

# SCIENCE

Teacher's Guide

► **5th Grade**

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# SCIENCE 500

## 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 Teaching 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 Teaching Notes—Materials Needed.

A suggested support item for this course is the 5th Grade Science Experiments Video, SD0501. 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 501**

## Unit 1: Cells

# TEACHING NOTES

## MATERIALS NEEDED FOR LIFE PAC

### Required

- optical microscope
- slides
- slide covers
- toothpicks
- diluted iodine solution
- 3 small jars half-full of water
- onion bulb
- knife or scalpel
- tweezers
- small eyedropper
- sterile needle
- ink stain
- pond water
- cotton ball
- rubbing alcohol

### Suggested

- 5th Grade Science Experiments Video

## ADDITIONAL LEARNING ACTIVITIES

### Section 1: The Basic Unit of Living Things: A Cell

1. Introduce students to the use of a microscope. Show them how to magnify and focus. Have students look at a drop of water, hair, paper, thread, and so forth for practice.
2. Students: Make drawings of a cell and label the nucleus, membrane, and cytoplasm. Under the drawing list the three parts and write a one-sentence description for each.
3. Prepare slides of several different fruits and vegetables. Observe and discuss your slides.
4. Look up information on Robert Hooke and write a short report.
5. Be creative! Write a few paragraphs and illustrate a story titled: "A Cell Named \_\_\_\_\_ (your name) \_\_\_\_\_." Include your parts and functions.

### Section 2: The Life and Activity of Cells

1. Have two green stalks of celery, one firm and one wilted. Discuss their color and rigidity. Encourage students to study Section 2 to find out why stalk #2 is weak and wilted.
2. Divide the class into pairs. Instruct each student to draw five different kinds of cells that they studied in Section 2. Have students exchange papers and label their partner's drawing.
3. Instruct the students to make a word find puzzle using the vocabulary words in this section of the LIFE PAC. Students can exchange puzzles and write the meanings of the words they unscrambled.

4. Students: Take two stalks of celery. Put each stalk in a glass of water. Add red or blue food coloring to one glass of water. Observe the glasses the next day. Write a report on what you observed. See if you can explain the results.
5. Draw pictures of the two kinds of blood cells and explain their functions.

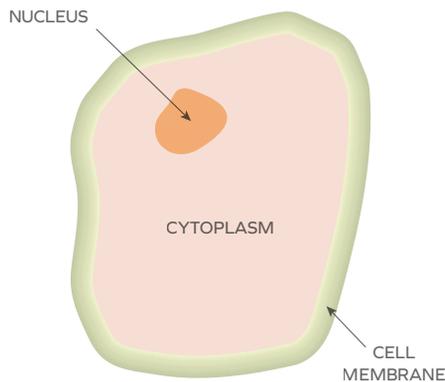
### **Section 3: Energy and Growth of Cells**

1. Students: Take two plants. Put one in the sunlight and one in the dark. Check the plants after one week. What happened? Why?
2. Cut out felt shapes for the sun, a few animals, and a few plants. Use the felt pieces to explain the carbon cycle in your own words. Do the same for photosynthesis.
3. Make your own drawings to explain mitosis. Show your drawings to a friend or the class and explain the process.
4. Observe or read about a sunflower. Write a few sentences explaining why you think the sunflower follows the sun.

# ANSWER KEYS

## SECTION 1

- 1.1 cells
- 1.2 cork
- 1.3 basic unit
- 1.4 unicellular
- 1.5 multicellular
- 1.6 b
- 1.7 f
- 1.8 a
- 1.9 d
- 1.10 g
- 1.11 c
- 1.12 Typical 3-part cell

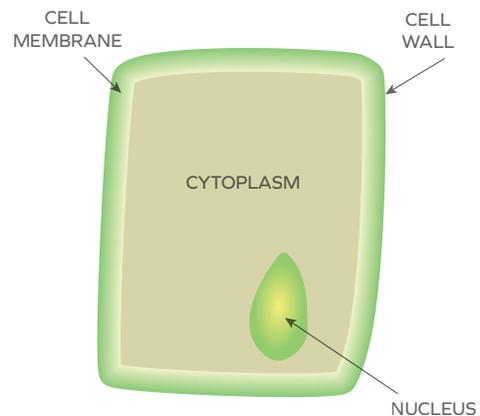


- 1.13 true
- 1.14 false
- 1.15 true
- 1.16 true
- 1.17 false
- 1.18 Microscopes help us to view cells. (Two types of microscopes are optical microscopes and electron microscopes.) It is also helpful to use dyes to view cells.
- 1.19 Compare to the cell illustrations shown in the LIFE PAC.
- 1.20 The student's additional observations should be noted.

