



SCIENCE

STUDENT BOOK

▶ **7th Grade | Unit 10**

SCIENCE 710

Science Review

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Science Review

Introduction

My name is John Hall. I am a student at the Christian Academy. While studying science at school, I decided to become a scientist. I am writing this log to organize and record all the data I have learned this year. I want to investigate the different sciences so that I can decide which science I want to make my career.

I plan to dedicate my life to God through science. Before each log entry I plan to reread Joshua 1:8, "...but thou shalt meditate therein day and night, that thou mayest observe to do according to all that is written therein: for then thou shalt make thy way prosperous, and then thou shalt have good success."

I want to research different scientists at work. By learning about other scientists, I will be able to decide on a science in which to specialize. I shall study the astronomer at work, the meteorologist at work, and the medical scientist at work. Those sciences are the ones I have studied this year.

Objectives

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAAC. When you have finished this LIFEPAAC, you should be able to:

1. List the five steps in the scientific method.
2. List the metric units of length, mass, and volume.
3. List four types of graphs.
4. Write one scientific achievement for each of the following scientists: Aristotle, Ptolemy, Copernicus, Kepler, Brahe, Newton, Galileo, Fahrenheit, Celsius, Torricelli, Vesalius, and Nightingale.
5. Define these terms: constellation, myth, hemisphere, zenith, nadir, comet, meteor, and Milky Way.
6. Label a diagram of the planets and the asteroids.
7. Label a diagram of four phases of the moon.
8. Explain how the sun produces solar energy.
9. Name the two brightest stars in our sky.
10. Name the main elements of weather.
11. Explain how temperature affects weather.
12. List the different air masses.
13. Describe where each air mass is formed.
14. List the abbreviations of the air masses.
15. Name and describe the three basic cloud types.
16. Name the four classes of weather fronts and describe the weather that is associated with them.
17. Explain how the meteorologist can predict weather.
18. Explain the difference between expiration and inspiration.
19. Explain how the heart and lungs work together.
20. List the three types of cells in the blood.
21. Explain the difference between arteries, veins, and capillaries.
22. Explain the function of the skeleton.
23. Explain how the nervous system works.
24. List four functions of the digestive system.
25. Define absorption and excretion.
26. Explain the function of three endocrine glands.

1. SCIENTISTS AT WORK

Scientists search for ways to unlock the door to nature's puzzling questions. God has given man a superior brain that serves as the key to the door. Scientists must organize their facts and record their data in an organized way. Scientists must be dedicated, for they are always

learning something new. Scientists have developed medicines, the automobile, and rockets that take man to the moon. They ask "Why?" and dedicate their lives to finding answers to their questions.

SECTION OBJECTIVES

Review these objectives. When you have completed this section, you should be able to:

1. List the five steps in the scientific method.
2. List the metric units of length, mass, and volume.
3. List four types of graphs.
4. Write one scientific achievement for each of the following scientists: Aristotle, Ptolemy, Copernicus, Kepler, Brahe, Newton, Galileo, Fahrenheit, Celsius, Torricelli, Vesalius, and Nightingale.

VOCABULARY

Study these words to enhance your learning success in this section.

accurate (ak' yur it). Correct, without error.

astronomy (u stron' u mē). Study of stars and planets.

axis (ak' sis). A straight line at right angles to another straight line.

ellipse (i lips). An oval.

interpret (in tēr' prit). To explain the meaning.

meteorology (mē tē u' rol' u jē). Study of weather.

metric system (met' rik sis' tum). System of measurement used by scientists.

observation (ob zur vā' shun). A close inspection.

research (ri sērch). A careful search or study.

Note: All vocabulary words in this LIFEPAC appear in **boldface** print the first time they are used. If you are not sure of the meaning when you are reading, study the definitions given.

Pronunciation Key: hat, āge, cāre, fār; let, ēqual, tērm; it, īce; hot, ōpen, ōrder; oil; out; cup, pūt, rüle; child; long; thin; /ʃh/ for then; /zh/ for measure; /u/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

LOG ENTRY I-A: SCIENTIFIC METHOD

Scientists must keep **accurate** records of everything they observe. Each detail must be accurately recorded. Scientists often make graphs, charts, and drawings in their notebooks. The notes and charts help them to remember what they observe.

