can affect the population sizes of a species in that environment. In this mini-lab, you will model one such limiting factor and observe its effect on a population.

**General Question:** How do limiting factors affect populations?

**Testable Question:** What is the effect of a limiting factor on a population’s ability to survive?

**Independent Variable:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Dependent Variable:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Hypothesis:** IF: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

THEN: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Constants** (for all lab groups): “environment size, task to complete, time units used, supplies

**Procedure:** 1. Mr. Littleton will divide you into your new lab groups. When you have been divided, he will assign you an area for your “environment”.

**2. Using a meter-stick and masking tape, mark out the boundaries of a 1-meter square on the floor. Place 1 piece of paper into the middle of this “environment”.**

3. For the first trial, have only two lab group members stand within the boundaries of the “environment”.

**4. While one lab group member standing outside of the “environment” keeps time with a stop watch, all other members of the lab group will write the alphabet, one letter at a time, on the sheet of paper. (One person writes the letter “a”, and then another person writes the letter “b” and so on through to “z”.)**

5. Figure out the average amount of time it took for each person to complete their part of the alphabet. (Use this formula: Personal Average Time = Total time in seconds / number of people who wrote on the paper) Record this time in the data table.

**6. Repeat this process again, except this time, add one more person to the “environment” (If you are a three person group, this would be the timekeeper, otherwise, the timekeeper can stay outside.)**

7. (For 4 person groups only) Repeat the process one more time adding the timekeeper to your “environment.

\*\*\*4 person groups: You could offer to help out a three person group and send one of your members over when you finish with the procedure.\*\*\*

**Data:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Average Times for 1st Trail (2 people) | Average Times for 2nd Trial (3 people) | Average Time for 3rd Trial (4 people) |
| Lab Group Member 1 |  |  |  |
| Lab Group Member 2 |  |  |  |
| Lab Group Member 3 |  |  |  |
| Lab Group Member 4 |  |  |  |

**Analysis:**

1. Describe USING DATA, how the space limitations affected your group’s ability to perform the task as your added more people to the “environment”. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. **Think Critically:** What function***s*** (note the plural form) might an organism, including but not limited to humans, perform that might be affected by a limited amount of space? *Name at least one that could be a positive effect.* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Application**:

1. You are a biologist studying the populations inside a protected (i.e. fenced-in) park area. You notice that there are a lot of squirrels that seem to be fighting in the trees. Using what you learned in this mini-lab, what might you report back to your superiors regarding potential problems with this population of squirrels? Include a possible solution to this dilemma.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Scoring:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Proficient……….Nearing Proficient…………Progressing…….….Below Average……...Little / No Attempt | | | | | | | | |
| Independent / Dependent Variable | 4 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | .5 | 0 |
| Hypothesis | 4 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | .5 | 0 |
| Data Table | 4 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | .5 | 0 |
| Analysis Question #1 | 4 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | .5 | 0 |
| Analysis Question #2 | 4 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | .5 | 0 |
| Application Question | 4 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1 | .5 | 0 |