

Discovery Science Library: The Basics

Life Science

Teacher's Guide

Grade Level: 3–5

Curriculum Focus: Life Science

Lesson Duration: Two class periods

Program Description

From genetics and symbiosis to coral ecosystems and plant adaptation, introduce elementary students to a wide variety of life science topics with these segments drawn from Discovery Channel School's award-winning series.

Lesson Plan

Student Objectives

- Describe a cell.
- Watch “The Cell,” a segment in *Discovery Science Library: The Basics: Life Science*.
- Draw pictures of plant and animal cells, highlighting differences and similarities.
- Write a list outlining differences and similarities of plant and animal cells.

Materials

- *Discovery Science Library: The Basics: Life Science* video
- Computer with Internet access
- Paper and colored pencils

Procedures

1. Begin the lesson by having students watch “The Cell,” a segment in *Discovery Science Library: The Basics: Life Science*. Ask students to pay close attention to the definition of the term “cell” and to the discussion about similarities and differences of plant and animal cells.
2. After students have finished watching the segment, ask volunteers to define the term “cell.” Make sure that students understand that a cell is the basic unit of life.
3. Remind students that a main point of the segment is exploring the similarities and differences of plant and animal cells. To reinforce this point, tell students that they are going to work with a partner to do the following:
 - Draw a picture of a plant cell and an animal cell.

- Label the main parts of each cell.
 - Identify main differences between plant and animal cells.
4. Give students time in class to work on their drawings and lists. Students can use colored pencils to distinguish one cell part from another. The following Web sites will provide more information about this topic:
- <http://www.northern.edu/ramsayj/etechWeb/cells.htm>
 - http://www.eurekascience.com/ICanDoThat/animal_cells.htm
 - http://www.eurekascience.com/ICanDoThat/plant_cells.htm
 - http://www.bbc.co.uk/schools/ks3bitesize/science/biology/lifecells1_2.shtml
5. During the next class period, ask volunteers to share their drawings. Make sure that students have correctly labeled and identified the main differences between plant and animals, which are explained below:
- Plant cells have a hard cell wall made of cellulose so that the plant can stand upright. Animal cells do not have a cell wall.
 - Plant cells have chloroplasts necessary for photosynthesis; animal cells do not have this structure.
6. Conclude the lesson by reviewing the structures that plant and animal cells share. By the end of the lesson, students should know that both plant and animal cells have a nucleus, cytoplasm, and mitochondria.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students were highly engaged in class and discussion; produced complete and accurate drawings of each kind of cell and descriptions of the differences of plant and animal cells.
- 2 points: Students participated in class and discussions; produced adequate drawings of each kind of cell and mostly complete and accurate descriptions of the differences of plant and animal cells.
- 1 point: Students participated minimally in class and discussions; produced incomplete drawings of each kind of cell and weak descriptions of the differences of plant and animal cells.

Vocabulary

cell

Definition: The basic unit of life

Context: The English scientist Robert Hooke was one of the first people to observe cells under a microscope.

cell wall

Definition: A rigid structure in plant cells, allowing the plant to stand upright

Context: The cell wall of a plant is made of cellulose, a substance that is both tough and flexible.

chloroplast

Definition: A structure in plant cells that allows plants to capture and use sunlight to make food

Context: Without chloroplasts, plants would not be able to make their own food in the process known as photosynthesis.

cytoplasm

Definition: A gel-like substance in which many of a cell's organelles are found

Context: In an animal cell, the cytoplasm is located between the cell membrane and the nucleus.

mitochondria

Definition: Structures in plant and animal cells that provide cells with energy necessary to carry out their life functions

Context: Sometimes mitochondria are referred to as the powerhouse because they are essential to the healthy functioning of a cell.

nucleus

Definition: A structure found in plant and animal cells that directs a cell's activities

Context: The nucleus performs a similar function in all types of cells.

organelle

Definition: A structure inside a cell designed to perform a specific function

Context: The organelles perform specific jobs, including producing the energy necessary to function and transporting nutrients to all parts of the cell.

Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Life Science--Understands the structure and function of cells and organisms
- Language Arts – Viewing: Uses a range of strategies to interpret visual media

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K-12 to promote scientific literacy. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>.

This lesson plan addresses the following science standards:

Grades K-4

- Life Science: Organisms and environments

Grades 5-8

- Life Science: Structure and function in living systems; Regulation and behavior
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:



Play Video—This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index—Here the video is divided into sections indicated by video thumbnail icons; brief descriptions are noted for each one. Watching all parts in sequence is similar to watching the video from start to finish. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Standards Link—Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources—This screen gives the technical support number and Web site address.

Video Index

Segment 1: The Cell (7 min.)

Learn about the cell, the building block of life, including its parts and their functions. Discover the difference between plant and animal cells.

Pre-viewing question

What do you know about cells?

Answer: Answers may include that the cell is the smallest unit of life.

Post-viewing question

What is the material of a cell of a plant, and what is its function?

Answer: The cell wall is made of cellulose, which allows the plant to stand upright.

Segment 2: Bacteria: Introduction (3 min.)

Examine different types of bacteria, the most diverse form of life. Discover where they exist and learn why they are important.

Pre-viewing question

In what ways have bacteria affected your life?