## SELF TEST 1

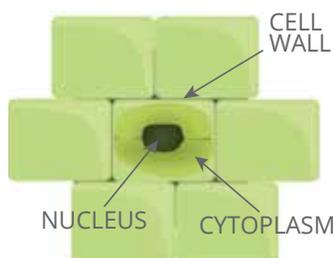
- 1.01 e
- 1.02 k
- 1.03 c
- 1.04 a
- 1.05 i
- 1.06 d
- 1.07 g
- 1.08 b
- 1.09 f
- 1.010 m
- 1.011 c. cells
- 1.012 c. discoveries
- 1.013 b. unicellular
- 1.014 a. a nucleus
- 1.015 d. optical microscope
- 1.016 d. all of these
- 1.017 b. yolk of an ostrich egg
- 1.018 The answer should contain some of the following: A cell is the basic unit of all living things. It is the unit of life. All living things that God has created contain cells. A cell contains at least two basic parts: a cell membrane and protoplasm. Three-part cells contain a cell membrane, cytoplasm, and a nucleus.
- 1.019 The dyes stain certain parts of the cell—such as the cell membrane and the nucleus—so that they stand out more clearly when the cells are viewed under the microscope.

1.020



## SECTION 2

- 2.1 cell membrane  
 2.2 a. phospholipid  
 b. proteins  
 2.3 organelles  
 2.4 nuclear membrane  
 2.5 Either answer is acceptable: chromatin or chromosomes  
 2.6 DNA  
 2.7 chromosomes  
 2.8 nucleolus  
 2.9 Any order:  
 a. those that produce proteins  
 b. those that produce energy  
 c. specialty organelles  
 2.10 DNA and genes contain the molecular information to make the cells and groups of cells within a living thing what they are to be. The DNA is what makes the offspring of a living thing like the parent.  
 2.11 false  
 2.12 true  
 2.13 true  
 2.14 true  
 2.15 false  
 2.16 true  
 2.17 Onion bulb cell



- 2.18 Any other information the student found interesting is acceptable.  
 2.19 Pond water first slide:  
 Compare with drawings of the unicellular animals in the LIFEPAC.  
 2.20 Pond water second slide:  
 Compare with drawings of the unicellular animals in the LIFEPAC.  
 2.21 Pond water third slide:  
 Compare with drawings of the unicellular animals in the LIFEPAC  
 2.22 For a., b., and c., compare with drawings of the unicellular animals in the LIFEPAC. Some answers may be “unknown.”

- 2.23 Any other information the student found interesting is acceptable.  
 2.24 a. membrane  
 b. protein  
 c. chromosomes  
 d. chlorophyll  
 e. unicellular  
 f. phospholipid  
 g. nucleolus  
 h. cellulose  
 i. photosynthesis  
 j. protozoa  
 2.25 Cheek cells: refer to epithelial cells on page 25.  
 2.26 Any other information the student found interesting is acceptable.  
 2.27 They should appear to be alike in structure. Their compositions are alike.  
 2.28 There should not be basic differences. Perhaps size differences would appear because of the drawing size.  
 2.29 The functions of the cells are similar. The functions of the cells are to cover and protect.  
 2.30 Blood cells: refer to red blood cells on page 24.  
 2.31 Any other information the student found interesting is acceptable.  
 2.32 unicellular  
 2.33 multicellular  
 2.34 White  
 2.35 Red  
 2.36 Nerve  
 2.37 Epithelial  
 2.38 Muscle  
 2.39 Any order:  
 a. epidermal  
 b. connective  
 c. storage  
 d. support  
 2.40 Any order:  
 a. epithelial  
 b. muscular  
 c. nervous  
 d. connective  
 2.41 A tissue is a group of cells in a multicellular plant or animal that is similar in structure and performs similar functions.  
 2.42 Some of the functions are similar—epithelial tissue covering in both. Connective tissue helps move needed nutrients in both plants and animals.

- 2.43** Some of the following should be covered: The nerve cells in the nervous tissue are close together and can send signals, or impulses, from one to another very quickly. Nervous tissue is located all through the body. It forms the communication network to and from the brain. Sensory nervous tissue is responsible for sending information to the brain. This sensory information comes from nerve cells and nerve tissues located in the eyes, ear, nose, mouth, and skin. The brain then receives and processes these messages and information. Then, information is sent out from the brain through motor nervous tissues in order to move muscles, activate certain glands, or perform other body functions.
- 2.44** Some of these thoughts could be shared: The body is made up of complex cells and tissues. They are wonderful in the way they are structured and function. Even the tiny cells are very complex. God has made us wonderfully.

