



CALVERT™
PUBLICATIONS

5th Grade



SCIENCE

SCIENCE 500

Teacher's Guide

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SCIENCE SCOPE & SEQUENCE

Life Cycles and Geology (Grade 5)

CELLS <ul style="list-style-type: none"> • Cell composition • Plant and animal cells • Life of cells • Growth of cells 	Unit 1
PLANTS: LIFE CYCLES <ul style="list-style-type: none"> • Seed producing plants • Spore producing plants • One-celled plants • Classifying plants 	Unit 2
ANIMALS: LIFE CYCLES <ul style="list-style-type: none"> • Invertebrates • Vertebrates • Classifying animals • Relating function and structure 	Unit 3
BALANCE IN NATURE <ul style="list-style-type: none"> • Needs of life • Dependence on others • Prairie life • Stewardship of nature 	Unit 4
TRANSFORMATION OF ENERGY <ul style="list-style-type: none"> • Work and energy • Heat energy • Chemical energy • Energy sources 	Unit 5
PHYSICAL GEOLOGY <ul style="list-style-type: none"> • Layers of the earth • How volcanoes are formed • Erosion and weathering • How glaciers form 	Unit 6
RECORDS IN ROCK: FOSSILS <ul style="list-style-type: none"> • Fossil types • Fossil location • Identifying fossils • Reading fossils 	Unit 7
RECORDS IN ROCK: GEOLOGY <ul style="list-style-type: none"> • Features of the earth • Rock of the earth • Forces of the earth • Changes in the earth 	Unit 8
CYCLES IN NATURE <ul style="list-style-type: none"> • Properties of matter • Changes in matter • Natural cycles • Phases of the moon 	Unit 9
LOOK AHEAD <ul style="list-style-type: none"> • Plant and animal life • Balance in nature • Earth's structures • Records of rock 	Unit 10

TEACHER NOTES

MATERIALS NEEDED FOR THIS UNIT	
Required	Suggested
<ul style="list-style-type: none"> • optical microscope • slides • slide covers • toothpicks • diluted iodine solution (Lugol's iodine solution) • 3 small jars • water • onion bulb • knife or scalpel • tweezers (forceps) • small eyedropper (pipet) • sterile needle (lancet) • ink stain (methylene blue) • pond water (or protozoa culture kit if pond is not available) • cotton ball • rubbing alcohol 	None

ADDITIONAL LEARNING ACTIVITIES

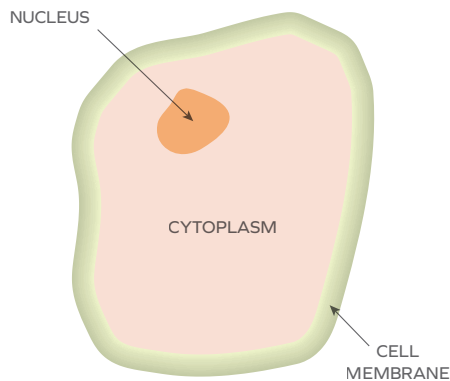
Section 1: The Basic Unit of Living Things: A Cell

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. Have 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. Assign students the task of preparing slides of several different fruits and vegetables. As a class, observe and discuss their slides.
4. Instruct the students to look up information on Robert Hooke and write a short report.
5. Be creative! Assign students the task of writing a few paragraphs and illustrating a story titled:
 "A Cell Named _____ (their name) ." Include their parts and functions.

ANSWER KEYS

SECTION 1

- 1.1 cell
- 1.2 cork
- 1.3 b
- 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

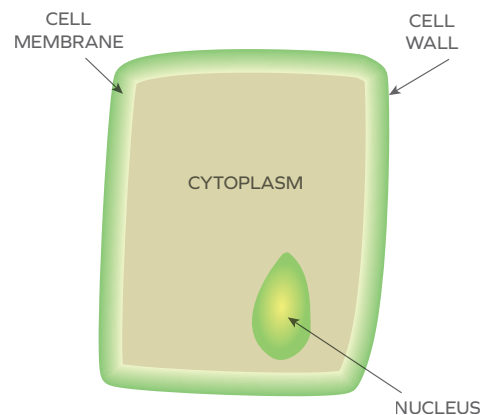


- 1.13 true
- 1.14 false
- 1.15 true
- 1.16 true
- 1.17 false
- 1.18 Microscopes help us to view cells.
(Two types of microscopes are optical microscopes and electron microscopes.)
It is also helpful to use dyes to view cells.
- 1.19 Compare to the cell illustrations shown in the workbook.
- 1.20 The 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 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



Complete this activity (each answer, 3 points).

