Under the Home

Second Grade Science
Lesson Guide Printout

Learn from the Masters

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Lesson 1 Guide: The Firefly

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

During warm summer nights, firefly insects light up and dart about looking like enchanted fairies. Some flicker on and off rapidly, and others keep their lanterns on longer to create curlicue trails of light. Fireflies flash their lights to attract mates. The light of day transforms fireflies into nothing more than plain beetles. Firefly bodies consist of three main sections: the head supporting the eyes and antennae, the middle thorax, and at last the abdomen. Fireflies have six short legs, heavily veined wings tucked under wing covers, and long antennae. Fireflies are mostly black with some yellow segments on their abdomens. Fireflies do not have lungs and instead use tubes called tracheae for breathing. Female fireflies lay luminescent eggs which hatch into luminescent larva called wireworms. Larvae make oval cells within the earth and morph into luminescent pupae. After ten days, pupae split open and full-grown beetles emerge. As larvae, fireflies are carnivores, consuming other insects, worms, and decaying animal flesh. As adults, fireflies transform into herbivores that mainly feed on nectar and pollen.

Vocabulary

- **Tracheae**: Each of a number of fine chitinous tubes in the body of an insect, conveying air directly to the tissues.
- **Larva**: The active immature form of an insect, especially one that differs greatly from the adult and forms the stage between egg and pupa.
- **Pupa**: An insect in its inactive immature form between larva and adult.
- **Antennae**: Either of a pair of long, thin sensory appendages on the heads of insects, crustaceans, and some other arthropods.
- **Thorax**: The middle section of the body of an insect, between the head and the abdomen, bearing the legs and wings.
- **Abdomen**: The part of the body of a vertebrate containing the digestive organs; the belly. In humans and other mammals, it is bounded by the diaphragm and the pelvis.
- **Luminescent**: Something that emits light without being heated.
- **Bioluminescence**: The emission of light by living organisms such as fireflies and deep-sea fishes.
- **Enzyme**: A substance that helps bring about a biochemical reaction.

Concepts

We see fireflies flicker on and off in the night. How do fireflies glow so brightly?

- Fireflies glow because of a phenomenon called bioluminescence.
- Bioluminescence occurs when substances within an organism combine and generate light.
- Multiple substances, including enzymes and oxygen, react together within fireflies' abdomens to produce their signature glow.
- Study the firefly image. Note its wing covers, wings, six legs, antennae, and yellow abdomen.

Enrichment Activities

Activity 1: Narrate the Story

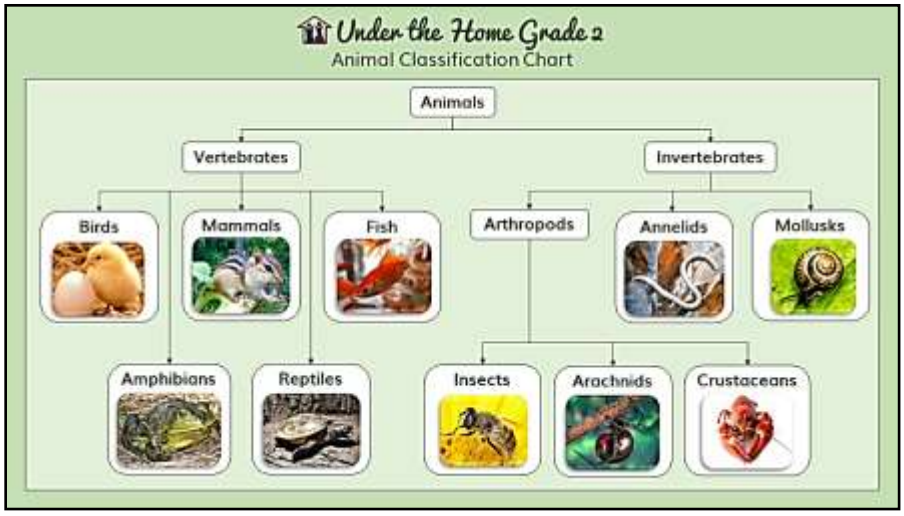
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch fireflies floating in a dark sky, and listen to night noises.

Activity 3: Classify the Animal

- Fireflies are animals, invertebrates, arthropods, and insects.
- Find which categories fireflies fit into on the classification chart.



Activity 4: Recite and Memorize a Poem Excerpt About Fireflies by James Whitcomb Riley

And lavishly to left and right,
The fireflies, like golden seeds,
Are sown upon the night.

Activity 5: Color and Label a Firefly

Complete page 5 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take an evening nature walk, locate a firefly or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a firefly, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 6 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How do fireflies move?
- How do fireflies eat?
- What do fireflies eat?
- How do fireflies sense the world?

Habitat observations include:

- Do fireflies live in a forest, a field, a town, or near water?
- In what type of climate do fireflies live (e.g. temperate, tropical, arid, arctic)?
- In what type of house do fireflies live?

Appearance observations include:

- What colors are the wings and body?
- How many legs do fireflies have?
- How many antennae do fireflies have?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 6 of 'Science Field Book for Second Grade.'

Review Questions

1. **How does glowing help fireflies?** Fireflies light up to attract mates.
2. **Which part of fireflies glow?** The abdomens of fireflies glow.
3. **During which life stages are fireflies luminescent?** Fireflies are luminescent during the egg, larva, pupa, and adult stages.
4. **Are fireflies herbivores or carnivores?** Fireflies are carnivores when larvae and herbivores when adults.
5. **What do fireflies eat?** Larvae eat insects, worms, and decaying animal flesh. Adults eat nectar and pollen.
6. **Which time of the year do fireflies typically glow?** Fireflies typically glow during the summer.

Lesson 2 Guide: The Butterfly

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, the butterflies are insects. The video below shows a black veined, orange-red monarch butterfly. Monarchs are distasteful to birds, and their brilliant colors advertise to birds their most disagreeable taste. Another butterfly species called the viceroy has taken advantage of the monarch's immunity from bird attack and has imitated its colors. Have you ever touched a butterfly's wings and noticed the powder on your fingers? Butterfly wings are covered with scales so tiny, they look like dust. Monarchs migrate in large flocks seasonally, flying south for the winter and back north for the summer. Male monarchs have black spots upon their hind wings called perfume pockets. Perfume pockets are filled with scent scales. These scales give forth an odor which humans cannot perceive; but the lady monarch is attracted by this odor. After mating with a male, female monarchs lay eggs that hatch into caterpillars. Caterpillars eat vegetation to grow larger and spin their chrysalises. Inside their chrysalises, butterflies transform from worms into flying pixies. The process of transforming from caterpillars to winged adult butterflies is called "metamorphosis."

Vocabulary

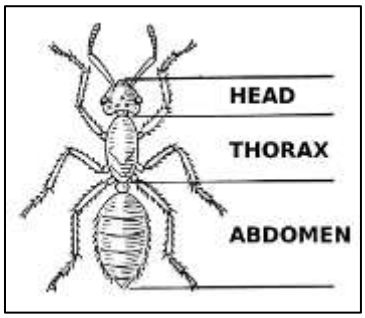
- **Metamorphosis**: The process of transformation from an immature form to an adult form in two or more distinct stages.
- **Caterpillar**: The larva of a butterfly or moth.
- **Chrysalis**: A moth or butterfly pupa within a hard outer case.
- **Exoskeleton**: A rigid external covering for the body in some invertebrate animals, especially arthropods, providing both support and protection.
- **Antennae**: Either of a pair of long, thin sensory appendages on the heads of insects, crustaceans, and some other arthropods.
- **Thorax**: The middle section of the body of an insect, between the head and the abdomen, bearing the legs and wings.
- **Abdomen**: The part of the body of a vertebrate containing the digestive organs; the belly. In humans and other mammals, it is bounded by the diaphragm and the pelvis.
- **Proboscis**: An elongated sucking mouthpart that is typically tubular and flexible.

- **Nectar**: A sugary fluid secreted by plants, especially within flowers to encourage pollination by insects and other animals. It is collected by bees to make into honey.

Concepts

Fireflies and butterflies are members of a group of animals called insects. Most insects have the following characteristics:

- Six legs
- An exoskeleton (hard crunchy shell) instead of an internal skeleton (bones)
- Two antennae for sensing the world
- Three body parts including the head, thorax, and abdomen (see the labeled ant insect below).



Enrichment Activities

Activity 1: Narrate the Story

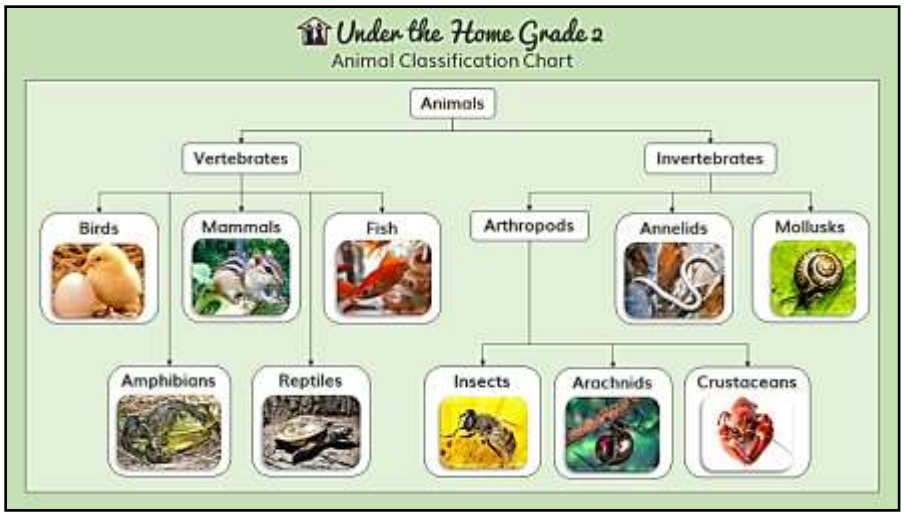
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video of a butterfly.
- Note its legs, antennae, body, and colorful wings.
- Also note its long black proboscis, which the butterfly inserts into the flower to obtain nectar.

