

Welcome to Nazareth Academy Honors Biology!
Summer Assignment Introduction

To whom this may concern,

The Scientific Method is a problem-solving approach taken in science. Disciplines in science like chemistry, physics, psychology, and biology all utilize this unique measure. Scientists are responsible for performing certain tests and asking certain questions. As a student in biology, you will be asked to do the same. In order for students to be prepared for the upcoming semester, it is essential to have a background in the scientific method.

Throughout this assignment, students will investigate all of the steps of the scientific method as well as define all the parameters that help scientists perform experiments and draw conclusions. Students will define terms, fill in short answer questions in complete sentences, fill in the blanks, determine whether a statement is true or false, select the appropriate multiple choice, and determine the right variable. On top of that, students will be asked to complete the **standardized test taking portion of the assignment** and **Chapter 1 preliminary lesson quiz.** PLEASE FOLLOW ALL DIRECTIONS.

When students begin this assignment, some students will begin the assignment with prior knowledge of the scientific method. Students may also use any resources such as websites or books to aid their research. A great resource for help is *Khan Academy*. You must complete the worksheets on your own and not collaborate with other students. This assignment will count as your first grade of the semester and is due on the first full day of classes even if you are rostered for Biology in the spring semester. **5 points per day will be deducted for lateness and please make sure your name is on the packet.** If there are any questions or concerns, please do not hesitate to contact your Honors Biology teacher.

You can contact Mr. Palumbo directly at apalumbo@nazarethacademyhs.org.

Submission Suggestions:

- **Preferred method:** Edit the document directly online and save it to your computer or flash drive. On the first day of class, directives on how to present your summer assignment will be designated by your teacher.

If students have an issue with the preferred method, they may follow the other two suggestions.

- You can edit the document directly, print it out, and hand it to your teacher on the first day of class.
- You can print out the document and fill it out with a pencil. Once you have filled it out, you can hand it to your teacher on the first day of class.

From the Nazareth Academy Biology department, we want to wish you a safe and enjoyable summer and we look forward to having you in the fall or spring.





Name: _____

Date: _____

Nazareth Academy High School: Summer Assignment

Define the following terms:

1. Data: _____
2. Independent variable: _____
3. Dependent variable: _____
4. Scientific method: _____

Short Answer:

1. List the steps to the scientific method. _____

2. How is a theory different from a hypothesis? _____

3. Give two examples of quantitative data. _____

4. Give two examples of qualitative data. _____

5. How many variables should an experiment test at a time? Explain your answer. _____

6. Why is it important that scientists communicate and report their findings? _____

7. A drug company is testing the effectiveness of a new blood pressure medicine using rats as the test subjects.

a) Describe the experimental group: _____

b) Describe the control group: _____

c) What is the independent variable? _____

d) What is the dependent variable? _____

e) What are some possible factors that must remain constant during the testing? _____

f) What is the ONE factor that will be different between the experimental group and the control group?

8. What is meant by the term "controlled experiment"? _____

9. Why must experiments be repeated many times? _____

Fill in the blanks:

1. The part of the experiment in which the experimental factor has been removed is referred to as the _____.

2. The group that shows the effect of the variable being tested is called the _____.

3. Over time, a hypothesis that is supported by many experiments and much data becomes a _____.

4. The purpose of an experiment is to gather data to determine if the _____ is supported or not supported.

Read each statement and determine if the statement is true or false. If the statement is false, correct the underlined word to make the statement true.

- _____ 1. A biologist who is measuring the length of salmon as they travel upstream is collecting qualitative data.
- _____ 2. An experiment is a procedure that tests a hypothesis by providing data and observations under controlled conditions.
- _____ 3. In scientific investigations, experimenting usually comes before hypothesizing.
- _____ 4. In an experiment, the control group is used to test the effect of the independent variable.
- _____ 5. Science begins with an observation.

Multiple Choice:

- _____ 1. Which of the following would be done last if one is following the scientific method?
(a) forming a hypothesis (b) observing a problem (c) performing an experiment
(d) reporting the results.
- _____ 2. A hypothesis:
(a) can be tested (b) is a prediction about the expected outcome of an experiment
(c) must be stated in a form that can be either proven or disproven (d) all of the above are true.
- _____ 3. The factors in an experiment that can be changed are called:
(a) variables (b) data (c) the hypothesis (d) the control.

Identify the independent variable and the dependent variable in each of the following hypotheses:

1. The process of photosynthesis requires a source of carbon dioxide.

HYPOTHESIS: Increasing the concentration of carbon dioxide available to aquatic plants will increase the rate of photosynthesis, as measured by the number of oxygen bubbles produced.