16. Put these fern life cycle events in order.
- | | | |
|------------------|-----------------------|------------------------|
| fern matures | sperm and egg develop | fertilization |
| tiny fern grows | spore begins growth | many spores are formed |
| prothallus forms | | |
- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____

Complete these statements (each answer, 3 points).

17. Cell division is called _____ .
18. Sperm can be carried by _____ grains.
19. When sperm joins an egg, _____ takes place.
20. The fern’s tiny, flat plant called a prothallus grows during the _____ stage.
21. Bees are important to flowers because they carry _____ from one part to another.

Write the correct answers (each numbered item, 4 points).

22. Explain vegetative reproduction.
- _____
- _____
- _____
23. How do seeds get from one location to another?
- _____
- _____
- _____
- _____

TEACHER NOTES

MATERIALS NEEDED FOR THIS UNIT	
Required	Suggested
<ul style="list-style-type: none"> • baby food jar or Mason jar • bran flakes or oatmeal • potato • mealworm • sharp knife or scalpel • chicken egg • dropper (pipet) • small dish • paper towel • magnifying glass • food coloring 	None

ADDITIONAL LEARNING ACTIVITIES

Section 1: Invertebrates

1. In groups of four or five, have students work together to make a chart classifying invertebrates. Headings should be One-Celled Animal-like Protists, Insects, Worms, Mollusks. Include all invertebrates mentioned in Section 1 plus any more they know or wish to look up in the library or online.
2. Assign students the task of looking up more information about butterflies. Have them draw pictures and explain the life cycle of one kind of butterfly.

Section 2: Vertebrates

1. Instruct students to cut out animal pictures from magazines. Each student may show one picture, name the animal, and tell whether it is a vertebrate or an invertebrate.
2. Make a large chart to classify vertebrates. One student will show a picture of a vertebrate and tell whether it is a fish, amphibian, reptile, bird, or mammal. The student will write the animal name in the appropriate section of the chart. Continue with other students.
3. Instruct students to ask their parents to take them to the zoo, and then tell them to follow these directions: List all the animals you see. Next to each animal name write *vertebrate* or *invertebrate*. Tell whether it is a worm, mollusk, reptile, and so forth.
Example: alligator-vertebrate-reptile.
4. If any students live near a pond, instruct them to try to observe some tadpoles to watch their growth. The stage from tadpole to adult will take approximately 6-12 weeks. Have them draw pictures of what they observe. Diagrams and videos of the growth process can be found online if a pond is not available.

Administer the Test.

TEST

1. a
2. d
3. c
4. a
5. b
6. d
7. c
8. b
9. d
10. a
11. true
12. true
13. false
14. true
15. false
16. false
17. true
18. false
19. true
20. true
21. c. roots
22. b. ecosystem
23. c. stewardship
24. c. pollution
25. a. terrarium
26. a. bison
27. Teacher check
28. A balance of nature occurs when the life needs of all the living things in an area of the earth are met.
29. Nothing would be eating the primary consumers so they would reproduce and get overpopulated and eat all the plants in the area until they didn't have food and the cycle of life would be interrupted.

ALTERNATE TEST

1. true
2. false
3. false
4. true
5. false
6. false
7. true
8. true
9. false
10. true
11. d
12. a
13. j
14. b
15. e
16. l
17. k
18. f
19. h
20. m
21. fire
22. grazers
23. settlers
24. predators
25. air pollution
26. photosynthesis
27. Example:
The needs of all life webs are supplied from the carbon, water, and chemical cycles. Food chains have producers, consumers, and decomposers.
28. Example:
Taking care of nature and preserving natural resources helps keep the life systems in balance so all living things have what they need.
29. Example:
Hunting can harm the balance of nature when too many animals are shot or when hunters kill off all predators. Hunting is part of the balance of nature when it is done within the law. Humans are just another predator in this case.
30. b. careful with
31. a. c. oxygen
b. b. carbon dioxide
32. Any order:
a. a. air
b. c. water
33. a. grasshoppers
34. a. fungi
35. c. dead animals
36. c. web of life

