



SCIENCE

STUDENT BOOK

▶ **7th Grade**

SCIENCE 701

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LIFEPAC Test is located in the center of the booklet. Please remove before starting the unit.

Perceiving Things

Introduction

God gave you five senses to use. With these senses you can **perceive**, or be aware of, God's creation all around you. With your eyes you perceive how things look. With your ears you perceive how things sound. With your hands you perceive how things feel. With your tongue and nose you perceive taste and odor.

When we use our ability to perceive, we take in information with our minds. We observe things and perceive how they are.

Measurement is a tool that we use in perceiving things as they are. We are always asking questions that involve measurement. How much is left? How many are going? How tall is that building? How heavy is the book? How far did he go? How soon are they coming? We answer all of these questions by measuring.

Measurement involves using a standard. *When we measure, we compare the object we are measuring with a measurement standard.* To find the measurement of the object, we count how many of the standard units are needed to equal the object.

In this LIFE PAC® you will learn about the standard units in the metric system of measurement. You will practice using these units, these standards, to measure objects around you. You will learn how to make a graph to report data you collect and how to use your graphs to predict additional information. In the Bible we learn that Christ is the standard by which our lives are measured. You will discover some Biblical standards for your life and determine how you measure up to God-given patterns and standards.

Objectives

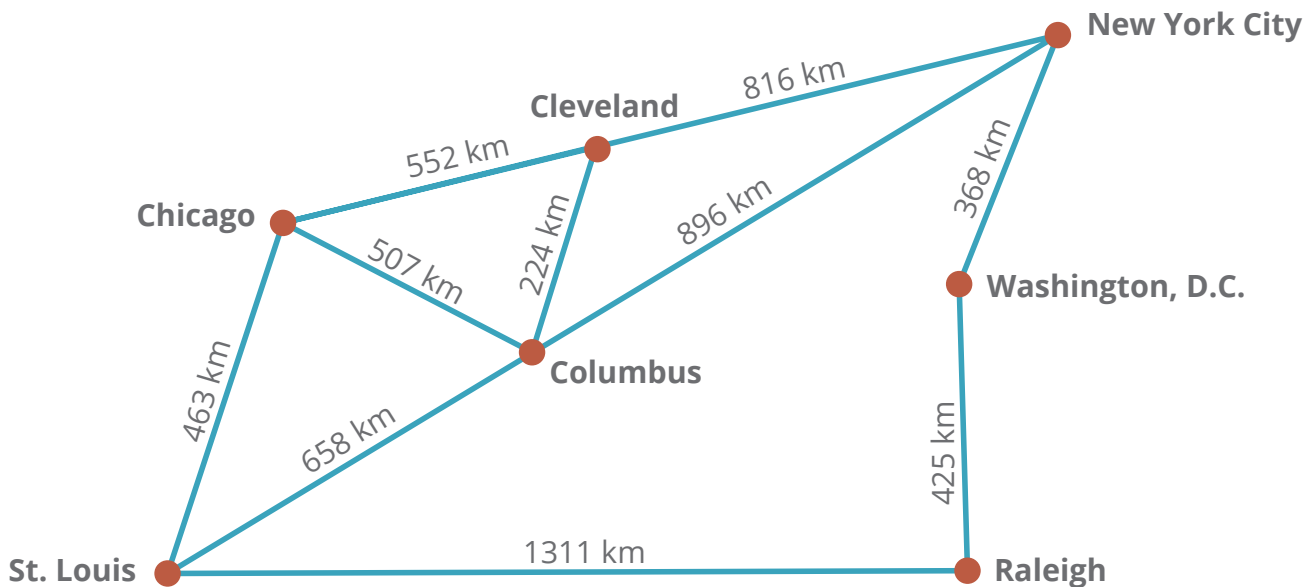
Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFE PAC. When you have finished this LIFE PAC, you should be able to:

1. Name the units of measurement in the metric system.
2. Tell about the history of the metric system.
3. Explain the advantages of the metric system.
4. Use the metric measurement units correctly.
5. Construct several kinds of graphs.
6. Determine the best graph to represent various data.



