UNIT OVERVIEW

All living things go through changes as they grow and develop. Although individual organisms die, new ones replace them, ensuring the survival of the species. During its life cycle, an organism goes through physical changes that allow it to reach adulthood and produce new organisms. Since these changes are common within a species, they can be grouped into stages of development. The unit *Life Cycles* addresses the life cycles of plants and animals, including humans.

All books and Quick Reads are available at three reading levels to facilitate differentiated instruction.

- low reading level
- middle reading level
- high reading level

THE BIG IDEA

Like all living things, humans go through a life cycle. Learning about life cycles helps students understand the changes they will experience, and the reasons why they will go through those changes.

Other topics

The unit also addresses topics such as: animal survival strategies, commercial uses of plants and animals, and selective breeding.

SPARK

This unit spark is designed to get students thinking about the topic and to generate curiosity and discussion.

Materials

- one hard-boiled egg
- one avocado
- knife

Activity

Slice the egg vertically without slicing the yolk, leaving it sticking out. Slice the avocado in half vertically, leaving the pit sticking out. They have a similar-looking structure. Have students compare the two items, including how they were each made. Ask whether the egg would grow if it were planted in soil, and whether the avocado would hatch if a bird sat on it. Discuss why not.

Discuss the differences between the life cycle of birds and that of plants. Make a T-chart on the board to list what students know about the stages each organism goes through during its development.

Explain that every living thing goes through changes as it gets older. The egg came from an adult bird. If the egg hatched into a baby bird, it might grow up and become an adult bird someday. It might even lay an egg of its own. Once that happens, we say that its life cycle has started again.

Sketch a simplified life cycle of a bird in a circular design on the board. Draw and label the egg, baby bird, and adult bird. Invite a volunteer to draw arrows to show the sequence. Help students understand the connection between the term "cycle" as it is used here, and as it's used in the word bicycle (things going in circles).

Ask what would happen if adult animals did not make new baby animals. *The life cycle would end and the species would stop existing.*

Repeat the cycle sketch and discussion for the avocado.

Vocabulary

Many of the unit's vocabulary terms are related to the spark activity and can be introduced during the spark. For vocabulary work, see the Vocabulary section in this unit guide, as well as the resources listed in the *Life Cycles Unit Map*.

PRIOR KNOWLEDGE

Invite students to brainstorm a list of living things. Once you have gathered a number of responses, encourage students to think about which of the living things go through similar stages as they grow, and group them by this similarity.

Probing Questions to Think About

Use the following questions to have students begin thinking of what they know about life cycles.

- Have you ever seen any of the living things in the list change from one stage of their life cycle to the next? Tell us about it.
- How long does it take for each living thing to go through its whole life cycle? (Compare organisms with longer and shorter life cycles.)
- Can animals make changes to their life cycle or make them go in reverse? Why not?
- Which living things have a life cycle most like a human being's life cycle?
- (optional) What would happen if living things did not die?

VOCABULARY

Use the terms below for vocabulary development throughout the unit. They can be found in boldface in the nonfiction book and/or in the Quick Reads. These terms and definitions are available on *Vocabulary Cards* for student practice.

Core Science Terms

These terms are crucial to understanding the unit.

adult	the stage in which an organism is fully developed
adolescent	a person in the stage of the human life cycle between childhood and adulthood
childhood	the stage in the human life cycle after infancy
egg	the beginning stage in the life cycle of many organisms
embryo	the early stage in which a plant or animal begins to grow
germinate	to begin to grow from a seed
infant	a baby human
larva	the caterpillar or worm-like stage in the life cycle of some insects
life cycle	the stages of change that an organism goes through during its life
mammals	animals that give birth to live babies and make milk for them
metamorphosis	an animal's change from one shape to a totally different shape
nymph	a young insect in the stage of its life cycle when it looks like a small adult
organism	a living thing
pupa	an insect in the stage of its life cycle when it changes from a larva to an adult
seedling	a young plant growing from a seed