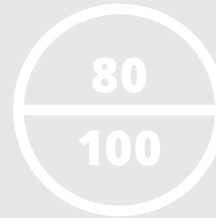
SCIENCE 505

ALTERNATE TEST

NAME _____

DATE _____

SCORE _____



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

1. _____ Work cannot be measured.
2. _____ Solar energy comes from the sun.
3. _____ Play cannot be work.
4. _____ Energy is needed for work to be done.
5. _____ Lightning is a form of electrical energy.
6. _____ Heat energy can be changed to mechanical energy.
7. _____ Nuclear energy cannot make electricity.
8. _____ All matter has some heat energy.
9. _____ Explosions cause sound energy.
10. _____ Food stores mechanical energy.

Write the **correct letter and answer on each line** (each answer, 3 points).

11. A burning leaf gives off _____ energy.
 a. heat b. mechanical c. potential
12. Energy cannot be _____.
 a. lost b. bought c. used
13. Solar energy does not give off _____.
 a. rays b. light c. pollution
14. Geothermal energy is produced when water touches _____.
 a. biomass b. oil c. hot rocks
15. Stored energy is _____ energy.
 a. kinetic b. potential c. old

TEACHER NOTES

MATERIALS NEEDED FOR THIS UNIT	
Required	Suggested
None	<ul style="list-style-type: none"> • various rocks • materials for volcano craft • crystals growing kit

ADDITIONAL LEARNING ACTIVITIES

Section 1: Earth Structures

1. Have students draw pictures of sedimentary, igneous, and metamorphic rocks.
2. Have students create a poster illustration of the layers of the earth, labeling them.
3. Bring in a variety of rocks and create a class display of rock types with labels.
4. Take a field trip to a museum with a geology display, and then have students write an essay about what they learned from the tour.

Section 2: Mountains

1. Have students identify the types of mountains in their state, using an atlas, an encyclopedia, or the internet.
2. Build a volcano. Use the internet to identify the method, but there are papier-mâché, salt dough, and even playdough options!
3. Have students research the most recent volcanic eruptions, and then choose one to write a paper about. Describe the type of volcano, location, date of eruption, and history of eruptions.
4. Get a crystal growing kit and grow crystals in class. Discuss the minerals in crystals and how they impact colors.

Section 3: Ocean

1. Have students choose a lagoon, lake, or group of islands, and then build a three-dimensional model using available materials, such as clay, sand, glue, food coloring, etc. Discuss the types of water formations and where water comes from for them.
2. Visit the USGS website and have students write a paper on "hot spots."
3. Have students research and write an essay about Alfred Wegener and others who believed South America and Africa were once united with Antarctica, Australia, and India.

Administer the Test.

SECTION 2

- 2.1 true
 2.2 true
 2.3 true
 2.4 false
 2.5 true
 2.6 - 2.9 Either order:
 2.6 a. flowering plants
 b. cone-bearing plants
 2.7 a. ferns
 b. fungi
 2.8 a. red algae
 b. green algae
 2.9 a. amoeba
 b. paramecium
 2.10 Any order:
 a. insects
 b. worms
 c. mollusks
 2.11 Any order:
 a. fish
 b. reptiles
 c. amphibians
 d. birds
 2.12 Either order:
 a. mammals
 b. some fish and reptiles
 2.13 seed
 2.14 one-celled
 2.15 soft
 2.16 leaves
 2.17 more
 2.18 flowers
 2.19 false
 2.20 false
 2.21 true
 2.22 false
 2.23 true
 2.24 false
 2.25 true
 2.26 false
 2.27 Teacher check
 2.28 F
 2.29 T
 2.30 T
 2.31 F
 2.32 T
 2.33 T
 2.34 F
 2.35 Teacher check
 2.36 b
 2.37 c
 2.38 c
 2.39 a
 2.40 c
 2.41 a
 2.42 Hint:
 a. It is a print fossil.
 b. It is not large.
 c. It looks somewhat like ferns of today.
 d. It was probably found at a rock quarry, or a mountain, or any area of sedimentary deposits.
 e. It was found in sedimentary rock.
 2.43 Hint:
 a. The fossil is a fern fossil.
 b. Ferns were not large.
 c. Ferns lived near water.
 d. Ferns needed a climate similar to today's ferns.
 e. The fern sank in the sediment and was drowned.
 2.44 Teacher check
 2.45 Teacher check
 2.46 Teacher check
 2.47 reconstruct
 2.48 man-made
 2.49 models
 2.50 conclusions, inferences
 2.51 scars
 2.52 Teacher check