Complete the following statements.

- 1.21 1000 mm \leftrightarrow _____ m
- 1.22 3000 mm \leftrightarrow _____ m
- 1.23 _____ mm \leftrightarrow 5 m
- 1.24 _____ mm \leftrightarrow 2 m
- 1.25 1000 m \leftrightarrow _____ km
- 1.26 4000 m \leftrightarrow _____ km
- 1.27 _____ m \leftrightarrow 7 km
- 1.28 _____ m \leftrightarrow 9 km



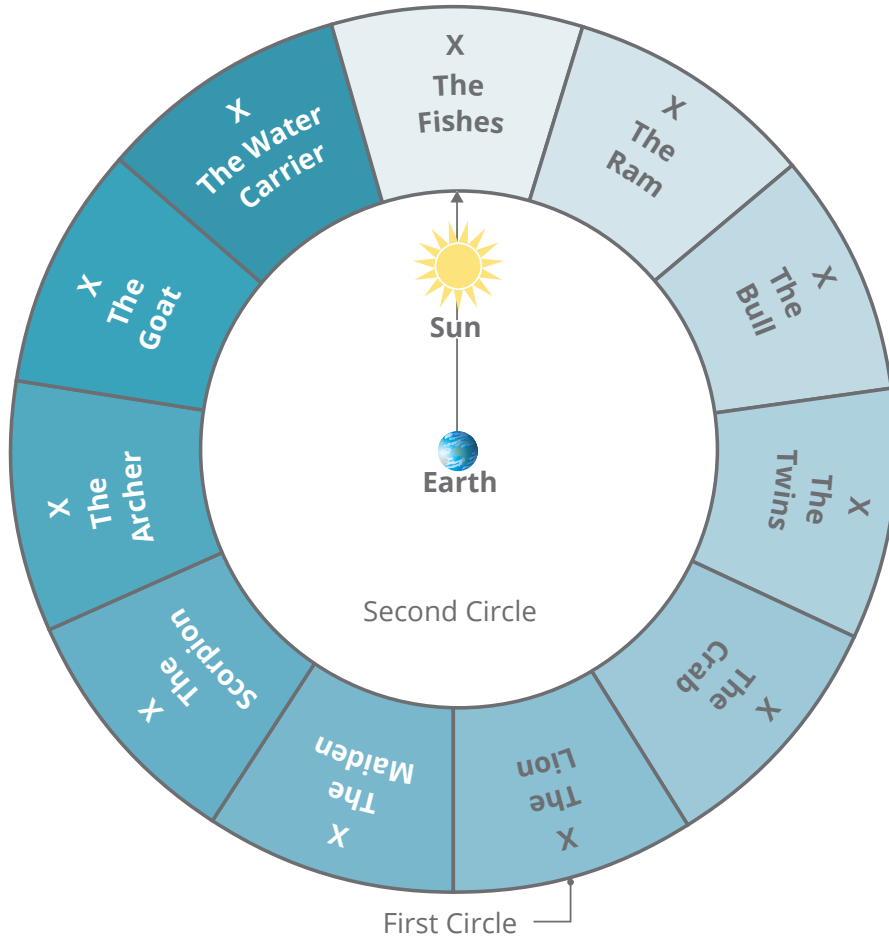
Use the map to find the distance between the following cities.

- 1.29 Chicago to Cleveland is _____ km.
- 1.30 Washington, D.C., to New York City is _____ km.
- 1.31 Cleveland to Columbus is _____ km.
- 1.32 New York City to St. Louis is _____ km.



Complete these activities.

- 1.10** Cut a cardboard circle about twenty-five centimeters in diameter (twice the diameter of the one shown here). Mark an X at each point where an hour would be on a clock face. At each X write the name of a zodiac constellation as shown in the figure.



Draw and cut out another circle about twenty centimeters in diameter. At the edge of this circle draw a small picture of the sun. Fasten the two circles together with a paper fastener through their centers. The paper fastener will represent the earth. Draw a line from the earth through the sun.