Activity 3: Classify the Animal

- Butterflies are animals, invertebrates, arthropods, and insects.
- Find which categories butterflies fit into on the classification chart.



Activity 4: Color and Label a Butterfly

Complete page 7 of 'Science Field Book for Second Grade.'

Activity 5: Sketch the Butterfly Lifecycle

Study the images below. Draw and label the lifecycle of a butterfly in order - from egg, to caterpillar, to chrysalis, to winged adult.

Activity 6: Take a Nature Walk

Take a nature walk, locate a butterfly or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a butterfly, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 6 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How do butterflies move?
- How do butterflies eat?
- What do butterflies eat?
- How do butterflies sense the world?

Habitat observations include:

- Do butterflies live in a forest, a field, a town, or near water?
- In what type of climate do butterflies live (e.g. temperate, tropical, arid, arctic)?
- In what type of house do butterflies live?

Appearance observations include:

- What colors are the wings?
- What colors are the eyes and body?
- How many legs do butterflies have?
- How many antennae do butterflies have?
- What does its proboscis look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 6 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do the bright colors of monarch butterflies protect them from being eaten by birds?** The bright orange-red color advertises to birds that they are butterflies that taste horrible.
2. **What is the dust on your fingers that results when you touch butterflies' wings?** The dust is made of the tiny scales that cover butterflies' wings.
3. **Why have viceroys imitated the colors of monarchs?** Birds find monarchs distasteful and avoid eating them. Birds believe viceroys are monarchs and will taste bad, so avoid eating them, even though viceroys would make a tasty bird snack.
4. **How many legs do monarchs have? How do you know?** Monarchs have six legs. Insects have six legs, and monarchs are insects.
5. **How do butterflies use their proboscises?** Butterflies use their proboscises for sucking nectar from fruit or flowers.
6. **What are the three sections of the bodies of insects?** The three sections of insect bodies include the head, thorax, and abdomen.
7. **What do insects have instead of bones / internal skeletons?** Insects have exoskeletons instead of bones / internal skeletons.
8. **Describe butterflies before metamorphosis.** Butterflies are crawling caterpillars before metamorphosis.
9. **Describe butterflies after metamorphosis.** Butterflies become winged adults that can fly after metamorphosis.

Lesson 3 Guide: The Honey Bee

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies and butterflies, honey bees are insects. Honey bees live in large colonies. There are three types of honey bees - the female worker, the female queen, and the male drone - each type with its own role to play. Worker bees gather nectar and pollen, spread pollen from flower to flower, build honeycomb, and produce honey. Workers have special pollen baskets on their legs for collecting pollen. Workers also have long tubular tongues that enable them to gather nectar from flowers. Workers secrete wax from their abdomens to make honeycomb. Queen bees start as regular worker eggs, but are selected to be housed in special chambers and fed with royal honey after hatching into larvae. Princess larvae weave silken cocoons around themselves and change into pupae. Meanwhile the workers seal their cells with wax. Upon hatching, a queen cuts a hole in her chamber. Her first real work is to hunt for other queen cells, and if she finds one she makes a hole in its side and destroys the poor princess within. If she finds another full-grown queen, the two fight until one succumbs. Sometimes the workers will prevent the queen from killing another princess and queen, so the queen will depart with an entourage of bees and to establish her own colony. The queen rarely uses her sting upon anything or anyone except a rival queen. The queen is larger than the drone or worker and has no pollen basket, for her job is reproduction, not pollen collection. The only job of drones is to mate with the queen. Drones have no pollen baskets, wax pockets, or stingers for fighting. Drone bees are feed by worker bees until the latter part of the season when the honey supply runs low, and then drones are driven from the hive to die of starvation.

Vocabulary

- **Pollen**: A fine powdery substance, typically yellow, consisting of tiny grains discharged from the male part of a flower.
- **Tubular**: Long, round, and hollow like a tube.
- **Colony**: A community of animals or plants of one kind living close together or forming a physically connected structure.
- **Beeswax**: The wax secreted by bees to make honeycombs and used to make wood polishes and candles.
- **Honey**: A sweet, sticky, yellowish-brown fluid made by bees and other insects from nectar collected from flowers.

- **Honeycomb**: A structure of hexagonal cells of wax, made by bees to store honey and eggs.
- **Nectar**: A sugary fluid secreted by plants, especially within flowers to encourage pollination by insects and other animals. It is collected by bees to make into honey.

Concepts

Worker bees collect both nectar and pollen from flowers as food for their colonies. Facts about pollen and pollen collection by worker bees:

- The hind leg has a pollen basket, which is a long cavity bordered by hairs wherein the pollen is packed and carried.
- Beyond the pollen basket are rows of spines which serve to collect pollen grains from other parts of the body.
- See below a worker bee gathering yellow pollen into its pollen basket.

- Pollen collection by worker bees helps flowers, since the bees spread pollen from one flower to another, enabling flowers to make seeds to grow new flowers. Zoom in to see the yellow pollen clinging to the bee.

- Humans harvest pollen from worker honey bees to eat, however, the health benefits of pollen are controversial. See below frozen bee pollen, a diet supplement.

Enrichment Activities

Activity 1: Narrate the Story

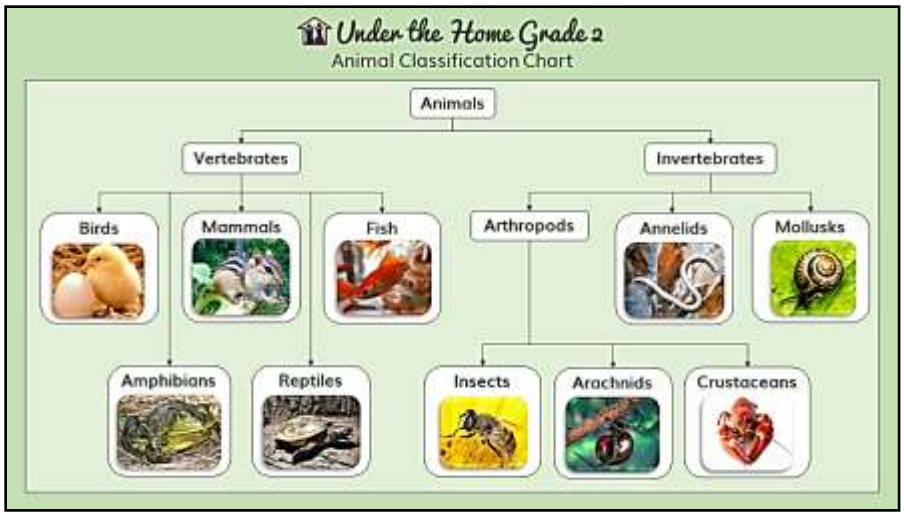
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- See and hear a bee. Point out its head, thorax, abdomen, wings, antennae, and legs.
- Does the video show a male bee or a female bee?
- Does the video show a queen bee, a worker bee, or a drone bee?

Activity 3: Classify the Animal

- Bees are animals, invertebrates, arthropods, and insects.
- Find which categories bees fit into on the classification chart.



Activity 4: Sketch a Honeycomb

A Honeycomb consists of hexagonal cells of wax.
Hexagons have six sides. Draw your own honeycomb by drawing adjacent hexagons as shown in the picture below.

Activity 5: See a Queen, Workers, and Drones

See below a queen (marked with a pink dot) and her worker bees.

See below a drone bee.

Activity 6: Color and Label a Bee
Complete page 9 of 'Science Field Book for Second Grade.'

Activity 7: Take a Nature Walk
Take a nature walk, locate a bee or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a bee, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 10 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How do bees travel?
- How do bees eat?
- What do bees eat?
- How do bees sense the world?

Habitat observations include:

- Do bees live in a forest, a field, a town, or near water?
- In what type of climate do bees live (e.g. temperate, tropical, arid, arctic)?
- In what type of house do bees live?

Appearance observations include:

- What colors are the wings and body?
- How many legs do bees have?
- How many antennae do bees have?

Activity 8: Complete a Field Book Entry
After your nature walk, complete page 10 of 'Science Field Book for Second Grade.'

Review Questions

1. **What are the three types of honey bees?** The three types of honey bees are the queen, the worker, and the drone.
2. **What work do queen bees do?** Queen bees lay eggs and produce more bees.
3. **What work do worker bees do?** Worker bees gather pollen and nectar, make honey, and make honeycombs.
4. **What work do drone bees do?** Drone bees mate with the queen.
5. **Which types of bees have pollen baskets?** Only worker bees have pollen baskets.
6. **What special food do princess larvae eat to become queens?** Princess larvae eat royal honey to become queens.
7. **What is the first thing young queens do upon emerging from their royal cells?** Newly hatched queens find any other queens and kill them.
8. **How are honey bees beneficial to flowers?** Worker bees spread pollen between flowers, helping to grow new flowers.

Lesson 4 Guide: The Mosquito

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, butterflies, and bees, mosquitoes are insects. The word mosquito means "little fly" in Spanish. Mosquitoes start their lives as eggs nestled together in a boat-shaped egg basket. The larvae, or wrigglers, hatch through the bottom of their eggs into the water. The wrigglers hang to the surface of the water by opening their star-shaped valves and allowing air to fill their breathing tubes and tracheae. The wrigglers sweep decaying vegetation into their jaws with the help of their mouth brushes. To defend themselves, when touched, wrigglers close their star-shaped valves and sink into the water. Wrigglers swim with the assistance of finger-like projections and hairs. Wrigglers grow into pupae, developing large heads, and they stay at the surface of the water for long periods of time. Unlike moths and butterflies, whose pupae remain still, mosquito pupae can move. Eventually, pupae split open and adult mosquitoes emerges. Mosquitoes float on their pupa skins while their wings dry. Once an adult, females live a week or two, and males only live several days. Only the female mosquitoes sing and bite. Females sing to attract mates by rapidly vibrating their wings. Females use a tube, called a proboscis, to pierce human skin and sip blood. Females need this blood to develop eggs. Males have wide, feathery antennae, which they use for hearing. In contrast to males, females have long, spindly antennae.

