Life Cycles: Teacher’s Guide

Grade Level: 3-5  Curriculum Focus: Life Science  Lesson Duration: One to two class periods

Program Description
Humans, animals, and plants reproduce so their species will survive. Segments cover types of reproduction, inherited and learned characteristics, and the role of cells. Life Cycles – Explains the difference between sexual and asexual reproduction. Heredity – Discusses how genes and mutations are passed to offspring during the reproduction process. Behavior – Focuses on traits that are learned as organisms make adaptations in order to survive. Cell Structure – Explores the biology and function of the building blocks of life.

- Life Cycles (6 min.)
- Heredity (5 min.)
- Behavior (6 min.)
- Cell Structure (6 min.)

Onscreen Questions
- What is the typical life cycle of a person?
- What is the life cycle of an insect?
- Describe three different life cycles discussed in this segment.
- How are these life cycles similar?
- How are they different?
- What physical characteristics do you share with family members?
- What personality traits do you share with family members?
- How do genes determine physical characteristics?
- In what ways does your environment affect your development?
- What factors determine how an animal behaves?
- How does your environment affect your behavior?
- What is the difference between instinctive and learned behavior?
- What are some of both behaviors that you have?
• How might cells in the human body be specialized?
• What is the benefit of having specialized cells?
• What are the major parts of most cells?
• How do the parts of most cells function?

Lesson Plan

Student Objectives
• Define the terms “genes” and “heredity.”
• Identify learned and inherited behaviors.
• Describe and compare family traits and characteristics.

Materials
• Life Cycles video and VCR, or DVD and DVD player
• Paper and pencils
• Computer with Internet access (optional)

Procedures
1. Begin the lesson by discussing genes and heredity. Ask students these questions: What are genes and genetics? What traits do animals pass to their offspring? What human behaviors are inherited? What behaviors are learned? What do we inherit from our parents?
2. After watching the program, discuss what students learned about heredity and genetics.
3. Tell students that they will prepare a genetic description of themselves. Ask them to think of a parent or grandparent. Students who may not have a relationship with a parent or grandparent may name any birth, adoptive, or foster family member. Have each student take a blank piece of lined paper and fold it into three columns. Ask them to open it and write characteristic/behavior at the top of the first column, the family member’s name at the top of the second column, and their own name at the top of the third column.
4. Have students number the lines in the first column from 1-15 and write the following list:
   (1.) Eye color
   (2.) Hair color
   (3.) Hair type (curly, straight, wavy)
   (4.) Skin color (fair, olive, dark)
   (5.) Face shape (heart shaped, round, long)
(6.) Height  
(7.) Foot size  
(8.) Moles or birthmarks (few, many, none)  
(9.) Sex (male or female)  
(10.) Diseases or conditions  
(11.) Mannerisms (body language)  
(12.) Favorite sport  
(13.) Favorite food  
(14.) Favorite school subject  
(15.) Favorite color  

5. Tell students that they will use this list to conduct research about their own genetic make-up; it will serve as a list of questions about themselves and their family members. Review the list for any questions. Give students some time in class to complete the answers about themselves and as possible for their family members. As a homework assignment, have them interview their family members for the remaining answers.  

6. In class, ask student volunteers to share interesting details learned about their family members. Have students look at their lists and compare their characteristics and behaviors with those of their family members. Ask about eye, hair, and skin color and face shape? Who shares favorite foods or a sport? Who walks, talks, or moves their body in a similar fashion to someone in their family?  

7. Discuss the similarities and differences students have learned. Talk about the characteristics that may be inherited (physical traits) and learned, such as a favorite color or food.  

8. Using their lists, students will write a paragraph comparing their characteristics and behaviors with those of a family member. Tell students to choose at least five items on the list; the traits may be differences or similarities. For example, a student may write about why her hair color differs from her family member’s. Ask volunteers to share their paragraphs with the class.  

9. If students have more questions about genetics or are interested in further study, have them visit the following Web sites:  
   - http://www.thetech.org/genetics/  
   - http://www.exploratorium.edu/genepool/exhibits.html  
Assessment

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

- **3 points**: Students correctly defined terms related to genetics; correctly identified learned and inherited behaviors; completed their lists appropriately; and wrote legible, informative paragraphs comparing at least five characteristics or behaviors with those of family member.

- **2 points**: Students somewhat correctly defined terms related to genetics; somewhat correctly identified learned and inherited behaviors; completed most of their lists appropriately; and wrote legible, somewhat informative paragraphs comparing at least three characteristics or behaviors with those of family member.

