

Life Science – Grade 4

Life Cycles

Standards:

- Recognizes that animals go through predictable life cycles

Teacher Background

Life cycle is a simple enough concept, but there are many variations in the animal world that are worth considering along with our own life cycle. The basic life cycle is birth-growth-adult-decline.

This website gives stages and diagrams for all the Chordate Classes and arthropods.

<http://www.kidzone.ws/animals/lifecycle.htm>

Ideas

- ∞ Can watch video of a farm animal being born or chickens hatching. You can also watch insect life cycles, flies, bees, butterflies.

Website for Butterfly info

<http://kidsbutterfly.org/>

Language Arts

- Have students write their life story and future plans. Make sure to include life cycle stages.
- Interview a grandparent and record their life cycle stories
- Read Charlotte's Web by E.B. White or watch the video (there are several versions)

Technology Link

- Create a video on iMovie with pictures of an animal's life cycle.

Lesson 1 – Observing Life Cycles

Objective: Watch an animal's life cycle

Materials: Tad pole kit

Procedure:

1. Create the living situation for the animal.
2. Create a science journal to record regular observations of the tadpole and it's developing life cycle. Digital pictures could be very helpful.
3. Produce a classroom chart of the animal's life cycle so that students can recognize the different phases.
4. Continue to record the changes until the animal reaches adulthood.

Lesson 2 – Comparing Animal Life Cycles

Objective: to compare animal life cycles

Materials: Venn diagram

Procedure:

1. Using a two-circle or three-circle Venn diagram, compare and contrast the life cycles of different animals.

Lesson 3 - Human Life Cycles

Objective: To find evidence of how humans change over their life cycle

Teacher background: When babies are born, their head is nearly $\frac{1}{3}$ of their entire body length. As they grow, their legs and torso grow until the legs make up approx. $\frac{1}{2}$ - $\frac{2}{3}$ of their entire length and the head only $\frac{1}{10}^{\text{th}}$.

Materials: meter sticks
graph paper

Procedure:

1. Measure the following parts of an adult (could be done for homework)
 - a. Head height-from chin to top of head
 - b. Torso height – from waist to chin
 - c. Leg length – from floor to waist
 - d. Total height – from floor to top of head

2. Measure the same for a child
3. Record the measurements in cm
4. Create a percentage of total body height by dividing the section of the body by total height. Record the % or ratio.
5. Use the measurements to draw the adult and the child on graph paper so that they are the same size. To do this, choose the number of squares tall the picture will be (for example 20 blocks)
6. Use the ratio or % to figure out how big each section of the body should be on the graph paper.
7. Draw both the adult and child figures the same size on the paper.
8. Compare the body design to see how we change over our life cycles.

Extension:

Measure dolls or pictures of babies or even a real baby and draw them on graph paper. The ratio of large head to small body strikes us as cute, so all dolls and toy characters have large heads and small bodies.

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Classifications

Standards:

- Classifies animals according to the physical characteristics they share
- Recognizes that animals go through predictable life cycles
- Describes how animal characteristics adapt to changes in the environment

Teacher Background

Animals are classified according to the physical characteristics they share. All animals and plants and living things are classified according to how they are put together. You are probably familiar with groupings such as insects, mammals, reptiles etc.

The most commonly agreed upon classification system is as follows with examples

	<u>Humans</u>	<u>Cat</u>	<u>Honey bee</u>
Kingdom	Animal	Animal	Animal
Phylum	Chordate	Chordate	Arthropod
Class	Mammal	Mammal	Hexapod
Order	Primates	Carnivore	Hymenoptera
Family	Hominid	Felidae	Apidae
Genus	Homo	Felis	Apis
Species	sapiens	catus	mellifera

This is a complete classification of an animal. The order can be memorized by this mnemonic:

King
Philip
Come
Out
For
Goodness
Sake

Scientists use Latin to name animals, but I have used the English when possible. Using all the names for each animal would be very inconvenient, so each different kind of animal on Earth has a unique name and is referred to by both the genus and species level. For example, we are *Homo sapiens*, a cat is *Felis catus*, a honey bee is *Apis mellifera*.