- 1.11** Complete the following chart by writing in Column 1 the name of the constellation that is in the line with the earth and sun. In Column 2 write the name of the constellation that would set just after the sun sets. Turn the constellation circle *counterclockwise* one constellation. Each time note which constellation is in line with the earth and the sun and which one would set just after sunset each time.



Constellations Experiment

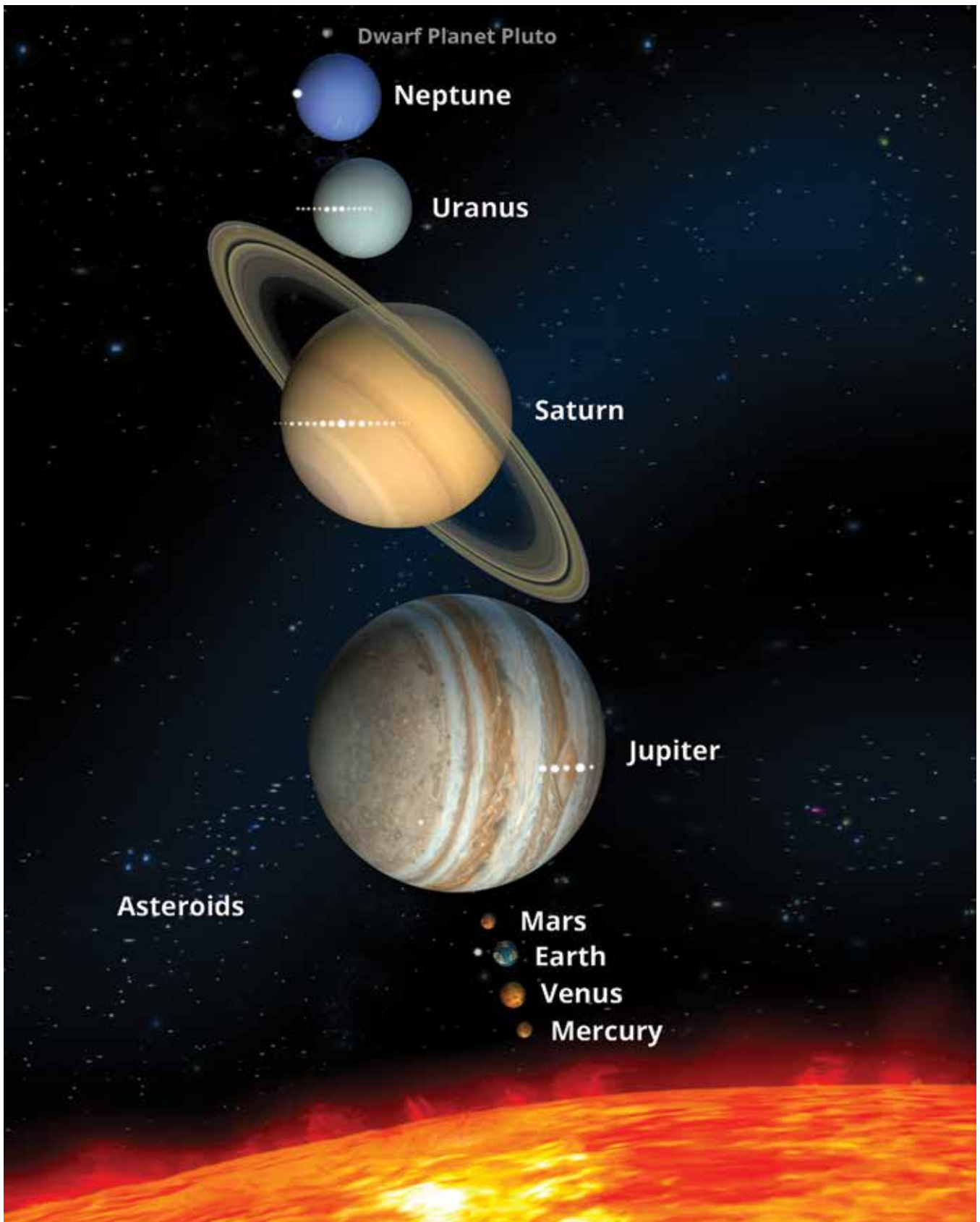
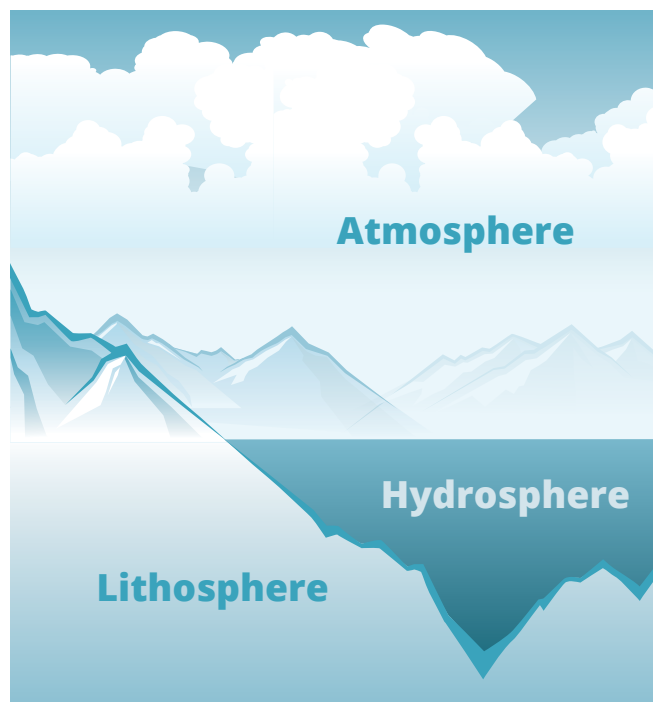