Vocabulary

- **Wrigglers**: The larvae of mosquitoes.
- **Pupa**: An insect in its inactive immature form between larva and adult.
- **Valve**: A device for controlling the passage of fluid or air through a pipe.
- **Proboscis**: An elongated sucking mouthpart that is typically tubular and flexible.

Concepts

Did you know mosquitoes can be deadly? Mosquitoes carry several diseases that threaten humans including malaria, Chikungunya, West Nile virus, dengue fever, and Zika virus. Techniques that help reduce the mosquito population include:

- Covering containers holding water such as rain barrels.
- Draining stagnant pools of water on your property.

- For larger pools or ponds that cannot be drained, introducing mosquito-loving fish such as minnows, sticklebacks, sunfish, and goldfish.

Enrichment Activities

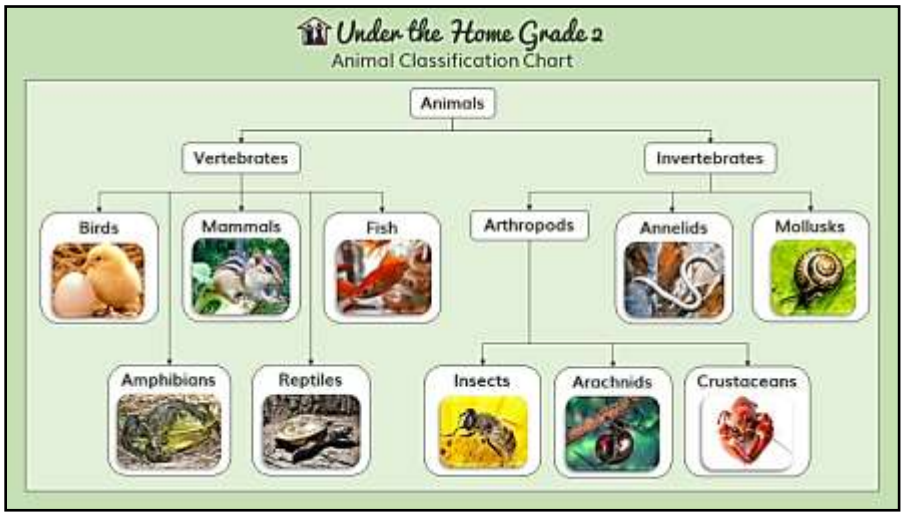
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video to see and hear a mosquito.
- Identify its head, thorax, abdomen, wings, antennae, legs, and proboscis.
- Examine the antennae to determine whether this a male or female mosquito.
- Does this mosquito really buzz like the audio in the video suggests?

Activity 3: Classify the Animal

- Mosquitoes are animals, invertebrates, arthropods, and insects.
- Find which categories mosquitoes fit into on the classification chart.



Activity 4: Grow Your Own Wrigglers
Place a large plastic container outside, and keep it filled with water.
Once the wrigglers emerge, observe them with a hand lens. Write the answers to the following questions in your field book:

- Do you see both larvae and pupae? How can you tell the difference between the two?
- Where do larvae rest when undisturbed?
- Do larvae rest head up or head down?
- Is there any part of the larvae which comes to the surface of the water?
- Observe larvae resting at the top of the water with a hand lens.
- Can you see the mouth brushes? Draw them.
- Do you see the long hairs along the side of the wriggler's body?
- Do you see any wrigglers at the bottom of the container?

Activity 5: Color and Label a Mosquito
Complete page 11 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate a mosquito or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a mosquito, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 12 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the mosquito move?
- How does the mosquito eat?
- What does the mosquito eat?
- How does the mosquito sense the world?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the wings and body?
- How many legs does it have?
- How many antennae does it have?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 12 of 'Science Field Book for Second Grade.'

Review Questions

1. **What is the purpose of breathing tubes in wrigglers?** Breathing tubes are used to distribute air to all parts of wrigglers. Breathing tubes also help wrigglers float.
2. **How do wrigglers prevent their breathing tubes from filling with water?** Wrigglers close their star-shaped valves to prevent water from filling the tube.
3. **How do mosquito pupae look different from mosquito larvae?** Mosquito pupae have much larger heads than larvae.
4. **How do mosquitoes emerge from pupae?** Pupa skins split to allow mosquitoes to exit. Mosquitoes stand on the floating pupa while waiting for their wings to dry.
5. **How are mosquito pupae different from butterfly pupae?** Mosquito pupae can move. Butterfly pupae cannot move.

6. **Which type of mosquitoes have wide, feathery antennae?** Male mosquitoes have wide, feathery antennae.
7. **Which kind of mosquitoes sing and drink blood?** Female mosquitoes sing and drink blood.
8. **Why do female mosquitoes drink blood? Why don't males?** Female mosquitoes drink blood to produce eggs. Males don't produce eggs, so they do not need blood.
9. **How do female mosquitoes sing?** Female mosquitoes sing by rubbing their wings together.
10. **List two ways you can prevent mosquitoes from growing in a stagnant pool of water.** You can drain the pool of water or fill it with mosquito-loving fish.

Lesson 5 Guide: The Dragonfly

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, butterflies, bees, and mosquitoes, dragonflies are insects. Dragonflies can be found skimming over still ponds, flowing brooks, and rippling fields of grass. Dragonflies are among the swiftest of all winged creatures, their rapid flight enabling them to catch their prey. Dragonflies feed on wrigglers and adult mosquitoes and help keep the mosquito population down. Most dragonflies love the sun, disappearing when clouds cover the sky. Dragonflies lay their eggs in water. Nymphs hatch from the eggs, strange little creatures that look like stunted crickets with spider-like legs. In the past, people were suspicious of dragonflies, calling them the devil's darning needles, snake doctors, and snake feeders. In reality, dragonflies are harmless and beautiful, more like shimmering blue and green sprites than evil-doers.

Vocabulary

- **Wriggler**: The larvae of mosquitoes.
- **Nymph**: An immature form of an insect that does not change greatly as it grows, e.g., a dragonfly, mayfly, or locust.
- **Darning Needle**: A long sewing needle with a large eye, used in mending.
- **Spiracle**: An external respiratory opening, especially each of a number of pores on the body of an insect.
- **Tracheae**: Each of a number of fine chitinous tubes in the body of an insect, conveying air directly to the tissues.

Concepts

Insects such as dragonflies, breathe differently than humans.
Facts about insect breathing:

- Insects don't have lungs.
- Insects don't breathe through their mouths.
- Insects breathe through holes in their sides called spiracles.
- Spiracles are found on the thorax or abdomen, and there are never more than two per segment.
- Spiracle holes lead to tubes called tracheae, which carry the air to all parts of the body.

Enrichment Activities

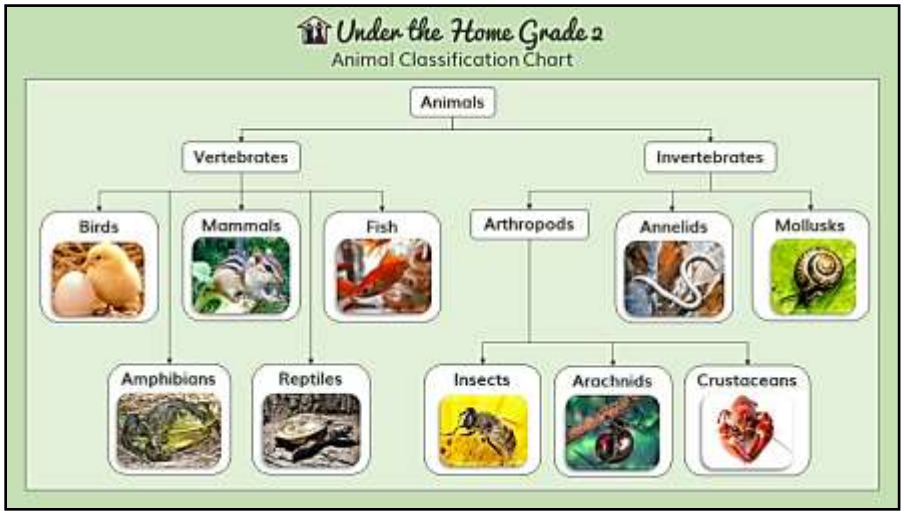
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Study the dragonfly in the video. Find its head, thorax, abdomen, wings, and legs.

Activity 3: Classify the Animal

- Dragonflies are animals, invertebrates, arthropods, and insects.
- Find which categories dragonflies fit into on the classification chart.



Activity 4: Read the Poem, 'The Fountain of Youth' by James Russell Lowell

In summer-noon flushes
When all the wood hushes
Blue dragon-flies knitting
To and fro in the sun.

With sidelong jerk flitting,
Sink down on the rushes.
And, motionless sitting,
Hear it bubble and run,

Hear its low inward singing
With level wings swinging
On green tasseled rushes,
To dream in the sun.

Activity 5: Color and Label a Dragonfly
Complete page 13 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate a dragonfly or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a dragonfly, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 14 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the dragonfly move?
- How does the dragonfly eat?
- What does the dragonfly eat?
- How does the dragonfly sense the world?

Habitat observations include:

- Does the dragonfly live in a forest, a field, a town, or near water?
- In what type of climate does the dragonfly live (e.g. temperate, tropical, arid, arctic)?

Appearance observations include:

- What colors are the wings and body?
- How many legs does the dragonfly have?
- How many antennae does the dragonfly have?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 14 of 'Science Field Book for Second Grade.'