The purpose of classification began as a way to show similar body shapes and features, but later became a way to show evolutionary relationships. New discoveries have caused classifications to change. For example, birds and dinosaurs are now thought to be more closely related.

I would suggest studying animals to the Phylum and Class level. That would include characteristics of the following 9 most common phyla (though there are many more)

Animal Phyla	Examples
Porifera	sponges
Cnidaria	Jellyfish, sea anemones, coral
Platyhelminthes	Flatworms - planaria
Nematodes	Roundworms- round worms found everywhere, including parasites
Annelids	segmented worms - earthworms
Mollusks	clams, snails, slugs, scallops, mussels
Arthropods	insects, crustaceans (lobster, crabs, shrimp) millipedes, centipedes, spiders
Echinoderms	starfish, sand dollars, sea urchins
Chordates	animals with chords along their back (backbones and cartilage animals)

***I think you could skip the following phyla: Porifera, Platyhelminthes and Nematodes

Phyla Characteristics:

<http://www.mcwn.org/Animals/Classification.html>

This website lists each phyla on the bottom of the page and has a chart of characteristics for each phyla. I would suggest that you not teach all the characteristics, but focus on these four:

Muscular-skeletal
Circulation
Respiration
Symmetry

Chordates are then broken down into several commonly known classes

Fish
Amphibian
Reptiles
Birds
Mammals

Again, teach the four characteristics above, focusing muscular-skeletal on skin covering.

Students should learn the characteristics of each phyla and be able to place an animal in one phyla or another.

Students can learn the factual information through readings and research. The activities below will help them to connect all the information together and review facts.

Lesson 1 – Classification

Objective: to learn good characteristics on which to classify

Materials: paper and pencil

Procedure:

1. Students will work in small groups of 2 or 3.
2. They will create a system to classify 10 letters (all the same case) of the alphabet based upon their shape. (all straight lines, curly ends, above/below the line)
3. The system will be presented to the class to see if it works.
4. The teacher will add 3 or 4 more “newly discovered” letters and see if the system works. If not, students will need to adjust their system.

Questions to ask to see if it works

1. Are classification systems natural or man-made? (man-made)
2. What is the purpose of a classification system? (to show relationships)

Lesson 2 - Animals and Symmetry

Objective: to learn one characteristic of animal classification

Materials: Worksheet animal samples or pictures if possible

Procedure:

1. Make sure all students understand concept of symmetry. If not, show how they are the same from L to R. One arm, one leg, one ear, one eye etc. on each side.

This is an example of: Bilateral symmetry – same left and right
 Radial symmetry – same all around a center point
 Asymmetrical – no symmetry

Give examples/explain each type.

2. Print this webpage for the worksheet.
http://www.biologycorner.com/worksheets/animal_symmetry.html
Use one of the three types of symmetry for each animal
3. Students can work individually or in small groups.
4. Extension: Ask how many lines of symmetry can be drawn for certain animals.

Lesson 3 – Phyla Characteristics

Objective: to learn characteristics of the different animal phyla

Materials: Bingo matching game (teacher created)

Procedure:

1. Have a set of animal cards to call or use a deck of playing cards to represent different animals.
2. Use Bingo cards of animal group characteristics
3. Play bingo.
4. This lesson can be repeated several times by changing the animal list
5. Feel free to stop the game to ask questions or lead brief discussions of animal groups or traits.
6. This may lead to nice little short research projects for children to do.

Lesson 4 – Characteristics of Animal Groups

Objective: to learn characteristics of animal groups

Materials: matching game worksheet

Procedure:

1. Have children work with the matching sheet while using their science journals or other research materials to find answers.

Name _____ Date _____

Animal Classification Matching Game

Work with a partner to find the match for each description.

- | | | |
|---------------|-------|--|
| 1. Cnidaria | _____ | These marine animals have spiny skin |
| 2. Chordates | _____ | Three body parts, jointed legs, Tough exoskeleton |
| 3. Molluscs | _____ | cold-blooded chordate with dry scaly skin |
| 4. Arthropods | _____ | soft-bodied, usually with shells |
| 5. Echinoderm | _____ | aquatic chordate with fins and scales |
| 6. Annelids | _____ | warm-blooded chordate covered with hair |
| 7. Fish | _____ | animals that have a chord in their back for support |
| 8. Amphibian | _____ | warm-blooded chordate covered with feathers |
| 9. Reptile | _____ | cold-blooded, chordate with skin covered with slime |
| 10. Bird | _____ | Jelly-like animals that are round and have radial symmetry |
| 11. Mammal | _____ | tube-shaped, segmented worms |

Name _____ Date _____

Animal Classification Matching Game

Answer Key

Work with a partner to find the match for each description.