## SELF TEST 2

- 2.01** true  
**2.02** true  
**2.03** false  
**2.04** true  
**2.05** true  
**2.06** false  
**2.07** true  
**2.08** true  
**2.09** false  
**2.010** true  
**2.011** false  
**2.012** basic unit  
**2.013** nucleolus  
**2.014** Bone  
**2.015** microscope  
**2.016** leaves  
**2.017** multicellular  
**2.018** l  
**2.019** k  
**2.020** j  
**2.021** i  
**2.022** h  
**2.023** g  
**2.024** f  
**2.025** e  
**2.026** d  
**2.027** c  
**2.028** There are no muscle, nerve and bone cells in plants. Functions of cells are different. Plant cells have a cell wall, chloroplasts, and chlorophyll. Animal cells do not.
- 2.029** Movement is caused by muscle cells contracting. Small movements happen when only a few muscle cells contract. Large movements result when many muscle cells contract.
- 2.030** DNA and genes contain the molecular information to make the cells and groups of cells within a living thing what they are to be. The DNA is what makes the offspring of a living thing like the parent.
- 2.031** Tissues are groups of cells in a multicellular plant or animal that are similar in structure and perform similar functions. The four types of animal tissues are epithelial, muscular, nervous, and connective.

## SECTION 3

- 3.1** Plants take in carbon dioxide through their leaves and water from their roots. In photosynthesis, the chlorophyll in the plant receives the energy needed from the sun to cause a chemical reaction with the carbon dioxide and water. As a result, oxygen gas is produced, along with sugars and other materials that the plant can use as food. The oxygen produced by photosynthesis is given off through the leaves.
- 3.2** No.
- 3.3** Respiration is the opposite of photosynthesis. Oxygen is used up, and water and carbon dioxide are given off.
- 3.4** c. oxygen and sugars
- 3.5** b. both plants and animals
- 3.6** d. red blood cells
- 3.7** c. energy
- 3.8** a. each other
- 3.9** Food is brought into the body through eating and the body's digestive system. Oxygen is brought into the body through breathing. Respiration occurs when the food is combined with the oxygen in the body, giving off energy the body needs to perform life and work.
- 3.10** Plants and animals depend on each other to carry on life. Plants must have adequate carbon dioxide given off by animals and human beings in order for the process of photosynthesis to take place. In turn, animals and human beings rely on plants for the oxygen and much of the food they receive. God has arranged this important cycle of energy in the world.
- 3.11** false
- 3.12** true
- 3.13** true
- 3.14** false
- 3.15** true
- 3.16** true
- 3.17** two
- 3.18** mitosis
- 3.19** cell division
- 3.20** red blood
- 3.21** Nerve
- 3.22** Teacher check

## SELF TEST 3

- 3.01** true
- 3.02** false
- 3.03** true
- 3.04** false
- 3.05** true
- 3.06** true
- 3.07** true
- 3.08** true
- 3.09** true
- 3.010** false
- 3.011** true
- 3.012** c. discoveries
- 3.013** d. all of these
- 3.014** a. organelles
- 3.015** a. oxygen
- 3.016** c. White blood
- 3.017** a. cell division
- 3.018** Nerve
- 3.019** Muscle
- 3.020** Phospholipids
- 3.021** Any order:  
a. DNA  
b. RNA  
c. other proteins
- 3.022** Mitosis brings about cell division and two new cells from one original cell. Mitosis starts when the chromatin within the cell begins to rearrange and condense into orderly strands called *chromosomes*. The chromosomes then move into pairs. After that, the chromosome pairs begin to pull apart from each other. Eventually, the chromosome pairs split apart. When they split apart, cell division occurs. Then there are two new cells instead of the original single cell.
- 3.023** Most of the multicellular plants and animals reproduce themselves by the process known as *male-female reproduction*. A cell from a male parent and a cell from a female parent join together to form a new cell. This process begins a new living thing that has characteristics of both parents. The newly formed cell then begins to reproduce itself through mitosis.
- 3.024** In photosynthesis, green plants containing chlorophyll absorb energy from the sun to cause a chemical reaction between carbon dioxide and water to produce oxygen and sugars. Respiration is the opposite of photosynthesis. In respiration, oxygen and food combine to produce energy and carbon dioxide and water are given off.