Figure 1 | Our Solar System

1. STRUCTURE OF THE ATMOSPHERE

The atmosphere is important to every living thing. To understand why it is important, we must learn more about it. At first, all parts of the atmosphere appear to be the same. A closer look reveals that the atmosphere is a complex structure that has changed through time. Many inventions have been necessary to enable man to take this closer look. He had to build complicated instruments, airplanes, rockets, and satellites. The information he gathered slowly changed his view of the atmosphere. It no longer seemed the same from one part to another. As the data were put together, they revealed that the atmosphere was made up of many layers of different gases which affect the sunlight and life.



| Figure 1

SECTION OBJECTIVES

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

1. Name the constant and variable gases and their percentages.
2. Name the layers of the atmosphere and some characteristics of each.
3. Describe the effects that the atmosphere has on solar radiation.
4. Tell how the atmosphere makes life possible.
5. Tell how the atmosphere has changed.

VOCABULARY

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

aurora (ô rôr' u). Streamers or bands of light appearing in the sky at night, especially in polar regions.

greenhouse effect (gren hous u fekt). Process by which the atmosphere traps heat given off by the earth after having been heated by the sun.

ion (ĩ' on). An electrically charged atom.

ionosphere (i on' u sfir). The layer of atmosphere containing ions; above the stratosphere.

mesosphere (mes' u sfir). The layer of the atmosphere just above the stratosphere.

Data Table 2							
	Temperatures		WInd		Rain or Snow	Humidity	
	Colder	Warmer	SW-N	NE-S		Incr.	Decr.
Rising barometer							
Falling barometer							



Answer these questions.

1.17 What weather conditions occurred most often with a rising barometer?

1.18 What weather conditions occurred most often with a falling barometer?

WIND

Wind is the movement of air over the surface of the earth. The energy necessary for air movement comes from uneven heating of the earth and the resulting temperature differences. As air is warmed, it expands and becomes less dense (lighter) than surrounding air. Cooling air contracts and becomes more dense (heavier). Warm air rises, and cold air sinks to fill in the space left by the rising warm air. These differences in temperature and the resulting air movement produce wind.

Air movement plays an important role in weather. Meteorologists use instruments to

measure the direction and speed of the wind. Air movement occurs on a small, local scale and on a large, worldwide scale.