- 1.63** a. stone
b. pebble
c. silt
d. sand
e. boulder
f. gravel
g. cobble

1.64 c

1.65 a

1.66 a

1.67 c

1.68 b

1.69 b

1.70 a

1.71 c

1.72 a

1.73 a

1.74 a

1.75 b

1.76 b

1.77 a

1.78 Any order:

- a. color
- b. luster
- c. streak
- d. hardness
- e. cleavage

1.79 Answer should include the five physical tests.

1.80 Answer should include the five physical tests.

1.81 Answer should include the five physical tests.

1.82 Teacher check

SELF TEST 1

1.01 d

1.02 e

1.03 i

1.04 a

1.05 b

1.06 c

1.07 f

1.08 true

1.09 false

1.010 false

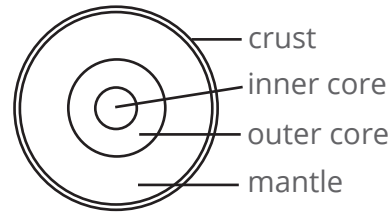
1.011 true

1.012 true

1.013 true

1.014 false

1.015



1.016 c. shale

1.017 c. luster

1.018 b. limestone

1.019 c. color

1.020 a. lava

1.021 b. constantly changing

1.022 b. Crystals

1.023 Any order:

- a. mountains, valleys, plains
- b. hills, oceans, rivers
- c. lakes, plateaus

1.024 Any order:

- a. color
- b. streak
- c. cleavage
- d. luster
- e. hardness

1.025 Heat and pressure can force magma towards the earth's surface. When magma gets near enough to the surface to cool down, igneous rocks form from the cooled magma.

1.026 Heat and pressure from within the earth cause igneous and sedimentary rocks to change physically (in looks) and chemically (new material).

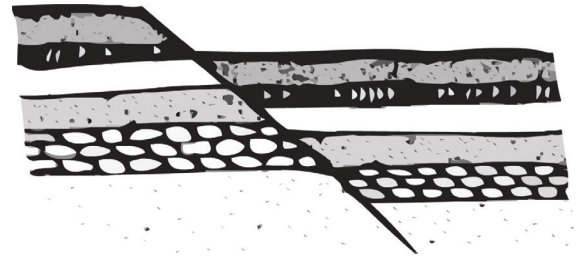
1.027 Sediment that builds up on the earth is cemented together by the pressure of water or other sediments.

SELF TEST 2

- 2.01 f
- 2.02 e
- 2.03 g
- 2.04 a
- 2.05 b
- 2.06 j
- 2.07 k
- 2.08 l
- 2.09 c
- 2.010 d
- 2.011 true
- 2.012 false
- 2.013 true
- 2.014 true
- 2.015 false
- 2.016 false
- 2.017 true
- 2.018 true
- 2.019 false
- 2.020 true
- 2.021 c. living conditions
- 2.022 b. cutting lumber
- 2.023 c. weathering
- 2.024 b. expand
- 2.025 d. deserts
- 2.026 a. delta
- 2.027



2.028



- 2.029 flattened
- 2.030 igneous
- 2.031 magma
- 2.032 nickel
- 2.033 They are formed as a result of magma getting near the surface and cooling. They can come from volcanoes, or through magma forcing itself between rock layers.
- 2.034 A mineral describes a substance that has four features. 1) A mineral is found in nature. Synthetic or man-made substances are not minerals. 2) A mineral has the same chemical makeup wherever it is found on the earth. 3) The atoms of a mineral are arranged in a regular pattern and form solid units called *crystals*. 4) Almost all minerals are made up of substances that were never alive.