As a student of science, and a future scientist, I shall keep a detailed notebook, too. The first thing I have decided to study is the scientific method so I can approach my studies in a truly scientific way. I have discovered that the scientific method is made up of five steps: stating the problem, forming the hypothesis, conducting an experiment, interpreting data, and drawing conclusions.

Stating the problem. The first step in the scientific method is stating the problem. A problem in science is anything puzzling or unexplained. Some typical problems that early scientists stated were these: What is air made of? What causes movement in the human body? How can we travel to the moon?

The scientific method is a way to explore and to discover God’s world. Before a scientist begins his exploration, he must state the problem he wishes to solve. A problem I want to solve is this question: How does water move up the stem of a plant?



Complete these sentences.

- 1.1 Scientists must keep accurate _____ .
- 1.2 The first step in the scientific method is _____ .
- 1.3 A problem should be stated in _____ .
- 1.4 A problem in science is anything that is _____ .

Complete this activity

- 1.5 State any scientific problem you would like to solve.

Write it here. _____

Forming the hypothesis. A *hypothesis* is a scientific guess. This guess is based on past knowledge and observations the scientist has made. The hypothesis is a reasonable, or educated, guess that could solve the scientist’s

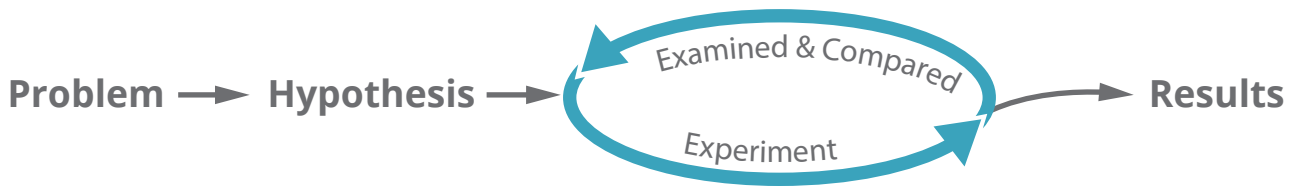
problem. I know that God has given man a circulatory system that carries food to every cell of the body. My hypothesis is that God has given His plants a special pipeline that carries water from the roots to every cell in the plant.


Write true or false.

- 1.6 _____ A hypothesis is a scientific guess that answers the scientist's question or problem.
- 1.7 _____ Scientists may have more than one hypothesis.
- 1.8 _____ Scientists do not have to formulate a hypothesis when using the scientific method.
- 1.9 _____ A hypothesis is a question.

Conducting an experiment. A scientist must have evidence to support or to deny his hypothesis. To obtain this evidence, a scientist must test his hypothesis. The test of a

hypothesis is called an *experiment*. An experiment produces results that are compared to the hypothesis to determine whether the hypothesis is correct.



An experiment that takes place in the laboratory involves **observation**. Experiments that take place in the library involve research.

I shall conduct my experiment in a laboratory. To test my hypothesis, I shall put celery in half a glass of water colored with red food coloring.



View 710 Testing a Hypothesis, from the Grade 7 SCIENCE EXPERIMENTS Video



Try this investigation to see if your experiment proves John’s hypothesis.

These supplies are needed:

- stalk of celery
- half a glass of water
- teaspoon
- sharp knife
- red food coloring

Follow these directions and answer these questions. Put a check in the box when each step is completed.

- 1. Mix one teaspoon of red food coloring into the water.
- 2. Cut the end off the stalk of celery. The stalk should then be about 4” to 6” long.
- 3. Put the cut end of the celery into the glass of colored water.
- 4. Wait 1 day and take the celery out of the water.
- 5. Observe the cut end of the celery.
- 6. Cut a cross section of the celery and observe that section.

1.10 Which parts of the stem have the most food coloring?

1.11 Did the cross section of the celery look the same as the bottom of the stalk?



TEACHER CHECK

_____ initials

_____ date

Testing a Hypothesis Experiment



Complete this activity.

1.12 Draw a diagram of the cross section of the celery.

Interpreting data. The written results of experiments are called *data*. Accuracy is very important when recording data. The big question after I record the data is how do I interpret the data. What does all the information mean? When the scientist has **interpreted** or explain-ed his data, he is ready to draw a conclusion.

When I took the celery out of the glass of colored water, I saw several dark red spots on the surface of the cross section. The cross section was identical to the bottom of the celery. Here is my diagram.