- | | |
|----------------|--|
| 7. Cnidaria | 5 _____ These marine animals have spiny skin |
| 8. Chordates | 4 _____ Three body parts, jointed legs, Tough exoskeleton |
| 9. Molluses | 9 _____ cold-blooded chordate with dry scaly skin |
| 10. Arthropods | 3 _____ soft-bodied, usually with shells |
| 11. Echinoderm | 7 _____ aquatic chordate with fins and scales |
| 12. Annelids | 11 _____ warm-blooded chordate covered with hair |
| 7. Fish | 2 _____ animals that have a chord in their back for support |
| 8. Amphibian | 10 _____ warm-blooded chordate covered with feathers |
| 9. Reptile | 8 _____ cold-blooded, chordate with skin covered with slime |
| 10. Bird | 1 _____ Jelly-like animals that are round and have radial symmetry |
| 12. Mammal | 6 _____ tube-shaped, segmented worms |

Lesson 5 – Animal Group Experts

Objective: Become an expert in one animal group

Materials: research materials

Procedure:

1. Each small group is assigned or chooses an animal grouping and finds out the following information.
 - a. Body shape (symmetry)
 - b. Skeleton (if any)
 - c. Skin type or body covering
 - d. How they breathe? (respiration system)
 - e. How they move things in their body? (circulatory system)
 - f. How they detect what is around them? (nervous system)
 - g. Where they live?
 - h. How they move?
 - i. 2 unusual facts
 - j. 5 examples of members of the group
2. Groups will present the information to the class by either a formal presentation or a carousel type activity.
3. Throughout the unit, this group will be the experts for other students who have questions about that group.

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Animal Adaptations

Standards:

- Describes how animal characteristics adapt to changes in the environment

Teacher Background

Animals are well suited to their environments or they don't survive. They cannot change quickly to changes. Changes occur over time. Some animals are born bigger or smaller than others and if the environment changes, smaller animals may survive better than bigger ones, so that eventually, generations later, all the animals are smaller.

We will look at how animals are adapted to their environment, how well they fit the place that they live.

Ideas

Fish adaptations

Tidal zone adaptations

Feathers, beaks, feet

Lesson 1 - Adaptations of Birds

Objective: To look at pictures of bird feet and see how they help the bird live

Materials: Pictures of the feet of different birds (you can choose any source or use the links to pictures below)

Procedure:

1. Ask students to look at their own feet and decide what their feet are shaped to help them to do. (compare to a monkey's feet if necessary)
2. Display the different pictures of bird's feet and give a few to each small group of students. DO NOT tell them the name of the bird.
3. Have each group answer the following questions for each picture. They do not need to have the same pictures in each group.

Questions:

1. How many toes does the bird have?
2. How many point to the front and how many point backwards?
3. Does the foot look strong or weak?
4. What do you think this foot can do well?
5. What bird do you think this belongs to? Why?

Types of feet and beaks

<http://visual.merriam-webster.com/animal-kingdom/birds.php>

Seagull feet <http://www.flickr.com/photos/94032388@N00/2959750152>

Perching feet (Robin, bluejay) <http://www.britannica.com/EBchecked/topic-art/445721/44424/Perching-mechanism-of-a-pigeon-with-the-leg-extended-and>

Hawk and Eagle feet http://www.paws.org/archives/WildAgain/wild_2006_01_11.htm

Sandpiper http://www.paws.org/archives/WildAgain/wild_2006_01_11.htm

Pelican feet <http://www.burdr.com/2009/11/fantastic-feet-of-birds/>

Ostrich foot <http://www.burdr.com/2009/11/fantastic-feet-of-birds/>

Woodpecker feet <http://www.burdr.com/2009/11/fantastic-feet-of-birds/>

Turkey foot <http://www.bear-tracker.com/turkey.html> near the bottom

Images of different birds beaks and feet

<http://www.passportacademy.com/2009/09/birds-beaks-feet.html>

Lesson 2 – Birds’ Beaks

Objective: To look at pictures of different bird beaks and see how they help the bird live