Review Questions

1. **What type of animal are dragonflies?** Dragonflies are insects.
2. **Do dragonflies breathe through their mouths?** No, dragonflies breathe through spiracles.
3. **How are dragonflies helpful to humans?** Dragonflies feed on insect pests such as mosquitoes and their wrigglers.
4. **Are dragonflies carnivores or herbivores?** Dragonflies are carnivores, feeding on other animals.

Lesson 6 Guide: The Beetle

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, butterflies, bees, mosquitoes, and dragonflies, beetles are insects. One notable type of beetle is the ladybug, (also called lady beetle or ladybird) often known for its bright wing covers and black spots. Ladybugs come in many colors, some are red with black spots, some are black with red spots, others are yellow with black spots, and still others are orange with no spots. There are around 5000 species of ladybugs, and different species of ladybugs have different numbers of spots. Contrary to what some believe, the number of spots on a ladybug does not correspond to age and does not change over time. Ladybugs do not taste good to birds and other predators. Both the bright colors and the spots of ladybugs warn birds of their bad taste. Tucked under the wing covers are a pair of wings, a thorax, an abdomen, and three pairs of short legs. Like other insects, ladybugs use antennae to sense their surroundings. Ladybugs help gardeners and farmers by eating crop pests such as aphids. Ladybugs have the same life cycle stages as butterflies. They start as tiny yellow eggs, hatch into larvae, and grow into pupae. Ladybugs remain dormant as pupae for a couple of days, before adult ladybugs emerge from their pupae skins. Ladybugs are often associated with good luck.

Vocabulary

- **Aphid**: A minute bug that feeds by sucking sap from plants. They can live in large colonies that cause extensive damage to crops.
- **Larva**: The active immature form of an insect, especially one that differs greatly from the adult and forms the stage between egg and pupa.
- **Pupa**: An insect in its inactive immature form between larva and adult.
- **Dormant**: Having normal physical functions suspended or slowed down for a period of time; in or as if in a deep sleep.
- **Species**: A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Concepts

Ladybugs undergo the process of metamorphosis like butterflies. Facts about ladybug metamorphosis:

- Mother ladybugs lay a cluster of tiny yellow eggs, often on a leaf.

- Ladybugs hatch into larvae, which eat aphids and other insect pests.

- Ladybug larvae grow into pupae, attaching to leaves and remaining dormant for a couple of days.

- Ladybugs split their pupa skins to emerge as their adult forms. Find in the below image the discarded pupa skin as well as the new adult ladybug.

Enrichment Activities

Activity 1: Narrate the Story

After reading or listening to the story, narrate the story events aloud using your own words.

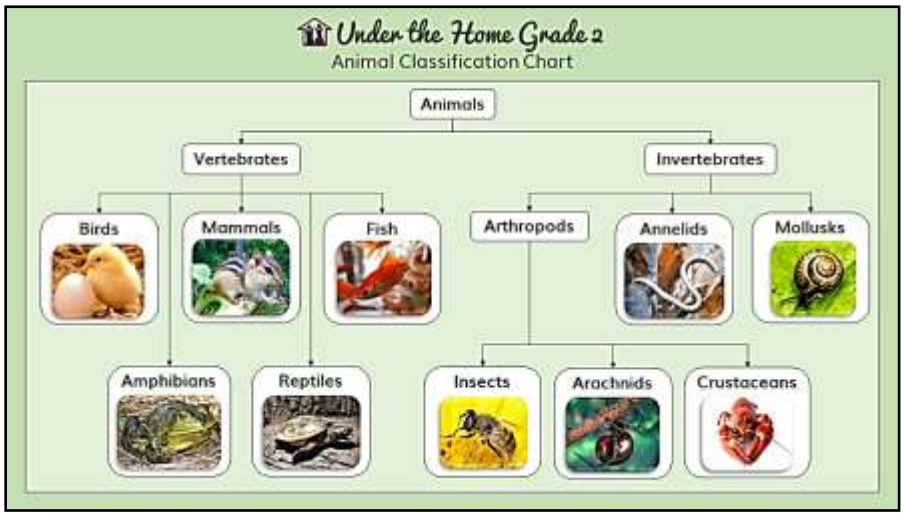
Activity 2: Watch the Video

- Study the ladybug in the video. Note the shiny, bright wing covers and the spots of the ladybug. Find the tiny aphids that provide an abundance of ladybug food.

Activity 3: Classify the Animal

- Ladybugs are animals, invertebrates, arthropods, and insects.

- Find which categories ladybugs fit into on the classification chart.



Activity 4: Recite and Memorize a Nursery Rhyme About Ladybugs
Ladybird, Ladybird, fly away home!
Your house is on fire and your children are gone,
All except one,
And her name is Ann,
And she hid under the baking pan.

Activity 5: Color and Label a Ladybug
Complete page 15 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate a beetle or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a beetle, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:
- The field book template you'll later complete on page 16 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:
- How does the beetle move?
- How does the beetle eat?
- What does the beetle eat?
- How does the beetle sense the world?

Habitat observations include:
- Does the beetle live in a forest, a field, a town, or near water?
- In what type of climate does the beetle live (e.g. temperate, tropical, arid, arctic)?

Appearance observations include:

- What colors are the eyes and body?
- How many legs does the beetle have?
- How many antennae does the beetle have?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 16 of 'Science Field Book for Second Grade.'

Review Questions

1. **What are the lifecycle stages of ladybugs?** The lifecycle stages of ladybugs are egg, larva, pupa, and adult.
2. **Why might a farmer buy ladybugs to release in their fields?** A farmer might buy ladybugs for release in their fields because ladybugs eat crop pests such as aphids.
3. **How many legs do ladybugs have?** Ladybugs are insects and have six legs.
4. **What colors might a ladybug be?** Ladybugs come in a variety of colors including yellow, orange, red, and black with different colored spots.
5. **How do ladybugs travel from place to place?** Ladybugs can both walk with their legs and fly with their wings.
6. **How are the bright colors and spots of the ladybug beneficial?** Both the bright colors and the spots of ladybugs warn birds of their bad taste, preventing them from being eaten.
7. **What does the number of spots on a ladybug signify?** The number of spots on a ladybug can help identify the ladybug's species. The number of spots does not correspond to a ladybug's age.

Lesson 7 Guide: The Grasshopper

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, butterflies, bees, mosquitoes, dragonflies, and beetles, grasshoppers are insects. When any creature has unusually strong hind legs, we may be sure it is a jumper, and grasshoppers show this peculiarity at first glance. The front legs are short, the middle legs a trifle longer, and the femur of the hind leg is nearly as long as the entire body. The hind leg contains many powerful muscles which have the appearance of being braided. Each grasshopper foot consists of three segments and a claw. Surrounding the claws are oval pads equipped with microscopic hairs, called tenent hairs, which secrete a sticky fluid and enable grasshoppers to climb vertical surfaces. Grasshoppers feed upon grass and other herbage and are especially fitted for living in grassy fields. Their color protects them from being spotted and eaten by their enemies, the birds. Since so many species of birds feed upon grasshoppers, their leaping power is much needed for escape. However, when grasshoppers make a longer journeys they use their wings. Grasshoppers have some means of defense as well as of escape; they can give a painful nip with their mandibles; and when seized, emit copiously from their mouths a brownish liquid which is acrid and ill smelling. This performance interests children, who are wont to seize grasshoppers by their jumping legs and hold them up, commanding them to "chew tobacco." In some areas of the world, grasshoppers provide a source of food for people. In Mexico, grasshoppers are served with tortillas and chili sauce. Grasshoppers may also be fried into a crunchy snack.

Vocabulary

- **Microscopic**: So tiny as to be visible only with a microscope.
- **Mandibles**: The jaw or a jawbone, especially the lower jawbone in mammals and fishes.
- **Acrid**: Having an irritatingly strong and unpleasant taste or smell.
- **Ovipositor**: A tubular organ through which a female insect or fish deposits eggs.

Concepts

Facts about grasshopper reproduction:

- Female grasshoppers lay eggs with ovipositors. Some female grasshoppers lay their eggs within deep holes in the ground or in decaying wood. After placing eggs in a hole, female

grasshoppers cover the hiding place with a gummy substance so that no intruders or robbers find and eat the eggs. See below an image of a grasshopper using her ovipositor to lay an egg in a hole.

- Most species of grasshoppers pass the winter in the egg stage. Sometimes we find in early spring young grasshoppers which hatched in the fall. They seem as spry as if they had not been frozen stiff all winter.
- Unlike butterflies which undergo complete metamorphosis, grasshoppers do not become caterpillars or spin chrysalises.
- Instead, grasshoppers undergo incomplete metamorphosis. Incomplete metamorphosis means that baby grasshoppers emerge from the egg looking like a smaller version of its parent, except that it has a very large head and a funny little body.

Enrichment Activities

Activity 1: Narrate the Story

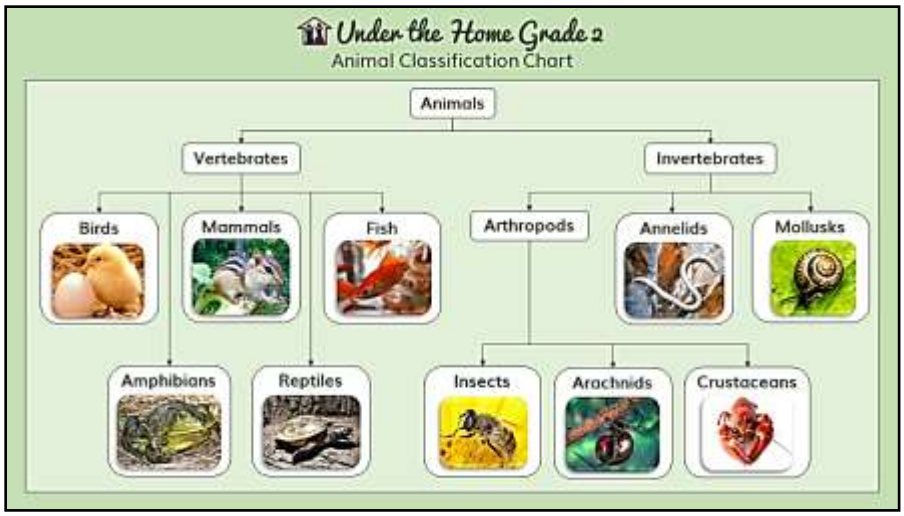
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Look at and hear a grasshopper. Grasshoppers make sounds by rubbing a hind leg against a wing.
- Note its long hind legs, eyes, antennae, head, thorax, and abdomen.

