Hypothesis and Testable Questions

1. An experiment was carried out to determine how competition for food affects the survival rate of bacteria in a culture. Different amounts of food were given to equal amounts of bacteria in three different Petri dishes, A, B, and C. The least food was given to the bacterial culture in Petri dish A, more food was given to the bacteria in dish B, and the most was given to those in dish C. After several weeks the size of each bacterial culture was measured.

a) State a hypothesis for the experiment.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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b) Identify the dependent variable in the experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Identify the independent variable in the experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The results from the experiment are shown below.

Bacteria

Dish A Dish B Dish C

d) State whether the results *support* or *refute* (does not support) the hypothesis you recorded for part a and justify your answer [1]

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2. A scientist conducted an experiment to test the hypothesis that maple seeds exposed to acid rain will take longer to germinate (grow) than seeds exposed to normal rain. Normal rain has a pH of 5.6 and acid rain has a pH between 1.5 – 5.0. The scientist set up four groups, each containing 200 maple seeds. The water used for each group had a different pH value: 5.6, 4.0, 3.0, and 2.0. All other conditions were kept the same. After ten days, the number of seeds that had germinated in each group was counted.

a) Identify the independent variable in this experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) Identify the dependent variable in this experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) Write a testable question for this experiment:

d) Write a hypothesis for this experiment:

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1. Three students decided to do an experiment to determine the effect of temperature on the heart rate of fleas. Each added equal volumes of pond water to four beakers and placed each beaker in a different water bath. Each student maintained the water baths at different temperatures. The students then added an equal number of water fleas to each of their four beakers. After one hour, the students used microscopes to determine the average heart rate of the water fleas.

The independent variable in this investigation is the

1. number of trials 3. number of water fleas

2. temperature of the water 4. average heart rate

*2. Wonder* has designed new packaging for their bread. They think the new packaging will prevent mold from growing on the bread so quickly. Before releasing the new packaging on the commercial market, they conduct an experiment to see if it prevents mold in comparison to the normal packaging. For one month, 50 loaves of bread are observed in the new packaging and 50 loaves of bread are observed in the regular packaging. They record how much mold grows on each loaf. Fill in the table below for the experiment.

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| --- | --- |
| **Independent Variable** |  |
| **Dependent Variable** |  |
| **Hypothesis** |  |
| **Example of evidence that would *support* the hypothesis** |  |