Instruments. Wind vanes are instruments used to measure the direction from which the wind is coming. For example, a north wind is coming *from* the north. The arrow on the wind vane points in the direction *from* which the wind is coming. Winds coming from a direction between the points of a compass are named by using both directions, such as *northeast, southeast, northwest, and southwest*.

SELF TEST 1

Match these items (each answer, 2 points).

- | | | |
|-------------|---|----------------|
| 1.01 | _____ thick, sticky substance | a. bronchus |
| 1.02 | _____ chest area | b. septum |
| 1.03 | _____ air sacs | c. vocal cords |
| 1.04 | _____ cartilage dividing nose in two parts | d. alveoli |
| 1.05 | _____ mucous folds in voice box | e. sinus |
| 1.06 | _____ windpipe | f. diaphragm |
| 1.07 | _____ branch of the windpipe | g. trachea |
| 1.08 | _____ smaller cavity above or near nasal cavity | h. thorax |
| | | i. mucus |

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

- 1.09** Hairs that clean dirt out of the air in your nasal passages are called _____.
 a. sinus b. trachea c. cilia d. mucus
- 1.010** A throat structure not used for breathing is the _____.
 a. trachea b. larynx c. pharynx d. bronchus
- 1.011** Many parts of the respiratory system can expand because they are _____.
 a. small b. cartilage c. mucus d. elastic
- 1.012** The thick muscle in the lower part of your chest is your _____.
 a. diaphragm b. thorax c. larynx d. lungs
- 1.013** The thin tissue on the outside of the lungs is _____.
 a. bronchi b. pleura c. alveoli d. esophagus
- 1.014** Each part of your lungs is called a(an) _____.
 a. alveoli b. bronchi c. lobe d. capillary
- 1.015** Your cells need _____ to live.
 a. carbon dioxide b. carbon c. air d. oxygen

Complete this diagram (each answer, 2 points).

- polar easterlies southeast trades
- prevailing westerlies southwest trades
- northeast trades

- 1.021 _____
- 1.022 _____
- 1.023 _____
- 1.024 _____
- 1.025 _____
- 1.026 _____

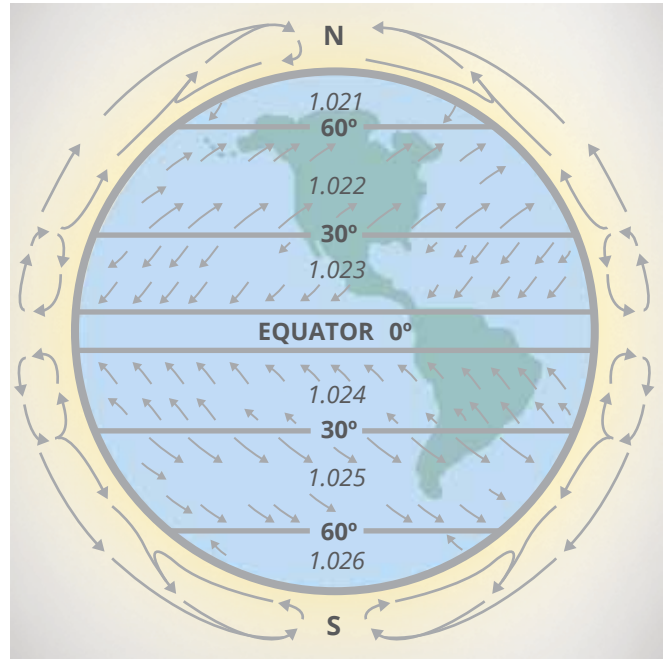


Figure 6 | Prevailing Winds and Their Locations

<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 44 55 </div>	SCORE _____	TEACHER _____ <small>initials date</small>
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SCIENCE

TEACHER'S GUIDE

▶ **7th Grade**

SCIENCE 700

Teacher's Guide

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INSTRUCTIONS FOR SCIENCE

The LIFEPAC curriculum from grades two through twelve is structured so that the daily instructional material is written directly into the LIFEPACs. The student is encouraged to read and follow this instructional material in order to develop independent study habits. The teacher should introduce the LIFEPAC to the student, set a required completion schedule, complete teacher checks, be available for questions regarding both content and procedures, administer and grade tests, and develop additional learning activities as desired. Teachers working with several students may schedule their time so that students are assigned to a quiet work activity when it is necessary to spend instructional time with one particular student.