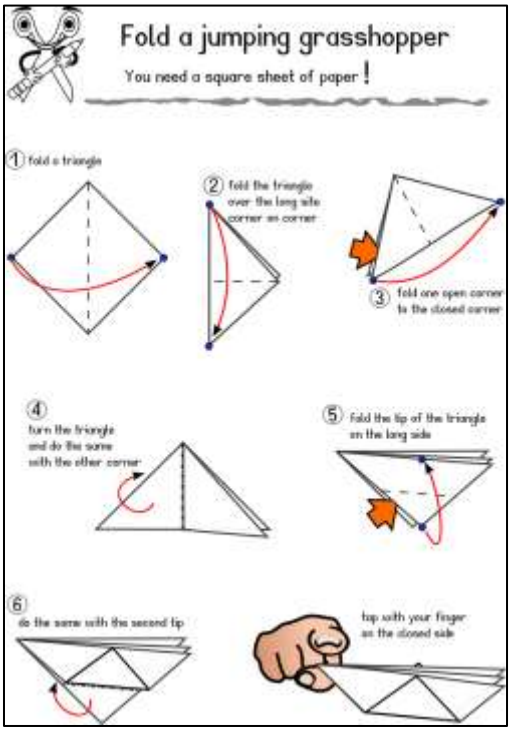
Activity 3: Classify the Animal

- Grasshoppers are animals, invertebrates, arthropods, and insects.
- Find which categories grasshoppers fit into on the classification chart.

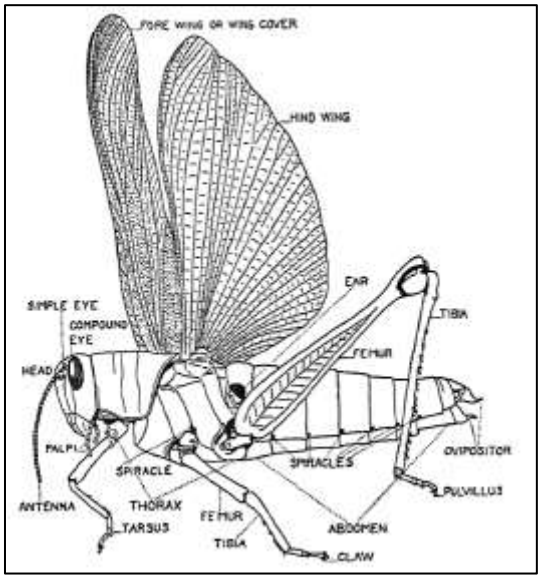


Activity 4: Make a Jumping Grasshopper

Zoom in to read the directions below to make your own jumping grasshopper.



Activity 5: Study Grasshopper Anatomy
Study the labeled image of the grasshopper below.
Find the following parts of the grasshopper: wings, hind leg, middle leg, front leg, antenna, eyes, claws, ovipositor.



Activity 6: Color and Label a Grasshopper
Complete page 17 of 'Science Field Book for Second Grade.'

Activity 7: Take a Nature Walk
Take a nature walk, locate a grasshopper or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a grasshopper, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 18 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the grasshopper move?
- How does the grasshopper eat?
- What does the grasshopper eat?
- How does the grasshopper sense the world?

Habitat observations include:

- Does the grasshopper live in a forest, a field, a town, or near water?
- In what type of climate does the grasshopper live (e.g. temperate, tropical, arid, arctic)?

Appearance observations include:

- What colors are the wings?

- What colors are the eyes and body?
- How many legs does the grasshopper have?
- How many antennae does the grasshopper have?

Activity 8: Complete a Field Book Entry
After your nature walk, complete page 18 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do grasshoppers escape being eaten by birds?** Grasshoppers can use their powerful legs to jump away from birds. If captured, the grasshopper 'spits tobacco,' spitting out a bitter tasting brown substance distasteful to birds.
2. **How do grasshoppers travel long distances?** Grasshoppers fly long distances using their wings.
3. **Do grasshoppers hibernate during cold winters?** Grasshoppers typically pass cold winters as eggs, but some young grasshoppers do hibernate over the winter.
4. **Where do mother grasshoppers lay their eggs?** Female grasshoppers use their ovipositors to lay their eggs in deep holes in the ground or rotten wood.
5. **Do grasshoppers hatch into caterpillars?** No, grasshoppers hatch from eggs as small versions of adult grasshoppers, only with a larger head.
6. **Do grasshoppers spin chrysalises?** No, grasshoppers undergo incomplete metamorphosis. They do not become caterpillars that spin chrysalises.
7. **What do grasshoppers eat?** Grasshoppers eat grass and other vegetation.
8. **How do grasshoppers cling to vertical surfaces?** Grasshoppers have tenent hairs on their feet which secrete a sticky fluid.

Lesson 8 Guide: The Katydid

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, butterflies, bees, mosquitoes, dragonflies, beetles, and grasshoppers, katydids are insects. "Katy did, she didn't, she did," poet James Whitcomb Riley writes, "The katydid is rasping at the silence." The word "rasping" well describes the note played by male katydids by rubbing their wings together. Katydids are beautiful insects, with green, finely veined, leaflike wing covers under which is a pair of wings. As they resemble leaves, katydids hide from predators by living among trees, shrubs, and tall grasses. Due to their effective camouflage, katydids are rarely discovered except by accident. However, when male katydids sing at night, they may be ferreted out with the aid of a flashlight. Like grasshoppers, katydids undergo incomplete metamorphosis and female katydids lay eggs using ovipositors. Newly hatched katydids look like small adults except they do not have wings. Katydids feed on vegetation. When eating, katydids often hold a leaf or flower firmly with their front feet, biting it off like a grazing cow and chewing industriously with their sidewise-working jaws. As they are insects, katydids breathe air through spiracles, expanding and contracting their bodies to open and close the spiracle openings.

Vocabulary

- **Spiracles**: An external respiratory opening, especially each of a number of pores on the body of an insect.
- **Air**: The invisible gaseous substance surrounding the earth, a mixture mainly of oxygen and nitrogen.
- **Expand**: Become or make larger or more extensive.
- **Contract**: Decrease in size, number, or range.
- **Compound Eye**: An eye consisting of an array of numerous small visual units, as found in insects and crustaceans.
- **Simple Eye**: A small eye of an insect or other arthropod that has only one lens, typically present in one or more pairs.

Concepts

Katydid have green eyes that are very different from human eyes. Facts about insect eyes:

- Insects have compound eyes, which are made of many small hexagonal eyes grouped together like a honeycomb. See below an electron microscope image of a compound eye.
- Insects have compound eyes during the adult stage.
- Some insects have a few tiny simple eyes between the compound eyes.

Enrichment Activities

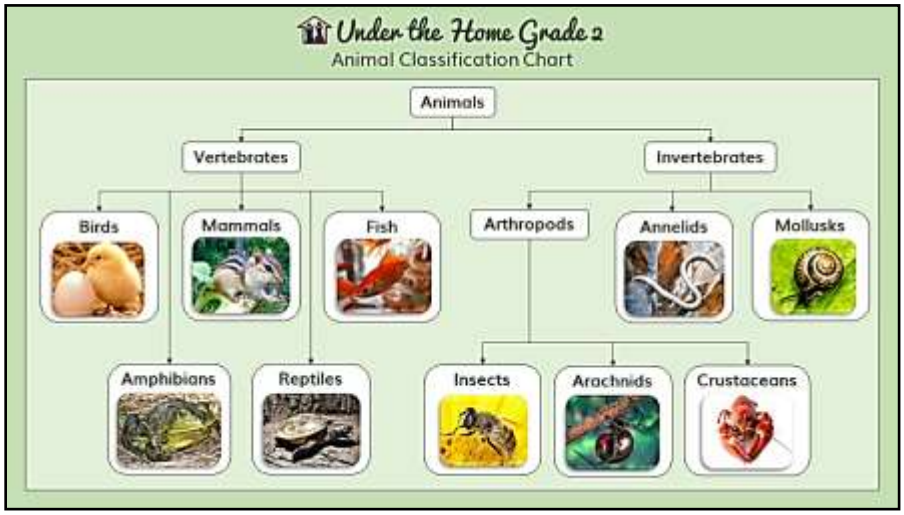
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch and listen to the katydid in the video.
- Note how the katydid mimics the appearance of a leaf. Sing, 'Katy did, Katy didn't, Katy did,' along with the insect.

Activity 3: Classify the Animal

- Katydids are animals, invertebrates, arthropods, and insects.
- Find which categories katydids fit into on the classification chart.



Activity 4: Recite 'To an Insect' by Oliver Wendell Holmes
I love to hear thine earnest voice
Wherever thou art hid,
Thou testy little dogmatist,
Thou pretty katydid,
Thou mindest me of gentle folks,
Old gentle folks are they,
Thou say'st an undisputed thing
In such a solemn way.

Activity 5: Color and Label a Katydid
Complete page 19 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate a katydid or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a katydid, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 20 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the katydid move?
- How does the katydid eat?
- What does the katydid eat?
- How does the katydid sense the world?
- How does the katydid breathe?

