

Dr. Ward

Biology Packet

Day 1-5

These Biology assignments are geared toward discovery and the scientific method. Please do the best that you can and feel free to use any resources at your disposal. These activities may reference a textbook, but the book is not needed.

These activities are meant to keep your mind engaged while you are away, but do try to have fun with them.

## Chapter

## 1

## Applying Scientific Methods

## Real World BioApplications

**H**ave you ever reached into your pocket for your keys only to discover that they weren't there? What actions did you take in such situations? Did you just assume they magically vanished into thin air? Chances are you expected a logical solution and then proceeded through a series of steps to locate the keys. First, your mind may have raced as you hypothesized about several places the keys could be. Next, you individually tested each hypothesis and gathered data by looking around the house. If the keys were found, the

problem was solved. If not, another hypothesis about the keys' location had to be formed. In essence, you went through a process of discovery that is very similar to the approach scientists use to solve problems—the scientific method.

Everyday life is filled with problems and questions that sometimes perplex us but that have logical solutions. The natural world is no exception. In this activity, you'll apply scientific methods to solve some everyday applications in biology.

### Part A: Reviewing Scientific Methods Used in Biology

The following describes an experiment to determine the effect of additional nitrogen on plant growth. Read the paragraph carefully, then answer the questions.

Dr. Anderson set up an experiment in which she planted bean seeds in two groups, A and B. After the seeds germinated, Group A was fed a balanced application of fertilizer with additional nitrogen, as recommended by most plant growers. Group B was grown under identical conditions, except the fertilizer they received contained no additional nitrogen. Dr. Anderson observed the plants for one month. You can see the results in Figure 1.

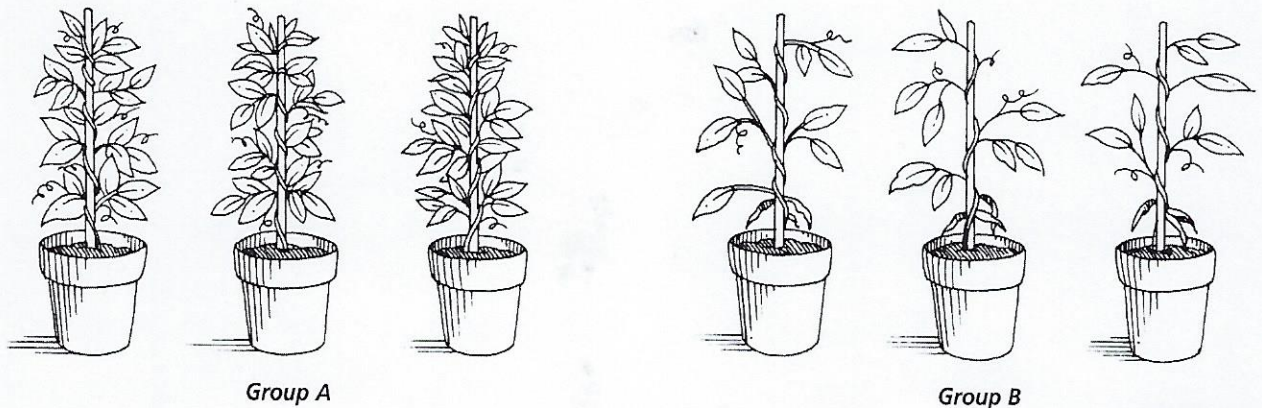


Figure 1

### ANALYZE AND CONCLUDE

1. Which plants represent the control group? Explain your answer.

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2. Which plants represent the experimental group? Why is this group of plants the experimental group?

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## Applying Scientific Methods, *continued*

3. What were the independent variable(s)? Dependent variable(s)?

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4. What experimental conditions did Dr. Anderson control?

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### Part B: Use Scientific Methods to Solve Everyday Questions in Biology

Below is a list of some everyday questions in biology. In this part, you'll choose two questions and propose solutions for them by applying scientific methods. Record all work in your notebook or science journal.

- Why does milk turn sour?
- Why do insects seem to appear suddenly in flour, cornmeal, or fruit?
- Do bay leaves repel cockroaches?
- Why do bananas turn brown?
- Why do insects gather around light sources?
- Do cats see colors?

### PROCEDURE

1. Begin by first writing down your **problem statement**. For example, if you wanted to know why insects seem to gather around light sources in the summer, your problem statement might read: Why do insects gather around light sources?
2. Next, prepare two alternative **hypotheses** that might explain your observations. Hypotheses are often written in an *if/then* format and must be testable. Thus, a hypothesis for this problem might be: If insects gather around light sources for warmth, then the insects would gather around other warm objects.
3. Write an **experimental plan** for each hypothesis. Experimental plans should detail the steps you would take to collect the data needed to test your hypotheses. In your experiments, be sure to indicate the dependent and independent variables as well as the experimental and control groups.
4. For each hypothesis, explain what results should be obtained to confirm the hypothesis.