The Teacher Notes section of the Teacher's Guide lists the required or suggested materials for the LIFEPACs and provides additional learning activities for the students. The materials section refers only to LIFEPAC materials and does not include materials which may be needed for the additional activities. Additional learning activities provide a change from the daily school routine, encourage the student's interest in learning and may be used as a reward for good study habits.

If you have limited facilities and are not able to perform all the experiments contained in the LIFEPAC curriculum, the Science Project List may be a useful tool for you. This list prioritizes experiments into three categories: those essential to perform, those which should be performed as time and facilities permit, and those not essential for mastery of LIFEPACs. Of course, for complete understanding of concepts and student participation in the curriculum, all experiments should be performed whenever practical. Materials for the experiments are shown in Teacher Notes – Materials Needed.

A suggested support item for this course is the 7th Grade Science Experiments video, SD0701. The video includes presentations of many of the experiments in this course. Several of the experiments that require special equipment or materials are demonstrated on these videos. They can either be used for answering the questions of the lab report or as a demonstration of the procedure prior to performing the experiment. A notice is included with each experiment in the LIFEPAC where the video is available.

Science Projects List

Key

(1) = Those essential to perform for basic understanding of scientific principles.

(2) = Those which should be performed as time permits.

(3) = Those not essential for mastery of LIFEPACs.

S = Equipment needed for home school or Christian school lab.

E = Explanation or demonstration by instructor may replace student or class lab work.

H = Suitable for homework or for home school students. (No lab equipment needed.)

V = This experiment is available on the Science Experiments video.

Science 701

pp 13 (1) H
27 (2) S

Science 702

pp 20 (1) S & V
24 (1) S & V

Science 703

pp 10 (1) H & V
18 (2) S or H
18 (1) S
24 (2) E & V
40 (1) S & V
41 (2) S
45 (2) S & V
52 (1) S & V

Science 704

pp 31 (1) S
40 (2) H
42 (1) S
55 (1) S

Science 705

pp 15 (1) S & V
27 (2) H

Science 706

pp 9 (1) H
21 (1) S & V

Science 707

None

Science 708

pp 7 (1) S & V
33 (1) H
37 (2) H & V
39 (1) H & V

Science 709

pp 11 (1) S & V
18 (1) H
20 (1) H
33 (2) H

Science 710

pp 8 (1) H & V

Materials Need for LIFEPAAC

Required:
None

Suggested:
box containing a variety of objects for students to classify--For example:
a nail, a piece of wood, a tin can, a seed, a piece of cloth, a sponge, a comb, a stone, a pencil, a plastic bag, a book of matches, and so on
a book or other resource with information about George Washington Carver

Additional Learning Activities

Section I Tools of a Scientist

1. Arrange ten objects on a tray. Show the tray to a group of friends for fifteen seconds and cover the tray. Ask your friends to list as many of the objects as they can remember.
2. Gather leaves from ten different plants. List as many similarities and differences as possible. Name ways to classify your leaves.

Section II Methods of a Scientist

1. Show the student(s) a magazine picture and ask the students to write as many questions as they can about the picture.
2. With a friend use the scientific method to solve a problem.
3. Write a skit involving a problem. Solve the problem with the scientific method. Present the skit to the rest of the class.
4. Make a poster illustrating the scientific method.
5. Write a one-page report on the importance of curiosity to a scientist.

Section III Work of a Scientist

1. Discuss the ways scientists have improved the quality of life. Topics might include: curing disease, predicting earthquakes and volcanic eruptions, developing varieties of plants that produce higher yields, forecasting the weather, and so on.
2. Make a bulletin board of famous scientists and their contributions.
3. Select one famous Christian scientist and write a one-page report about him. You may use an encyclopedia or other library books for this assignment.