Habitat observations include:

- Does the katydid live in a forest, a field, a town, or near water?
- In what type of climate does the katydid live (e.g. temperate, tropical, arid, arctic)?

Appearance observations include:

- What do the wing covers look like?
- What colors are the wings?
- What colors are the eyes and body?
- How many legs does the katydid have?
- How many antennae does the katydid have?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 20 of 'Science Field Book for Second Grade.'

Review Questions

1. **Katydids have three pairs of legs. Which are the longest?** The hind legs are the longest pair of legs.
2. **How do katydids hide from predators?** Katydids are the same color as the leaves and bushes they reside among. In addition, their wing covers look just like leaves, allowing them to blend in.
3. **What are the three main parts of katydids' bodies?** The three main parts of all insect bodies include the head, the thorax, and the abdomen.
4. **How many legs do katydids have?** Katydids have six legs.
5. **How do katydids sing?** Katydids sing by rubbing their wings together.
6. **Do all katydids sing?** No, only male katydids sing.
7. **Do katydids have lungs like humans?** No, katydids do not have lungs. Instead, they breathe through openings called spiracles.

8. **Do katydids have bones like humans?** No, katydids are insects. They have an exoskeleton instead of an internal skeleton of bones.
9. **Are katydid eyes like human eyes?** No, katydids have compound eyes with multiple visual units.

Lesson 9 Guide: The Cricket

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like fireflies, butterflies, bees, mosquitoes, dragonflies, beetles, grasshoppers, and katydids, crickets are insects. Known as the "troubadours of the field," the chirping of crickets conjures up a calm summer evening. The chirp of the cricket is quiet at the beginning of summer and grows louder as fall approaches. Crickets rub their wings together to make their chirps. Only male crickets chirp, and they chirp to attract mates. If two male crickets sing too close together and see each other, they may change their song to a warning and get into a fight. Crickets are black and shiny like patent leather. Crickets use their compound eyes, their simple eyes, and their antennae, and their cerci for sensing the world. Crickets live in fields under stones and in burrows. They eat plants such as grass and clover, but especially enjoy sweet, juicy fruits such as apples or melons. Some crickets fly, but others cannot despite having wings. Like katydids and grasshoppers, crickets have long, strong hind legs that make them good jumpers, although it is usually their quick running that helps them to evade predators and disappear into the grass.

Vocabulary

- **Segment**: Each of the series of similar anatomical units of which the body and appendages of some animals are composed.
- **Antennae**: Either of a pair of long, thin sensory appendages on the heads of insects, crustaceans, and some other arthropods.
- **Feelers**: An animal organ such as an antenna or palp that is used for testing things by touch or for searching for food.
- **Cercus (pl. Cerci)**: A small appendage at the end of the abdomen of some insects and other arthropods, occurring in pairs.

Concepts

Crickets and other insects have sensing organs called antennae. Facts about antennae

- Antennae are made out of segments.
- Antennae have many joints, which make them very flexible.
- Some insects have antennae as thin as threads.
- Other insects have feather-like antennae.
- Despite sometimes being called 'feelers', antennae are used for smelling as well as feeling.

Enrichment Activities

Activity 1: Narrate the Story

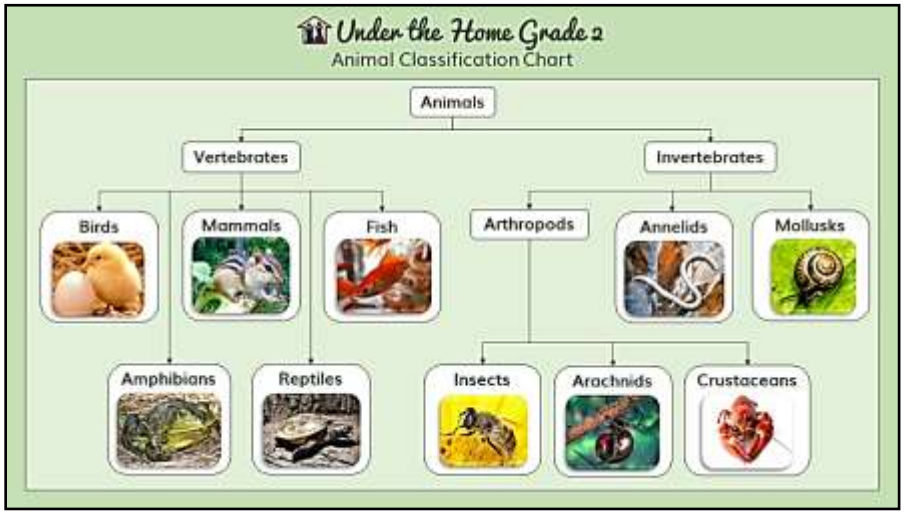
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Look at and listen to a cricket.

Activity 3: Classify the Animal

- Crickets are animals, invertebrates, arthropods, and insects.
- Find which categories crickets fit into on the classification chart.



Activity 4: Color and Label a Cricket

Complete page 21 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
Take a nature walk, locate a cricket or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a cricket, you may sketch a different animal or make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 22 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the cricket move?
- How does the cricket eat?
- What does the cricket eat?
- How does the cricket sense the world?

Habitat observations include:

- Does the cricket live in a forest, a field, a town, or near water?
- In what type of climate does the cricket live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the cricket live?

Appearance observations include:

- What colors are the eyes and body?
- How many legs does the cricket have?
- How many antennae does the cricket have?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 22 of 'Science Field Book for Second Grade.'

Review Questions

1. **Is the covering of the cricket shining, like black patent leather, or is it dull?** The covering of the cricket shines like black patent leather.
2. **Where can you find crickets?** You can find crickets out in fields, under rocks, and in burrows.
3. **Where are the crickets' ears located?** The crickets' ears are located on their elbows.
4. **How many legs do crickets have?** Crickets are insects and have six legs.
5. **Which of the three pairs of cricket legs are the largest?** The hind legs of the cricket are the largest, and they are used for jumping.
6. **Do both male and female crickets sing?** Only the male crickets sing.
7. **List two reasons why male crickets sing.** Male crickets sing to attract mates and to warn other male crickets off.
8. **What time of year do the crickets sing loudest?** Crickets sing loudest near autumn.
9. **How do crickets use their cerci?** Crickets use their cerci, paired spikes at the end of the abdomen, to sense the world.

Lesson 10 Guide: The Spider

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Spiders are not insects like the butterfly or the beetle, they are arachnids. You can remember this by knowing spiders have eight legs instead of six. Also unlike insects, spiders have two main body sections rather than three, as the head and thorax are merged into one cephalothorax. In addition, the abdomens of spiders have no segments unlike insects. One of the most fascinating characteristics of spiders is the gossamer thread they spin. Spiders are the civil engineers of the animal world, spinning bridges, airplanes, and balloons. Spiders often spin their sticky webs where walls meet ceilings in our homes. These webs entangle and trap a variety of insect pests such as flies, mosquitoes, and grasshoppers, making spiders beneficial to humans. As soon as an insect becomes entangled in a spider's web, the spider runs to it, seizes it in its jaws, sucks its blood, and then throws away the shell, the wings, and the legs. Spiders reproduce by laying eggs within egg sacs. The eggs hatch into spiderlings, which mature to adults in around a year. Most spiders are entirely harmless to humans; however, the bites of some species are poisonous, including the brown recluse and the black widow. The mouths of spiders are guarded by two mandibles, each ending in a sharp claw, at the tip of which the poison gland opens.

Vocabulary

- **Civil Engineer**: An engineer who designs and maintains roads, bridges, dams, and similar structures.
- **Cephalothorax**: The fused head and thorax of spiders and other chelicerate arthropods.
- **Mandible**: Either half of the crushing organ in an arthropod's mouthparts.
- **Poison**: A substance that is capable of causing the illness or death of a living organism when introduced or absorbed.
- **Gossamer**: A fine, filmy substance consisting of cobwebs spun by small spiders, which is seen especially in autumn.

Concepts

Did you know some spiders have poisonous bites? In the United States, poisonous spiders include the North American black widow and the brown recluse.
Facts about black widows:

- Although poisonous, black widow bites are rarely fatal. The bite of the female is more dangerous than the bite of the male.
- The black widow is identifiable by the red or orange hourglass shape on the underside of the abdomen.
- Study the picture of the black widow below, and find the red hourglass shape.

Facts about brown recluses:

- The brown recluse is identifiable by its six eyes (most spiders have eight eyes) and by the dark violin shape on its cephalothorax.
- Although poisonous, brown recluse bites are rarely fatal.
- Zoom in to study the picture of the brown recluse below. Find the dark violin shape on its cephalothorax.

Enrichment Activities

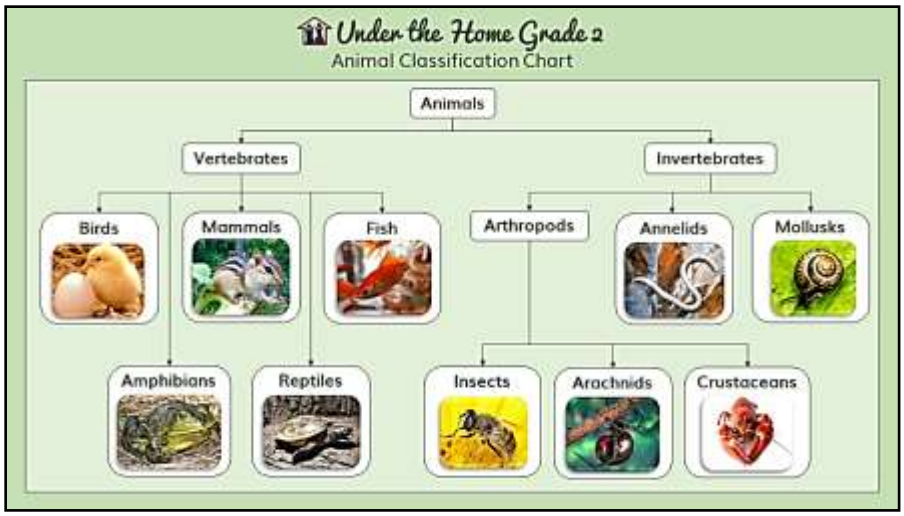
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the spider climbing on its web in the video.
- Locate the spider's cephalothorax, abdomen, and eight legs.