Independent variable: _____

Dependent variable: _____

2. Cell membranes are fragile and can easily be damaged by various substances.

HYPOTHESIS: When testing the effect of different alcohols on the cell membrane of red beet cells, the damage to the membrane can be measured by the amount of red dye released into the solution.

Independent variable: _____

Dependent variable: _____

3. Water is the solvent of life, meaning that many substances can easily dissolve in it.

HYPOTHESIS: Increasing the temperature of a salt water solution will result in a greater amount of salt being dissolved in the solution.

Independent variable: _____

Dependent variable: _____

4. Transpiration is the loss of water from the leaves of plants. The stomata of leaves must open to allow carbon dioxide to enter the leaf for photosynthesis, but when they are open, water vapor escapes into the atmosphere.

HYPOTHESIS: As the intensity of light is increased, the rate of transpiration will increase, as measured in by the loss of mass of the plant.

Independent variable: _____

Dependent variable: _____

5. A catalyst is a substance used to increase the rate of a chemical reaction. Two catalysts are tested to see which will most effectively increase the rate of hydrogen peroxide decomposition. Hydrogen peroxide decomposes into water and oxygen.

HYPOTHESIS: Catalyst A will increase the rate of reaction faster than Catalyst B.

Independent variable: _____

Dependent variable: _____

6. Enzymes are biological catalysts. Enzymes are proteins that are found inside cells to increase the rate of chemical reactions within each cell. Enzymes are denatured (destroyed) by various environmental conditions. Amylase is an enzyme in the digestive system that helps to break down complex carbohydrates into simple sugars.

HYPOTHESIS: Amylase works best in an environment with a pH level of 7.

Independent variable: _____

Dependent variable: _____

Taking a Standardized Test

Test Taking Tip: Watch for Clue Words

When you read a test question, watch for the clue words *except*, *always*, and *mostly*. When a question has the word *except*, you are looking for the answer that is not correct. When you see *always* in a question, it means the answer is true in every situation. *Mostly* suggests that the correct answer generally applies, but there are exceptions.

Read the following questions and answer choices.

Living things show all of the characteristics except

- A. growth and development.
- B. ability to respond to the environment.
- C. ability to dissolve.
- D. reproduction.

Step 1 What is the question asking? This question asks you to spot the characteristic that is NOT true of living things.

Step 2 Look for clue words. This question includes the word *except*. You are looking for the answer that is not correct.

Step 3 Read each answer choice carefully. Cross out choices you know are true. You may remember that living things grow and develop and they respond to the environment, so you can cross out **A** and **B**.

Step 4 Choose one of the answers left. You know that the correct answer is either **C** or **D**. You may remember that living things reproduce. The only characteristic that is NOT true of all living things is **C**, ability to dissolve.

Self-Test

Practice what you have learned by answering the following questions. Before you choose your answer, underline the clue word. Then circle the correct answer.

1. In research, a scientist must always consider
 - A. plants.
 - B. evidence.
 - C. photographs.
 - D. theories.
2. A bias is mostly due to
 - A. the study of life.
 - B. controlled experiments.
 - C. experimental data.
 - D. a personal point of view.

Chapter 1 Preliminary Lesson Quiz:

This section will preview how the typical assessment questions will appear throughout the course of the semester. Please circle the appropriate answer.

1. Each of the following statements is used to define science EXCEPT

- A. Science is a way of knowing.
- B. Science is a process.
- C. Science includes the study of supernatural events.
- D. Science refers to the body of knowledge that scientists have gathered over the years.

2. In terms of the scientific method, the purpose of an experiment is to

- A. form a hypothesis.
- B. prove a theory
- C. form a conclusion.
- D. test a hypothesis.

3. Examples of qualitative data include

- A. the number of students with red hair in your school.
- B. people's descriptions of the fair's fireworks.
- C. the amount of mold on an old slice of bread.
- D. how much lake water has lowered over the summer.

4. A scientist willing to accept ideas that disagree with his/her hypothesis is displaying which of the following scientific attitudes?

- A. Curiosity
- B. Open-mindedness
- C. Skepticism
- D. Creativity

5. Scientists review and evaluate each other's work to ensure

- A. the experiment data is quantitative.
- B. the study was completed by respected scientists.
- C. accuracy and to gather new ideas for more research.
- D. the study is based on earlier studies.

6. In science, a theory is

- A. considered absolute truth.
- B. something that can never be revised.
- C. used when scientists are not certain about an observation or hypothesis.
- D. a well-tested explanation for a wide range of hypotheses and observations.