Section IV Careers in Science

1. Discuss with the students the difference between a technician and an engineer (Training differences can be seen in a university catalog or a junior college catalog.)
2. Read a brief biography of a scientist in an encyclopedia. With friends act out an important event in the life of that scientist.
3. Look in pamphlets like those from the federal or state governments, colleges, or Metropolitan Life Insurance Co. Select one field of science and read about different occupations within that field.
4. Make a poster using the information given in Section IV to illustrate the need for scientists.

Name _____

Answer *true* or *false* (each answer, 1 point).

1. _____ Observation involves a careful examination of things around us.
2. _____ The inductive method is a process of beginning with many particulars and proceeding to a generalization.
3. _____ Living things depend on other living things.
4. _____ Chemists tell us how things work, e.g. how a camera works.
5. _____ Philosophers are concerned about how man's mind works.
6. _____ Classification tells us the length and weight of something.
7. _____ Psychologists study human and animal behavior.
8. _____ Anthropologists study man's culture.
9. _____ Geology is a biological science.
10. _____ An experiment is a trial or test to discover something unknown.

Complete these statements (each answer, 3 points).

11. When making observations, man has _____ that he uses.
12. An inference is a _____.
13. When a scientist makes a reasonable guess about the answer to a problem, he makes a _____.
14. The sciences that are concerned with the nature of the universe are called _____.
15. The biological sciences are concerned with the study of _____.
16. The process of orderly observation and thinking is _____.
17. The study of the relationships of living things to each other and their environment is called _____.
18. The branch of biology concerned with plant life is _____.
19. The work of _____ was to change agriculture in the south.

Match these items (each answer, 2 points).

- | | |
|---------------------------------|--|
| 20. _____ classification | a. found no gain or loss in chemical reactions |
| 21. _____ data | b. information |
| 22. _____ measurement | c. studied water with microscope |
| 23. _____ questions | d. Law of Gravitation |
| 24. _____ Antoine Lavoisier | e. determining length, weight, and volume |
| 25. _____ Isaac Newton | f. system of classification |
| 26. _____ Albert Einstein | g. systematic arrangement |
| 27. _____ Anton van Leeuwenhoek | h. wondering about phenomena |
| 28. _____ Galileo | i. solar system and telescope |
| 29. _____ Carolus Linnaeus | j. Law of Relativity |

Science 701 Answer Key

- 1.24 one-hundredth
1.25 one thousand
1.26 An angstrom is one hundred millionth of a centimeter.
1.27 A light year is the distance light travels in a year: almost 6,000,000,000,000 miles or 9,654,000,000,000 meters.
1.28 A micron is one-millionth of a meter.
1.29 Classifications of objects can be made according to color, shape, size, or use of material. Objects belong to the mineral kingdom, the vegetable kingdom, or the animal kingdom.
1.30 Any order:
a. mineral
b. plant or vegetable
c. animal
1.31 a. grow
b. grow and live
c. grow, live, and have feeling
1.32 Similarities Differences
Examples: Examples:
a. animal coloring
b. lives in Africa sound each makes
c. warm-blooded food each eats
1.33 Classifications will vary.
1.34 Observation will vary: however, observations will describe the differences between a paper clip and a ruler.
1.35 Answers will vary.
1.36 Answers will vary.
1.37 Answers will vary.
1.38 a. observation or question or data or experiments
b. generalization or conclusion
1.39 conservation of matter
1.40 The deductive method of reasoning starts with a general principle that is accepted as true, applies it to a particular case, and arrives at a conclusion. This means the reasoning proceeds from the general to the specific.
1.41 The inductive method of reasoning is one in which one collects many particular cases, finds out what is common, and forms a general rule that is taken to be true. This has the reasoning proceeding from the specific to the general.
1.42 deductive
1.43 deductive
1.44 inductive
1.45 deductive
1.46 inductive
1.47 balance
1.48 Either order:
a. gains
b. loses
1.49 conservation of matter
1.50 inductive
1.51 inductive
1.52 deductive
1.53 Example:
All Christians love God.
Mary is a Christian.
Therefore, Mary loves God.
1.54 Example:
Mary, Joe, Bill, Jan, and Jim are Christians.
Mary, Joe, Bill, Jan, and Jim love God.
Therefore, all Christians love God.