Activity 3: Classify the Animal

- Spiders are animals, invertebrates, arthropods, and arachnids.
- Find which categories spiders fit into on the classification chart.



Activity 4: Seek Out Spider Webs

- Look for spider webs in and around your house. Look where the ceiling meets the walls. Basements, attics, sheds, and garages are particularly great places to look for spiders.
- Did you find any spider webs? What patterns do they have? Did you find any spiders?

Activity 5: Color and Label a Spider

Complete page 23 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk

Take a nature walk, locate a spider or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a spider, you might make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 24 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the spider move?
- How does the spider eat?
- What does the spider eat?
- How does the spider sense the world?

Habitat observations include:

- Does the spider live in a forest, a field, a town, or near water?
- In what type of climate does the spider live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the spider live?

Appearance observations include:

- What colors are the legs and body?
- How many legs does the spider have?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 24 of 'Science Field Book for Second Grade.'

Review Questions

1. **List two ways spiders differ from insects.** Spiders have eight legs, and insects have six. Spiders have a cephalothorax and a non-segmented abdomen, while insects have a head, a thorax, and a segmented abdomen.
2. **Why do spiders spin webs?** Spiders spin webs to catch insects to eat. They also spin webs to help them travel places.
3. **How to spiders inject poison into their prey?** Spiders bite their prey with their sharp mandibles, each ending in a sharp claw, at the tip of which the poison gland opens.
4. **Where might you find spiders and their webs around your house?** You can often find spiders in corners, such as where walls and the ceiling meet. Seldom used places such as attics, basements, or sheds make good hunting grounds for spiders.
5. **Are most spiders harmful to humans?** No, most spiders are harmless to humans, although some are poisonous.
6. **Name one poisonous spider.** Poisonous spiders include the black widow and the brown recluse.

Lesson 11 Guide: Feathers as Clothing

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson covers birds and their feathers. Unlike people, birds don't wear clothing to keep themselves warm and dry. Instead, birds grow feathers to protect themselves from the rain, snow, wind, and cold. Bird feathers have three parts: the shaft, barbs, and fluff. The feathers on the backs and chests of birds overlap like shingles, keeping the bird dry by enabling rain water to easily run off. As birds preen their plumage, they further waterproof their feathers by applying a special oil to their feathers.

Vocabulary

- **Preen**: Straighten and clean its feathers with its beak.
- **Plumage**: A bird's feathers collectively.
- **Shaft**: The stem of the feather which gives it strength.
- **Barbs**: The projections from the stem toward the end of the feather, making the thin, fanlike portion of the feather.
- **Fluff**: The soft and downy part of feathers near to the body of the fowl.
- **Habitat**: The natural home or environment of an animal, plant, or other organism.
- **Climate**: The weather conditions prevailing in an area in general or over a long period.
- **Temperate Climate**: A moderate climate often with cool or cold winters and warm summers.
- **Tropical Climate**: A hot climate that often has a wet season and a dry season.
- **Arid Climate**: A climate with a severe lack of water and vegetation.
- **Arctic Climate**: A climate with frigid winters and cool summers.

Concepts

Second grade science focuses on learning about animals. Did you know that animals include not only mammals such as cats and dogs, but also robins, clams, minnows, snakes, spiders, frogs, whales, turtles, lizards, and bugs?

Birds are one type of animal. Key characteristics of birds include an ability to fly, wings, beaks, and feathers (although not all birds fly such as penguins and ostriches).

Facts about feathers:

- Feathers grow from the skin of a bird and protect the bird from rain, snow, wind, and cold.
- Feathers on a bird's back and breast overlap like shingles on a house, so that the rain drips off and leaves the bird's underclothing quite dry. Compare the photo of the shingle-like feathers on the back of the parakeet to the photo of the house shingles.

Each bird feather consists of three parts: the shaft, the barbs, and the fluff.

- The shaft is the stem of the feather, and gives it strength.
- The soft fluff helps to keep the bird warm and is comparable to our underclothing.
- The smooth, overlapping web of barbs forms a rain and wind-proof outer coat.

Types of feathers include down and pin-feathers.

- Down is a feather with no quill.
- Young chicks are covered with down.
- A pin-feather is simply a young feather rolled up in a sheath, which bursts later and is shed.

Did you know that many birds apply a special waterproofing oil to their feathers?

- The oil gland is on the back of the bird, just at the base of the tail feathers.
- The bird squeezes the gland with its beak to get the oil and then rubs the beak over the surface of its back and breast to make the feathers shed water easily.
- People on farms sometimes say that when a hen oils her feathers it is a sure sign of rain.

Enrichment Activities

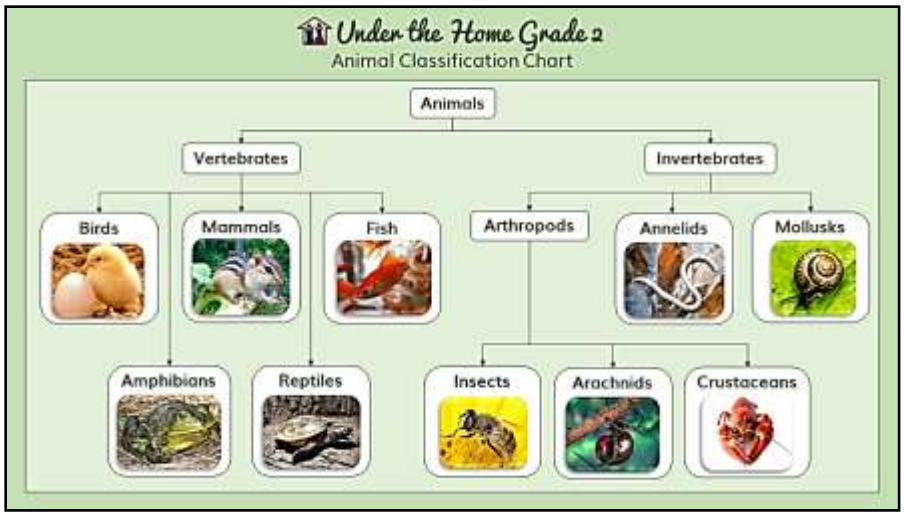
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch a Video of a Bird
Observe the European Robin in the video, and answer the following questions. If you listen hard, you can hear the bird chirping over the sound of the flowing water.

- Describe the bird's appearance (what does it look like)?
- Describe the bird's behavior (what does it do)?
- Describe the bird's habitat (where does it live)?
- Describe the bird's feathers on its tail, back, head, neck, and chest.

Activity 3: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 4: Identify Animals

Identify which of the following are animals:

- Squirrel
- Bat
- Butterfly
- Deer
- Dandelion
- Salmon
- Rock
- Rattlesnake
- Frog
- Dog
- Robin
- Worm
- Apple Tree
- Whale

(Answers: Y,Y,Y,Y,N,Y,N,Y,Y,Y,Y,Y,N,Y)

Activity 5: Act Out the Lesson

- Pretend to be a bird, preening its feathers.
- Get out your special oil from the gland on your back.
- Waterproof your feathers by applying your special oil.

Activity 6: Draw and Label the Parts of a Feather

Complete page 25 of 'Science Field Book for Second Grade.'

Activity 7: Take a Nature Walk
Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. Take special care to study the bird's feathers. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 26 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?

Activity 8: Complete a Field Book Entry
After your nature walk, complete page 26 of 'Science Field Book for Second Grade.'

Review Questions

1. **Are the feathers arranged on the backs and breasts of birds more like puzzle pieces shingles on a roof?** Feathers on the backs and breasts of birds are arranged like shingles on a roof. This allows the water to run off their backs and keeps the birds warm and dry.
2. **Are both ends of a grown bird's back feathers alike?** If not, what is the difference? The soft and downy part of feathers are near to the body of the bird. The part farther away from the body consists of barbs branching off a central quill.
3. **Is the fluffy part of a grown bird's feather on the outside of the feather or on the inside next to the bird's skin? What is its use?** The fluffy part of a feather is next to the bird's skin. The fluffy part of the feather helps to keep the bird warm.
4. **Why is the smooth part of the feather (the web) on the outside?** The outside parts of feathers are smooth to help birds shed water off their backs and breasts.
5. **How do some birds keep their feathers oily and glossy so they will shed water?** Some birds produce a special oil. They spread this oil over their feathers to more easily shed water.
6. **Where do birds get their oil?** The birds get their oil from a gland on their backs.
7. **Describe how a bird oils its feathers.** The bird squeezes their gland with its beak to get the oil and rubs the beak over its back and breast.
8. **Do some birds oil their feathers before a rain?** Yes, certain birds, such as hens, do oil their feathers before a rain.

Lesson 12 Guide: Feathers as Ornament

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

In the bird world, oftentimes male birds are brightly colored while their female counterparts are drab. Why is this? Male birds are brightly colored to attract their female mates. Some male birds can be show-offs," spreading their tail to the fullest extent and shifting it this way and that to show the exquisite play of colors over the feathers in the sunlight. Male peacocks, in particular, create gorgeous displays of blue, green, and purple plumage. Female birds are often drab colored to blend in with their habitats, especially their hidden nests, to cover and camouflage their eggs and nestlings. Muted colors help female birds and their babies evade the sharp eyes of hungry, high-soaring predators such as hawks.