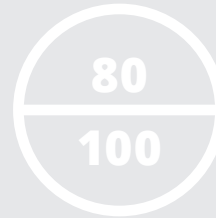
SCIENCE 509

ALTERNATE TEST

NAME _____

DATE _____

SCORE _____



Match these items (each answer, 2 points).

- | | |
|--|-----------------|
| 1. _____ water vapor | a. solid state |
| 2. _____ the most heat causes this | b. liquid state |
| 3. _____ takes the shape of its container | c. gas state |
| 4. _____ molecules grouped closely together | |
| 5. _____ molecules moving fastest | |
| 6. _____ molecules locked together | |
| 7. _____ often matter cannot be seen | |
| 8. _____ result of taking heat away from gas state | |
| 9. _____ clouds | |
| 10. _____ snow | |

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

11. _____ An object has the same mass on the moon as on the earth.
12. _____ All matter has the same special properties.
13. _____ Two items can take up the same space.
14. _____ To find an item's special properties, tests must be made.
15. _____ A special property of matter is brittleness.
16. _____ Rust is a physical change.
17. _____ Atoms are made up of compounds.
18. _____ The head of a comet has a nucleus.
19. _____ Formation and decay help cycle matter.

ANSWER KEYS

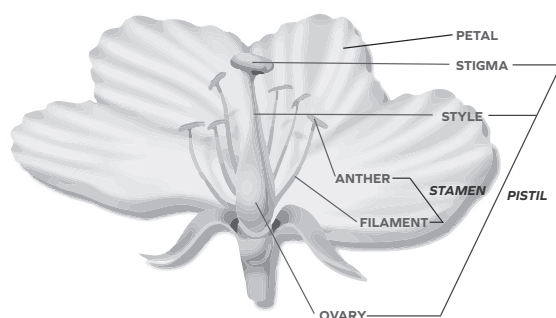
SECTION 1

- 1.1 b. unicellular
 1.2 b. eukaryote
 1.3 c. cell wall
 1.4 b. chlorophyll
 1.5 a. photosynthesis
 1.6 Any order:

- a. animals
 b. plants
 c. fungi
 d. protists
 e. monerans

- 1.7 cell—the basic unit of all living things.
 1.8 cellulose—a substance that forms the walls of plant cells.
 1.9 nucleolus—a small part within the nucleus that is very condensed chromatin and consists mainly of RNA and other proteins.
 1.10 xylem—The connective tissues in plants that help carry materials through the plant.
 1.11 tissue—A group of similar cells connected together that perform similar work.
 1.12 fungi—One of the five main kingdoms of living things. They do not produce chlorophyll.
 1.13 yeast—A single-celled fungi.
 1.14 spores—tiny, specialized structures that are able to grow into a new organism. Spores help an organism survive and move from place to place.

1.15



- 1.16 a
 1.17 a
 1.18 c
 1.19 c
 1.20 a
 1.21 b
 1.22 c
 1.23 c
 1.24 a

- 1.25 b
 1.26 b
 1.27 c
 1.28 b
 1.29 b
 1.30 a
 1.31 a.

- Mitosis is cell division. In mitosis, one cell splits apart to form two new cells. The nucleus brings its materials together to form chromosomes. The chromosomes move in pairs. Soon they pull away from each other, allowing the cell to split into two cells with the same makeup as the original cell.
 b. The parent cell develops a bump on itself. Some cytoplasm and some of the nucleus move into the bump. The cell membrane pinches away from the bud. Two cells are produced.

- 1.32 true
 1.33 false
 1.34 false
 1.35 true
 1.36 true
 1.37 false
 1.38 true
 1.39 false
 1.40 Teacher check
 1.41 Teacher check
 1.42 Teacher check
 1.43

Mitosis is the process of cell division where a cell divides into two identical cells. Osmosis is the process where materials are brought into cells or out of cells through the cell membrane. They are two unrelated cell processes.

- 1.44 The host is a plant or animal that supports a parasite. The parasite lives in or on the host and usually feeds off the host's food or the host itself. The parasite needs the host for survival, but the host does not need the parasite.
 1.45 They are all stages in a life cycle. They can be identified as stages of development of the animal they will become. The animals in these stages do not have all of the parts that an adult of the species has.



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