Answer: Some students may say that bacteria have given them infections.

Post-viewing question

What are two ways that bacteria are helpful?

Answer: Bacteria in the digestive system help food digestion. Some bacteria can clean up environmental pollutants.



Segment 3: The Rain Forest and the Desert (8 min.)

Travel to the Manu Biosphere and observe its range of plants and animals. Then go to the desert and discover how living things overcome challenges.

Pre-viewing question

What plants and animals live in the rain forest?

Answer: Answers will include trees, birds, and monkeys.

Post-viewing question

What is the relationship between the squirrel monkeys and the capuchin monkeys in the Manu Biosphere?

Answer: The capuchin monkeys are the only ones that can open palm nuts. The squirrel monkeys wait below the trees to eat the remains of palm nuts that the capuchin monkeys throw down.

Segment 4: Coral Ecosystems (2 min.)

Explore the bustling underwater city of Truk Lagoon, the largest coral reef in Micronesia. Find out how coral reefs form and why living organisms make this ecosystem their home.

Pre-viewing question

Have you ever heard of the Truk Lagoon? If so, what do you know about it?

Answer: Answers will vary.

Post-viewing question

How does a coral reef form?

Answer: A reef forms from a coral polyp, which reproduces asexually, causing thousands more to emerge. Dead polyps leave their skeletons behind, resulting in the formation of a coral reef.

Segment 5: Organisms: Undersea Discoveries (5 min.)

How do scientists identify and classify species? Learn about the levels of classification that scientists consider when identifying and naming new species.

Pre-viewing question

What do you know about how scientists classify living organisms?

Answer: Answers will vary.

Post-viewing question

What are the levels, from the broadest to the specific, on the classification chart used by scientists?

Answer: The levels are domain, kingdom, phylum, class, order, family, genus, and species.



Segment 6: Birds and Insects (6 min.)

Explore the world of birds and insects. Find out what all birds share. Learn about the diversity of insects and how they grow and change.

Pre-viewing question

What prehistoric animal do scientists think that birds are descended from?

Answer: Most scientists think that birds may be descended from dinosaurs.

Post-viewing question

What trait do all birds share?

Answer: All birds have feathers.

Segment 7: Symbiosis (3 min.)

What are symbiotic relationships and why do they exist in nature? Learn how two different organisms live closely for mutual benefit.

Pre-viewing question

Do you know what the term “symbiosis” means?

Answer: Symbiosis is two kinds of organisms living together in close association in a way that benefits both.

Post-viewing question

What are lichens, and how are they an example of symbiosis?

Answer: Lichens are organisms that include fungus and algae. The fungus eats the food produced by the algae, and the algae get water and minerals from the fungus. This relationship is an example of symbiosis because each organism benefits and gets what it needs to survive.

Segment 8: How Plants Adapt (4 min.)

Discover how plants survive in harsh environments around the world. Learn how plants adapt in cold climates and how the giant water lily makes sure pollination takes place.

Pre-viewing question

What do you know about adaptation?

Answer: Answers will vary, but students may know an adaptation is a structure or behavior that enables an organism to survive in its environment.

Post-viewing question

How does the giant water lily's blooming cycle help its pollination?

Answer: At the beginning of the giant water lily's blooming cycle, its blossoms are white, have a sweet fragrance, and are open to the sun. When an insect feeds on the plant's nectar, the petals lose

their fragrance, close, and change to pink. When the petals reopen, the insect is covered with pollen. When it flies to another plant, the pollen will spread to that plant.

Segment 9 :How Bones Develop (4 min.)

Learn how bones grow and change. Find out about their structure and how they are designed to absorb tremendous force.

Pre-viewing question

Are babies born with bones?

Answer: Answers will vary, but some students may know that babies are born with cartilage.

Post-viewing question

Why are bones able to absorb great force without breaking?

Answer: Bones have a spongy bone layer inside, which makes them lightweight but strong and able to absorb great force without breaking.

Segment 10: Skin (2 min.)

Find out the functions that skin performs. Explore the skin's layers and learn how to take care of your skin.

Pre-viewing question

What do you know about the skin?

Answer: Answers will vary, but students may know it is an essential organ.

Post-viewing question

Why is sunscreen useful?

Answer: Sunscreen helps prevent the sun's ultraviolet rays from penetrating and damaging the skin.

Segment 11: Food and Digestion (6 min.)

Watch as the Ayvaliotis family learns about nutrition. Learn about digestion and why a healthful diet is essential to a well-functioning digestive system.

Pre-viewing question

Do you think that you eat a nutritious diet?

Answer: Answers will vary.

Post-viewing question

What one important lesson did the Ayvaliotis family learn from the nutritionist?

Answer: The family learned that they had to reduce the amount of soda and junk food in their diets and add more fruits and vegetables.



Segment 12: The Genetics of Twins (4 min.)

Discover how twins form and the difference between identical and fraternal twins. Listen as a psychologist explains the latest thinking about how genes and the environment determine who we are.

Pre-viewing question

Do you know any twins?

Answer: Answers will vary.

Post-viewing question

What is the difference between identical and fraternal twins?

Answer: Identical twins develop from a single fertilized egg, which means the offspring share the same DNA. Fraternal twins develop from two fertilized eggs, so they do not share DNA.