Other Key Science Terms

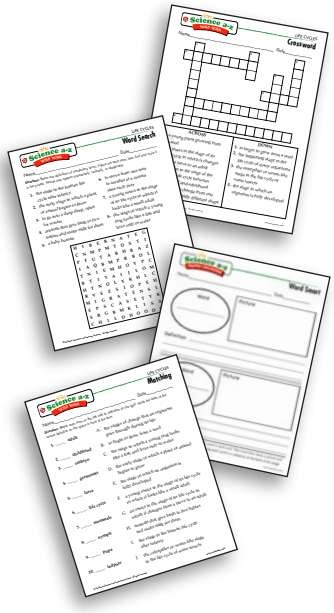
The following vocabulary is not essential for comprehending the unit, but may enrich students' vocabulary.

cocoon	silky case in which some insects live during the pupa stage
chrysalis	a butterfly in the pupa stage, which has a hard outer covering

develop	to grow or reach the next stage in a life cycle
froglet	a small frog that is changing from a tadpole to an adult
hibernate	to go into a deep sleep, often for winter
migrate	to move from one area to another at a certain time each year
monarch	a large, colorful butterfly found in North America
quadruplets	four babies born in one birth
quintuplets	five babies born in one birth
tadpole	the stage in which a young frog looks like a fish and lives only in water
triplets	three babies born in one birth
twins	two babies born in one birth

Vocabulary Activities

You may choose to introduce the terms that will be encountered in the unit before assigning any of the reading components. *Vocabulary Cards* with the key science terms and definitions are provided. Dots on the cards indicate the reading levels of the nonfiction book or the Quick Reads in which each term can be found. If all levels appear, the term may come from elsewhere in the unit. Students can use these cards to review and practice the terms in small groups or pairs. They can also be used for center activity games such as Concentration.



For further vocabulary practice and reinforcement, you can choose from the *Crossword*, *Word Search*, and *Matching* vocabulary activities and the vocabulary *graphic organizers*. To build customized vocabulary lessons with terms related to life cycles, see Vocabulary A–Z.com

Students can use the *Word Smart* vocabulary graphic organizer to organize information on the science terms. You may want to assign each student one to three words to share their Word Smart knowledge with classmates. Students who have the same word should first compare their Word Smart sheets with each other, and then report to the larger group.

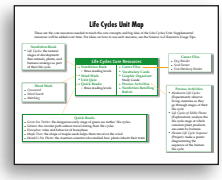
The science terms can be used in oral practice. Have students use each term in a spoken sentence.

It is also useful to have students create a science dictionary in a notebook where they will enter terms from each unit as it is taught.

UNIT MATERIALS

Each unit provides many resources related to the unit topic. These resources are essential to teaching the Big Idea and core concepts of the unit, and will prepare students for the Unit Quiz. Over time, additional resources will be added to the unit that will supplement and enrich students' understanding.

SPECIAL NOTE: To best prepare students for the *Unit Quiz*, we recommend at least using the nonfiction book and vocabulary activities with your students. Using additional resources will reinforce the concepts and details addressed in the Unit Quiz. The *Process Activities* are hands-on experiments, explorations, and projects that will engage students in the application of unit concepts. The *Quick Reads* are magazine-like fact sheets that will help students develop a deeper understanding of several topics related to the unit. The *Career Files* describe science-related careers in which students could someday apply the unit concepts.


Life Cycles Unit Map

For a complete list of materials provided with the unit, see the *Life Cycles Unit Map*.

BACKGROUND AND MISCONCEPTIONS

Use this section as a resource for more background knowledge on unit content and to clarify the content for students if misconceptions arise. Refer to *Using the Internet* below for more ways to extend the learning.

Q: *Do all animals follow the same life cycle?*

A: No, but certain types of animals have similar life cycles. For example, mammals and reptiles have very different life cycles from each other, but a horse and a cat have similar life cycles, because they are both mammals.