**3.025** Microscopes are helpful in viewing cells. There are two basic types of microscopes: optical and electron. Dyes are also helpful in viewing cells so that parts of the cells stand out more clearly.

## LIFEPAC TEST

1. d
2. e
3. f
4. b
5. c
6. g
7. h
8. i
9. j
10. k
11. true
12. true
13. true
14. true
15. false
16. true
17. false
18. false
19. true
20. true
21. c. cells
22. a. a nucleus
23. c. oxygen and sugars
24. d. red blood cells
25. b. nuclear membrane
26. Any order:
  - a. optical
  - b. electron
27. Any order:
  - a. nuclear membrane
  - b. chromatin
  - c. nucleolus
28. Any order and any four of the following six:  
white blood cells  
red blood cells  
nerve cells  
bone cells  
epithelial cells  
muscle cells
29. The answer should contain some of the following: A cell is the basic unit of all living things. It is the unit of life. All living things that God has created contain cells. A cell contains at least two basic parts: a cell membrane and protoplasm. Three-part cells contain a cell membrane, cytoplasm, and a nucleus.
30. Food is brought into the body through eating and the body's digestive system. Oxygen is brought into the body through breathing. Respiration occurs when the food is combined with the oxygen in the body, giving off energy the body needs to perform life and work.

## ALTERNATE LIFE PAC TEST

1. true
2. false
3. true
4. true
5. true
6. true
7. false
8. false
9. false
10. true
11. Any order:
  - a. carbon dioxide
  - b. water
  - c. sunlight
12. a. - b. Either order:
  - a. oxygen
  - b. food
  - c. carbon dioxide
13. a. oxygen  
b. carbon dioxide
14. a. fearfully  
b. wonderfully
15. need drawing and label
16. c. microscope
17. b. male-female reproduction
18. a. organelles
19. a. cell division
20. b. DNA
21. Examples; any order:
  - a. epithelial
  - b. connective
  - c. muscle or nervous
22. Either order:
  - a. oxygen
  - b. sugars or food
23. e
24. f
25. a
26. g
27. b
28. h
29. c
30. i
31. d
32. l

# SCIENCE 501

## ALTERNATE LIFEPAC TEST

**NAME** \_\_\_\_\_  
**DATE** \_\_\_\_\_  
**SCORE** \_\_\_\_\_



**Write true or false** (each answer, 2 points).

1. \_\_\_\_\_ Cells are the basic unit of life.
2. \_\_\_\_\_ All cells have a cell wall.
3. \_\_\_\_\_ Prokaryote cells have only two parts—an outer membrane and inner protoplasm.
4. \_\_\_\_\_ Almost all cells are microscopic.
5. \_\_\_\_\_ Scientists are still making new discoveries today about cells.
6. \_\_\_\_\_ The cell membrane consists of a phospholipid double layer and proteins.
7. \_\_\_\_\_ The cell wall is usually made up mostly of water.
8. \_\_\_\_\_ Photosynthesis in plants produces carbon dioxide and water.
9. \_\_\_\_\_ Protozoa are an example of a multicellular organism.
10. \_\_\_\_\_ Budding is a process of cell reproduction.

**Complete these statements** (each answer, 3 points).

11. Photosynthesis works when a. \_\_\_\_\_, b. \_\_\_\_\_ and c. \_\_\_\_\_ are present in the plant.
12. The carbon cycle needs a. \_\_\_\_\_ and b. \_\_\_\_\_ from plants and c. \_\_\_\_\_ from animals.
13. Red blood cells take a. \_\_\_\_\_ to the cells and b. \_\_\_\_\_ away from them.
14. Psalms 139:14 says that we are a. \_\_\_\_\_ and b. \_\_\_\_\_ made.



**Match these items** (each answer, 2 points).

23. \_\_\_\_\_ cells that fight disease
24. \_\_\_\_\_ nucleolus
25. \_\_\_\_\_ energy
26. \_\_\_\_\_ mitosis
27. \_\_\_\_\_ xylem
28. \_\_\_\_\_ respiration
29. \_\_\_\_\_ cytoplasm
30. \_\_\_\_\_ God
31. \_\_\_\_\_ Robert Hooke
32. \_\_\_\_\_ cell wall
- a. the capacity to do work
- b. connective tissue in plants
- c. fluid material within cell membrane and outside the nucleus
- d. discovered cells while looking at cork
- e. white blood cells
- f. contained within the nucleus of a cell
- g. a single cell splits to form two new cells
- h. carbon dioxide and energy given off
- i. created all living things
- j. invented the telescope
- k. made of chloroplasts
- l. usually made of cellulose



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