SELF TEST 1

- 1.01 b
1.02 g

1.03 e
1.04 a
1.05 c
1.06 f

1.07 Any order:
a. sight
b. hearing
c. taste
d. smell
e. feel (touch)
1.08 a
1.09 d
1.010 b
1.011 c
1.012 a
1.013 a
1.014 d

1.015 Any order:
a. lion
b. horse
c. (canary) elephant
d. lizard
e. (eagle) mouse
f. giraffe
g. rattlesnake
1.016 Any order:
a. canary
b. rattlesnake
c. alligator
d. elephant
1.017 a
1.018 b
1.019 b. Some football players are good students.
1.020 a. All mothers see their babies as beautiful.
1.021 Hint:
Through careful observation man can learn much about many things. Write of some of the useful things man learns through observing.

SELF TEST 2

- 2.01 a. Stating the problem
b. Forming the hypothesis
c. Devising an experiment
d. Interpreting data or observation
e. Drawing conclusion

2.02 Examples:
a. History of the area gathered from newspapers
b. Colleagues or other knowledgeable people
c. Professional publications
2.03 evening
2.04 calm

2.05 flat
2.06 No
2.07 white; From the North Pole, all directions are south; and polar bears live near the North Pole.
2.08 a. inquisitiveness
2.09 b. is about 150 words a minute
2.010 b. moisture and dust are important for rain

SELF TEST 3

3.01-3.04 Any order

3.01 astronomy

3.02 geology

3.03 chemistry

3.04 physics

3.05-3.08 Any order

3.05 botany

3.06 ecology

3.07 zoology

3.08 paleontology

3.09-3.014 Any order

3.09 geography

3.010 psychology

3.011 economics

3.012 philosophy

3.013 anthropology

3.014 sociology

3.015 i

3.016 a

3.017 c

3.018 b

3.019 f

3.020 j

3.021 k

3.022 n

4.01 e

4.02 c

4.03 b

4.04 g

4.05 d

3.023 g

3.024 l

3.025 m

3.026 h

3.027 d

3.028 e

3.029 Hint; ideas to be included:

- a. Childhood – poor, slave, during Civil War, freed, frail, observed plants
- b. Education – hardship, poor, eager, worked his way, Master’s degree
- c. Occupation – teacher, researcher, scientist of plants, greenhouse-keeper, laundryman
- d. Experiments – peanut, sweet potato, a variety of products (list three), 300 or 400 products
- e. Reliance on God – learned prayer early and prayed daily, learned from God the potential in plants, gave honor to God

3.030 ACROSS

5. environment

7. atom

8. culture

9. energy

10. weather

DOWN

1. valid

2. elements

3. molecule

4. atmosphere

5. earthquake

6. gravity

SELF TEST 4

4.06 a

4.07 i

4.08 f

4.09 j

4.010 l

**Science 701
LIFEPAC Test**

1. false
2. true
3. false
4. true
5. false
6. false
7. true
8. true
9. false
10. false
11. Any order:
 - a. taste
 - b. touch
 - c. sight
 - d. smell
 - e. hearing
12. instruments
13. hypothesis
14. data
15. Either order
 - a. peanuts
 - b. sweet potatoes
16. Physical
17. Social
18. Biological
19. Mathematics
20. f
21. h
22. b
23. k
24. d
25. j
26. a
27. i
28. c
29. g
30.
 - a. 2
 - b. 3
 - c. 1
 - d. 3
 - e. 2
 - f. 3
 - g. 3
 - h. 1
 - i. 1
 - j. 2
 - k. 2
 - l. 1
31. deductive
32. inductive
33.
 - a. Ecology is the study of relationship of plants and animals to their environment
 - b. Science is systematically organized knowledge.
Examples:
34. fur, small
35. four legs
36. pets, ears, mammals
Examples:
37. offspring
38. trainability
39. sounds