Q: *Do all insects follow the same life cycle?*

A: No. Some insects go through three stages of development (egg-nymph-adult), and some go through four stages (egg-larva-pupa-adult).

Q: *Are humans animals?*

A: Yes, humans are a type of animal, as are fish, birds, insects, spiders, arthropods, mollusks, and many other creatures. Humans are mammals, so we have life cycles similar to other mammals.

Q: *Can humans or other animals decide when to change from one stage to the next?*

A: No, these changes happen naturally.

Q: *Do butterflies live in cocoons as they go through their metamorphosis from pupa to adult?*

A: No. Butterfly pupae develop in a chrysalis. Moth, beetle, and some other insect pupae develop inside a cocoon.

Q: *Do life cycles end after the adult stage?*

A: A life cycle describes all the stages an organism goes through from beginning to end, and how that cycle continues as new organisms are created and grow. While the life cycle of an individual organism ends when it dies, the life cycle of its species continues as new organisms are created and grow.

Q: *Do all animals depend on plants for food?*

A: No. Some animals eat plants, but some animals eat other animals that eat plants.

Q: *Since plants are organisms, does that mean they give birth?*

A: While plants do go through a life cycle just as animals do, they do not lay eggs or give birth. They grow from seeds, which sprout and develop into seedlings and then adult plants.

EXTENSION ACTIVITIES

Using the Internet

Most search engines will offer a wealth of options when "life cycle" or the name of a plant or animal species is entered. Try them in combination, such as "fish life cycle." Be aware that some sites may not be educational or intended for the elementary classroom.

Many search terms can be useful for finding additional information about life cycles on the Internet, such as:

- biology
- life science
- baby penguin
- adult anteater

Below are some links with excellent resources for students and/or teachers:

The Smithsonian Institution has a website geared toward educators, although it also has resources for students and for parents. Once on the site, click on "Educators," and then search for lesson plans, field trip ideas, websites, and more by grade level and subject matter.
http://www.smithsonianeducation.org

National Geographic offers background information, often including descriptions of life cycles, on many animal species.
http://www3.nationalgeographic.com/animals/index.html

The United States Department of Agriculture (USDA) has a Kids' Science Page that offers science books, Internet links, and educator resources on several subjects, including plants and animals associated with agriculture.
http://www.nal.usda.gov/

Monarch Butterfly USA has excellent pictures and explanations of the monarch's life cycle. *http://www.monarchbutterflyusa.com/Cycle.htm*

The Franklin Institute Science Museum in Philadelphia offers science resources designed through an online educator program. Check out "Something Froggy" for a diagram of a frog life cycle.
http://fi.edu/fellows/

"The Great Plant Escape," from the University of Illinois Extension, guides students through mock mysteries to unlock the "secrets" of plant life.
http://www.urbanext.uiuc.edu/gpe/case4/index.html

The School District of the City of Erie, Pennsylvania provides a lesson plan on animal life cycles that includes images, information, activities, and pre/post testing. Follow links from their home page for other curricular help.
http://www.esd.iu5.org/LessonPlans/LifeCycle/animals.htm

Projects and Activities

- **Writing:** Have students write a diary of an animal as it moves through its life cycle stages.
- **Writing:** Have students write a humorous short story in which an animal's life cycle goes in reverse, or switches from the life cycle of one species to another.
- **Art:** Invite students to help create a bulletin board with images of well-known fictional characters from children's stories, movies, and television shows. Group them by their life cycle stages.
- **Project:** Plant a class garden, using seeds known to grow well in your area and at the current time of year. Hold a class vote to select plants. Have students keep a growth log with pictures, measurements, and observations as the plants grow. Ideally, you will be able to replant seeds from the plant to restart the life cycle.
- **Research:** Students can create mobiles, dioramas, or posters displaying information about the life cycle of their favorite or assigned plants or animals. Research can be conducted as a family/home project or in the library/media center.
- **Field Trip:** Take a field trip to a fish hatchery, chicken farm, zoo, or other location where students can see animals in different stages of development.