My interpretation of this data is that the dark red dots on the celery are part of the water-carrying pipeline of this plant.

Drawing conclusions. After the scientist has collected the data and interpreted it, he is ready to draw a conclusion. A *conclusion* is the final decision on whether the hypothesis is correct. Before a scientist states the conclusion, he may want to go to the library to **research** the experiments and conclusions of other scientists. He may also perform the experiment several times, recording and comparing data each time.

I performed the same experiment with a radish and a carrot. My data agreed with my experiment with the celery. I went to the library and



researched how water moves up the stems of plants. I learned that plants have long strands called *xylem* that carry water. The xylem is made of hollow cells. These cells form a pipeline from the roots to the leaves of plants. The dark red spots on the celery are xylem. My conclusion is that my hypothesis is correct. God *has* given His plants a special pipeline that carries water from the roots to every cell in the plant.

I plan to use the scientific method in all of my science studies.

END OF LOG I-A

John



Complete these sentences.

- 1.13 The test of a hypothesis is called a(n) _____ .
- 1.14 Experiments that take place in the library involve _____ .
- 1.15 The written results of experiments are called _____ .
- 1.16 The final decision on whether or not the hypothesis is correct is called the _____ .
- 1.17 A scientist must gather evidence to support or deny his _____ .

Complete this activity.

1.18 List in order the five steps in the scientific method.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

LOG ENTRY I-B: SCIENTIFIC MEASUREMENTS

The Apostle Paul wrote to the Philippians (Philippians 3:16 and 17), “Nevertheless, whereto we have already attained, let us walk by the same rule, let us mind the same thing. Brethren, be followers together of me, and mark them which walk so as ye have us for an ensample.” Man cannot measure his need for spiritual guidance, but he can measure the material things that God has given him.

Scientists must measure everything they do. They use the metric system to measure length, mass, and volume. Scientists use graphs and charts to measure their experiments and to make them understandable.

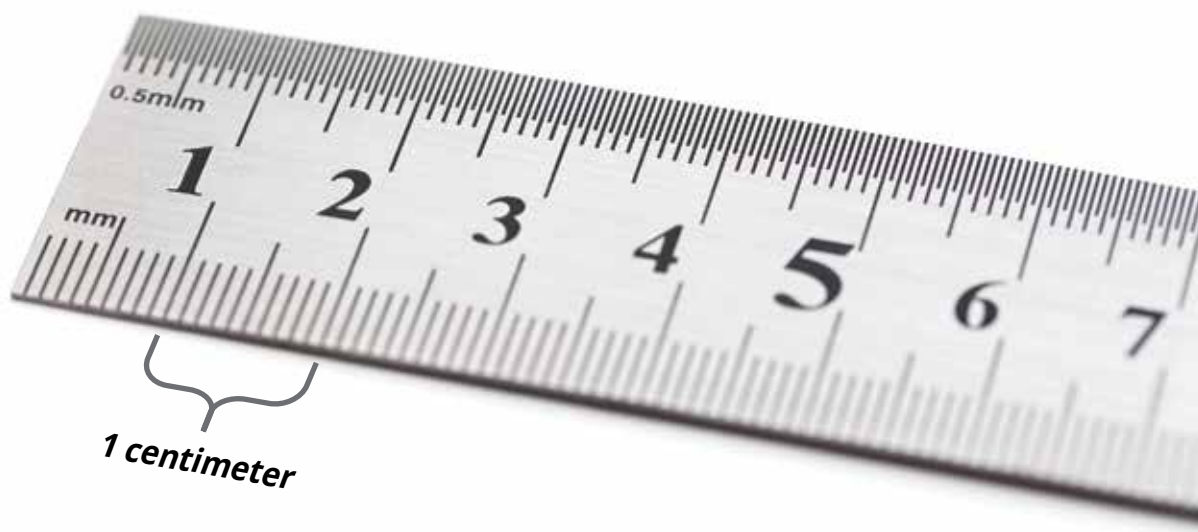
I must review Science LIFE PAC 702 and brush up on measurement.

Metric system. The **metric system** is the system of measurement used by scientists. The metric system originated in France in 1670

and has been the basic system used in most of Europe since then.

The modern metric system is known as the International System of Units. The name International System of Units with the international abbreviation SI was given to the system by the General Conference on Weights and Measures in 1960. In 1965 Great Britain began using metrics. The United States has still not completely converted to the metric system.