- **1 point**: Students did not correctly define terms related to genetics; could not identify learned and inherited behaviors; did not complete their lists appropriately; and wrote illegible, uninformative paragraphs comparing one or no characteristics or behaviors with those of family member, or did not complete a paragraph.

Vocabulary

behavior
*Definition*: The manner of acting or conducting yourself
*Context*: Behavior is a combination of inherited traits and experience.

gene
*Definition*: A unit of heredity; a segment of DNA found on a chromosome that codes for a particular protein
*Context*: A dominant genetic trait, such as dark hair, requires a gene from only one parent.

heredity
*Definition*: The passing of characteristics from parents to children
*Context*: Heredity is the explanation for a family with many generations of children born with red hair.

offspring
*Definition*: The descendants of a person, plant, or animal
*Context*: Offspring, or children, may closely resemble their parents.

reproduction
*Definition*: The process of generating offspring
*Context*: No organism lives forever, so reproduction maintains a species’ survival.
Academic Standards

National Academy of Sciences
The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit http://books.nap.edu.

This lesson plan addresses the following science standards:
- Life Science: Characteristics of organisms; Organisms and environments; Reproduction and heredity; Regulation and behavior

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:
- Science—Life Sciences: Understands the principles of heredity and related concepts
- Language Arts—Viewing: Uses viewing skills and strategies to understand and interpret visual media

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

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 four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief
descriptions and total running times are noted for each part. 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.

Curriculum Units — These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher’s Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

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

I. Life Cycles (6 min.)
All organisms undergo cycles of life. Learn about the life cycles of several different animals, including reproduction.

II. Heredity (5 min.)
Learn about genes and heredity and discover the genetic connection between modern birds and ancient dinosaurs.

III. Behavior (6 min.)
Explore the concept of behavior and see what kinds of instinctual behaviors some animals possess.

IV. Cell Structure (6 min.)
A mature human being has an estimated 100 trillion cells, all of which work together. Take a close look at the structure and functions of cells.

Curriculum Units

1. Cycles of Life

Pre-viewing question
Q: In your own words, describe a life cycle?
A: Answers will vary.

Post-viewing question
Q: What do you think is the most important stage in an organism’s life cycle and why?
A: Telescopes let us observe large distant objects. Using magnification, telescopes show parts of the universe that cannot be seen with the naked eye.
2. Metamorphosis and Reproduction

Pre-viewing question
Q: Why aren’t offspring produced through sexual reproduction identical to their parents?
A: Answers will vary.

Post-viewing question
Q: What is the difference between complete metamorphosis and incomplete metamorphosis?
A: Butterflies undergo the four stages of complete metamorphosis: egg, larvae, pupa, and adult. Grasshoppers undergo the three stages of incomplete metamorphosis: egg, nymph, and adult.

3. Inherited Traits

Pre-viewing question
Q: Do you think genetics or environment play a larger role in a person’s life?
A: Answers will vary.

Post-viewing question
Q: What is the difference between dominant and recessive traits?
A: A dominant trait, such as dark hair, is a characteristic that needs only one gene from a parent. A recessive trait, such as light-colored hair, requires a combination of the same type of gene from both parents.

4. Fossils and Genetics

Pre-viewing question
Q: What can we learn by studying fossils?
A: Answers will vary.

Post-viewing question
Q: What will scientists learn if they continue to study genes and heredity?
A: Answers will vary.

5. Instincts and Adaptations

Pre-viewing question
Q: What similarities do wolves and domestic dogs share?
A: Answers will vary.

Post-viewing question
Q: What are some adaptations or instinctual behaviors among wild animals where you live?
A: Answers will vary.

6. Inside a Cell

Pre-viewing question
Q: What do you know about cells?
A: Answers will vary.
Post-viewing question
Q: What are some organelles found in the cytoplasm of a cell?
A: Answers include mitochondria, which convert food to energy; endoplasmic reticulum, a network of channels moving materials within the cell; Golgi bodies, which distribute proteins and other materials throughout the cell; ribosomes, which produce proteins carried to the Golgi bodies; and, lysosomes, sacs filled with digestive enzymes that ingest different forms of cell debris.

7. Organ and Muscle Cells

Pre-viewing question
Q: What do you think are the most important cells in the human body?
A: Answers will vary.

Post-viewing question
Q: What are some different types of bone cells and their functions live?
A: Osteoblasts are cells that form new bone. They produce osteocytes, or mature bone cells. These cells secrete enzymes that monitor the amount of minerals in bones. Osteoclasts help repair and reshape the skeleton so it can withstand different stresses.