Materials: Pictures of the beaks of different birds (you can choose from any source or the links to pictures below)

Procedure:

1. Ask students to consider their own mouth and decide what their mouth is shaped to help them to do. (compare to a dog’s mouth if necessary)
2. Display the different pictures of bird’s beaks and give a few to each small group of students. DO NOT tell them the name of the bird.
3. Have each group answer the following questions for each picture. They do not need to have the same pictures in each group.

Questions:

1. What is the shape of the beak?
2. Are the top and bottom parts the same size or shape?
3. Does the beak look strong or weak?
4. What do you think this beak can do well?
5. What bird do you think this belongs to? Why?

Bird beak types

<http://www.birdwatching-bliss.com/bird-beaks.html>

More types – about ½ way down the page

<http://www.wqed.org/birdblog/category/bird-anatomy/>

More pictures

http://idahoptv.org/dialogue4kids/season10/birdsofprey/worksheet1_activities2.htm

Lesson 3 – Fish Comparisons

Objective: Compare fish body shapes with where it lives and what it eats

Materials: office supplies
recycled materials

Procedure:

1. Students will choose one of four marine environments below
 - i. Open ocean
 - ii. Sandy bottom
 - iii. Rocky bottom
 - iv. Coral reef
2. Student will work in groups to design an imaginary fish to live in the above environment.
3. They will have to decide
 - a. How it protects itself
 - b. What it eats
 - c. How it catches it's food
 - d. How it breathes
4. Students may look at the poster below for ideas if it is available.
Atlantic fish poster: http://www.scandfish.com/products/cl_wallcharts/index.asp
5. Students will build the fish and it's adaptations to it's environment
6. Fish will be presented to class members either as a formal presentation or via a carousel activity.
7. Ask the group to answer the following questions
 - i. Would your fish be able to live if the water became really cloudy?
 - ii. Would your fish be able to live if a new predator came to live there?
 - iii. Would your fish be able to live if the water got really cold or would it have to move?

Lesson 4 - Change Over Time

Objective: to learn how populations change over time

Materials: Playing cards
Data sheet

Procedure:

1. Tell students that they will become a population of rabbits.
2. Each student will pick a card from the deck. Write this information on the board so all can see it. The cards mean the following
 - i. heart – darker color, small
 - ii. diamond – darker color, large
 - iii. spade – lighter color, small
 - iv. club – lighter color, large
3. Give students the following information.
 - a. Large animals stay warmer better in the winter, but are slower than small animals
 - b. Lighter colored animals are not as well camouflaged as darker colored animals
4. All students will write down the kind of rabbit they are and stand at their desks.
5. Let students pick cards that will represent changes in the environment. Once two cards that do the same thing are chosen, the environment changes and some animals will not survive. Post the cards next to the effect on the board.
6. Write this information on the board;
 - i. Red face card – temperature gets warmer, more plants grow, gets darker in the woods.
 - ii. Black face card – temperature gets colder, more snow, fewer plants grow
 - iii. Ace – drought – fewer plants grow and large animals go hungry
 - iv. 2,3,4 – extra rain – more plants grow, darker in the woods and more food, larger animals chase small ones away.
 - v. 5,6,7 – new fast attacking predator arrives
 - vi. 8,9,10 – new houses built, predators leave
7. As a class decide how the different events will affect the rabbits.
8. If the event goes against your kind of rabbit, then you have to sit down and don't live there anymore. It is possible that everyone may not survive or live there or

that only some rabbits will survive. (teacher can decide how long to play the game)

Questions:

1. If only larger, darker rabbits survive, what will all the rabbits in that place look like in 40 years?
2. Is one type of environment better for the rabbits than another?
3. If you could design a perfect rabbit environment, what would it be?
4. Is the perfect rabbit environment also perfect for hawks? Robins? Snakes?

Teachers can lead a discussion about how there is no perfect environment. Everything that lives in an environment causes changes and everything has to adapt to those changes in order to keep living there.