In the metric (SI) system the standard unit of length is the meter. The meter is a little longer than a yard. The meter is divided into 100 equal parts called *centimeters*, or 1,000 equal parts called *millimeters*. One thousand meters equals one kilometer. The prefix *centi-* means one-hundredth, *milli-* means one-thousandth, and *kilo-* means one-thousand. These prefixes are used for all units of measurement in the metric system.



The standard unit of volume is the liter. Volume is the amount of space that matter takes up. The liter is subdivided into 100 centiliters and 1,000 milliliters. A milliliter and a cubic centimeter are the same. Therefore, volume can be measured in cubic centimeters or in milliliters.

The standard unit of mass is the kilogram. The kilogram is divided into 1,000 grams and

1,000,000 milligrams. One thousand grams equals one kilogram. Scientists measure the *mass* of an object rather than the weight. The mass of an object remains the same, but the weight of an object changes. Weight depends on gravity. If I were on the moon, I would not weigh the same as I do on earth. *Mass* is the measure of the amount of matter. It is a property of matter and does not change.

This container has 150 mL in it.





Match these items.

- | | | |
|------|--|------------------|
| 1.19 | _____ system of measurement used by scientists | a. kilometer |
| 1.20 | _____ amount of space that matter takes up | b. centi- |
| 1.21 | _____ measure of the amount of matter | c. kilo- |
| 1.22 | _____ one-thousandth of a kilogram | d. metric system |
| 1.23 | _____ one-hundredth | e. millimeter |
| 1.24 | _____ one thousand meters | f. liter |
| 1.25 | _____ one-thousandth of a meter | g. volume |
| 1.26 | _____ one thousand | h. gram |
| 1.27 | _____ standard unit of volume | i. kilogram |
| 1.28 | _____ standard unit of mass | j. mass |
| | | k. centigram |
| | | l. cubic meter |

Complete this activity.

1.29 Measure this line with a metric ruler and write the measurement in centimeters.



Define these words.

1.30 mass _____

1.31 volume _____

1.32 metric system _____



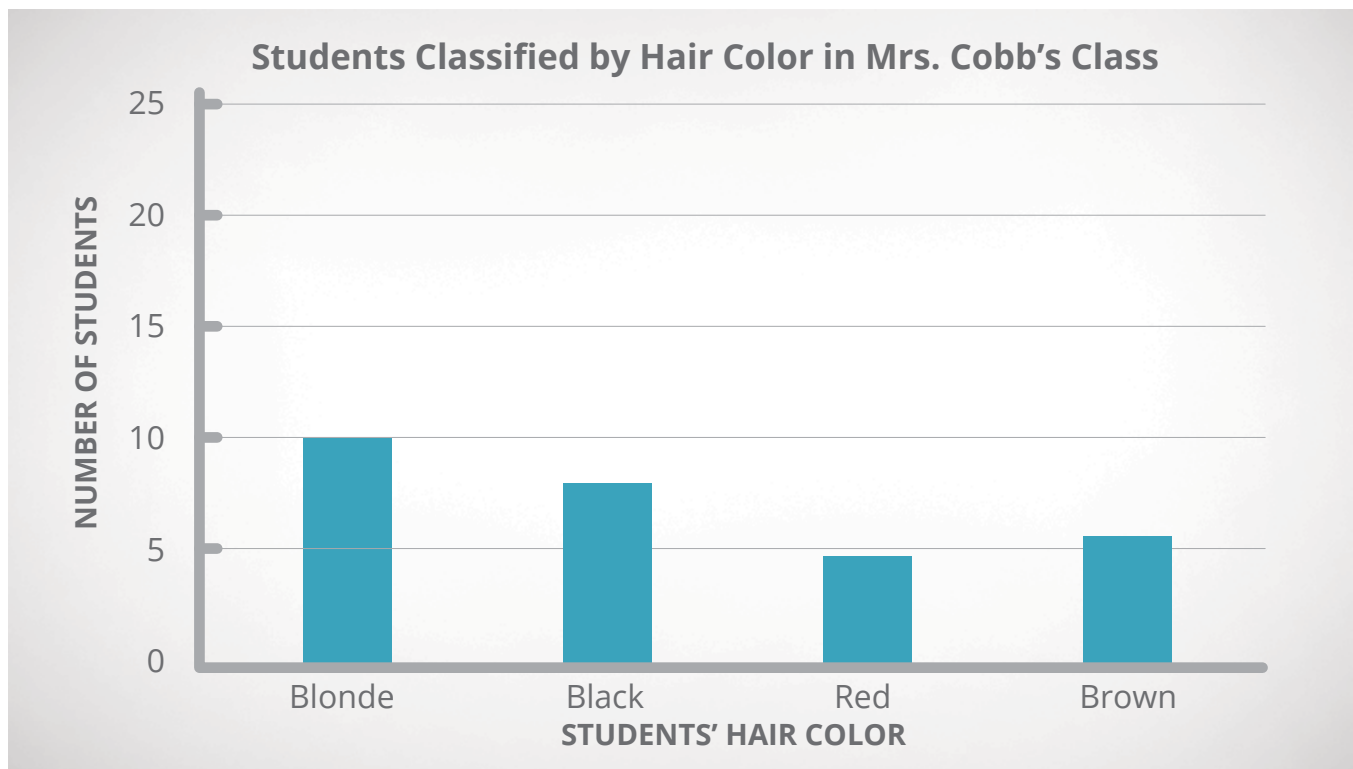
Complete these sentences.

- 1.33 The standard unit of length in the metric system is the _____ .
- 1.34 The prefix for one-thousandth is _____ .
- 1.35 One-hundredth of a meter is a _____ .
- 1.36 One-thousandth of a liter is a _____ .
- 1.37 One-hundredth of a gram is a _____ .
- 1.38 One thousand grams is a _____ .

Graphs. When I was doing research on scientific experiments in the library, I learned that one of the best ways to record data was to chart it on a graph. A *graph* is a drawing that shows a table of related numbers. A graph organizes data so that the data is easy to understand. Graphs and charts are used to present information, to show relationships, to

catch the reader's eye, and to make data easily understood.

Four kinds of graphs are used by scientists to record data. The *bar graph* uses the height of the column to catch the reader's eye and presents information in an easily understood way. I decided to use a bar graph to chart the hair colors of students in my class.



SELF TEST 1

Match these items (each answer, 2 points).

- | | | |
|-------------|---|----------------|
| 1.01 | _____ developed geocentric theory | a. Torricelli |
| 1.02 | _____ introduced heliocentric theory | b. Copernicus |
| 1.03 | _____ founded nursing profession | c. Kepler |
| 1.04 | _____ invented barometer | d. Nightingale |
| 1.05 | _____ considered "Father of Modern Science." | e. Galileo |
| | | f. Aristotle |
| 1.06 | _____ discovered law of universal gravitation | g. Celsius |
| | | h. Vesalius |
| 1.07 | _____ examined the inner workings of the human body | i. Newton |
| 1.08 | _____ developed temperature scale | |

Write true or false (each answer, 1 point).

- 1.09** _____ Meters and centimeters are units of length in the metric system.
- 1.010** _____ Mass is a measure of weight.
- 1.011** _____ Long distances are usually measured in kilometers.
- 1.012** _____ The weight of an object never changes.
- 1.013** _____ In the geocentric theory the earth is the center of the universe.
- 1.014** _____ The gravitational pull of the sun keeps the planets in orbit.
- 1.015** _____ The barometer measures the temperature of the air.
- 1.016** _____ Florence Nightingale believed that God had called upon her to relieve the suffering of poor people.

Write the letter of the correct choice (each answer, 2 points).

- 1.017** The number of centimeters in a meter is _____ .
 a. 10 b. 100 c. 1000 d. 1
- 1.018** The liter is used to measure _____ .
 a. weight b. mass c. volume d. length
- 1.019** The mass of an object is measured in _____ .
 a. liters b. meters c. degrees d. kilograms
- 1.020** In science anything puzzling or unexplained is a scientific _____ .
 a. problem b. experiment c. hypothesis d. conclusion
- 1.021** A scientific guess is a(n) _____ .
 a. problem b. experiment c. hypothesis d. conclusion
- 1.022** After conducting an experiment, a scientist must first _____ .
 a. state the problem b. interpret data
 c. draw conclusions d. form a hypothesis

Complete these lists (each answer, 3 points).

1.023 List in order the five steps in the scientific method.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

1.024 List the four types of graphs.

- a. _____
- b. _____
- c. _____
- d. _____

50
63

SCORE _____ **TEACHER** _____
 initials date



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