Vocabulary

- **Ornament**: A thing used to make something look more attractive but usually having no practical purpose.
- **Drab**: Lacking brightness or interest; drearily dull.
- **Mate**: Each of a pair of birds or other animals.
- **Camouflage**: An animal's natural coloring or form that enables it to blend in with its surroundings.
- **Plumage**: A bird's feathers collectively.
- **Peafowl**: A large crested pheasant native to Asia.
- **Peacock**: A male peafowl.
- **Peahen**: A female peafowl.
- **Peachick**: A young peafowl.

Concepts

The color and shape of feathers make some birds more beautiful; while in others, the color of the feathers protects them being spotted by their enemies.

Examine the pictures of male (left) and female (right) birds and compare their plumage:

- Male Rooster and Female Hen
- Male and Female Cardinals

- Male and Female Ducks

Enrichment Activities

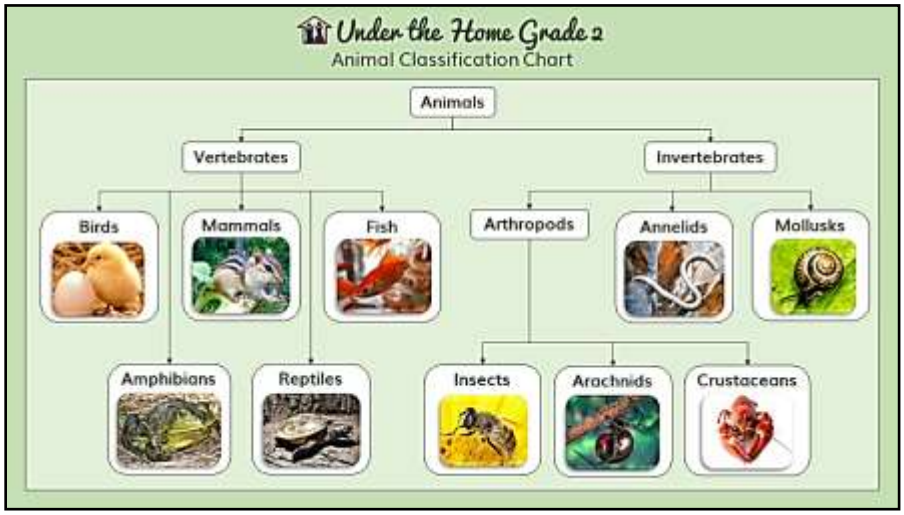
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video of a Peacock
Observe the peacock shaking his feathers in the video, and answer the following questions.

- Describe the bird's appearance (what does it look like)?
- Describe the bird's behavior (what does it do)?
- Describe the bird's habitat (where does it live)?
- Describe the bird's feathers on its tail, back, head, neck, and chest.
- What do the spots on the peacock's feathers look like?
- Why does the peacock spread out its feathers and shake them?

Activity 3: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 4: Identify Males and Females
For each pair of birds, identify which bird is male and which is female:

- Peafowl
- Goldfinches
- Scarlet Tanagers
- Turkeys

Activity 5: Act Out the Lesson
Act out the role of color in shielding a peachick from being spotted by a hawk.

- The peachick holds a piece of paper the same color as the floor/ground over their head (green, brown, gray, etc.), crawls around, and pretends to search for food.

- The hawk soars around the peachick, but cannot see it.
- The peachick holds a bright red, orange, or yellow piece of paper over their head, crawls around, and pretends to search for food.
- The hawk soars around the peachick, spots its bright colors, and swoops down to carry it off.

Activity 6: Read a Poem About a Peacock
Read 'The Peacock' by Robert Greene (1560).

The bird of Juno glories in his plumes;
Pride makes the fowl to preen his feathers so.
His spotted train fetched from old Argus' head,
With golden rays like to the brightest sun,
Inserteth self-love in the silly bird;
Till midst its hot and glorious fumes
He spies his feet and then lets fall his plumes.

Note: Argus is a figure from Greek mythology who had many eyes on his head, like the many 'eyes' of the peacock feather. See below the bald, many-eyed head of Argus in the painting, 'Mercury, Argus and Io,' by Abraham Bloemaert.

Activity 7: Draw and Label a Peacock Feather
Using the image of a peacock feather as a guide, complete page 27 of 'Science Field Book for Second Grade.'

Activity 8: Take a Nature Walk
Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. If possible, seek out a bird with pretty plumage. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 28 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What feathers does the bird wear?
- What colors are the feathers?
- Are the feathers especially bright colored or drab colored?
- Would it be hard for a predator to spot the bird, based on its color?
- From the feather colors, do you guess the bird is male or female?
- What colors are the beak and feet?

Activity 9: Complete a Field Book Entry
After your nature walk, complete page 28 of 'Science Field Book for Second Grade.'

Review Questions

1. **Which has brighter and larger tail feathers - the hen or the rooster?** The rooster has brighter and larger tail feathers.
2. **Which has brighter feathers - the male cardinal or the female cardinal?** The male cardinal has brighter feathers.
3. **Why might a peacock shake its tail feathers?** The peacock often shakes its tail feathers to attract a peahen.
4. **Why do many male birds have bright feathers?** Male birds are brightly colored to attract their female mates.
5. **Why do many female birds have drab colored feathers?** Female birds are often drab colored to blend in with their habitats, especially their hidden nests, so they can cover and camouflage their eggs and nestlings from predators.
6. **How are the Greek mythology figure Argus and the male peacock similar in appearance?** Both Argus and the male peacock have many eyes. Argus had many eyes embedded on his head. Peacocks have many eye-shaped features on their tails.

Lesson 13 Guide: How Birds Fly

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Birds wings correspond to human arms. Birds fly by using their wings to press down against the air. Birds use their tails as rudders, enabling them to turn and navigate through the air.

Vocabulary

- **Air**: The invisible gaseous substance surrounding the earth, a mixture of mainly oxygen and nitrogen.
- **Rudder**: A flat piece, usually of wood, metal, or plastic, hinged vertically near the stern of a boat or ship for steering.
- **Navigate**: Travel on a desired course.
- **Buoyant**: Able or apt to stay afloat or rise to the top of a liquid or gas.
- **Parallel**: Of lines, planes, surfaces, or objects, side by side and having the same distance continuously between them.
- **Perpendicular**: At an angle of 90° to a given line, plane, or surface.

Concepts

Birds use their wings and tails to fly. Facts about bird wings:

- Birds control the opening and closing of their wings.
- Feathers open and shut on each other like an old-fashioned, hand-held fan.
- Feather quills overlap on an open wing, so the air cannot pass through them.
- Open wings are curved down like an umbrella to enable the wings to press down harder on the air for greater lift.

Facts about bird tails:

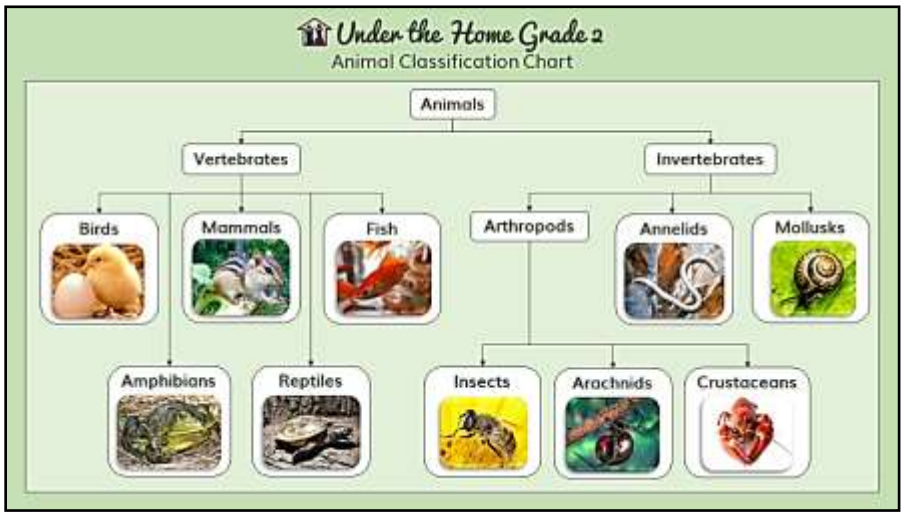
- Birds fan out their tails when flying.
- Birds use their tail like a rudder, enabling them to turn while flying.
- Baby birds have a hard time navigating as they fly, because their tail feathers have not yet grown in.

Enrichment Activities

Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 3: Experiment with Flying
Birds use their wings to press down against the air to lift their bodies into flight.

- We can't see air directly, so how can we push it and how can it push against us?
- Use your hand to fan your face. Can you feel the air pushing against your face? If air was nothing, we would wave our hand and would feel nothing against our faces.
- The air pushes against the wings of birds just as it pushes against our faces.

Hold an open umbrella and jump as high as you can. The air pushes against the bottom of the umbrella and you will feel buoyed up.

- If air was nothing, we would not feel buoyant when jumping with an umbrella.
- The air pushes against the wings of birds just as it pushes against the bottom of an open umbrella.

Extend your arms and hold your hands parallel to the ground. Keeping your fingers together and cupping your hands, flap your wings and feel the air resistance against your hands.

- Next, extend your arms and hold your hands perpendicular to the ground. Keeping your fingers together and cupping your hands, flap your wings and feel the air resistance against your hands.
- Which way produced more air resistance against your hands? (Ans: perpendicular)
- Just as you swiveled your hands to be perpendicular to the floor, birds' wings swivel sideways before the up stroke and do not push the bird down.

Activity 4: Pretend to Fly
Flap your arms the way a bird flaps its wings.

- Feel the air pressing against your arms as they move them.
- Does the air press harder or softer when you move your arms faster?

Activity 5: Color and Label a Flying Bird
Complete page 29 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate flying birds to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 30 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird fly?

Habitat observations include:

- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What feathers does the bird wear?
- What colors are the feathers?
- From the feather colors, do you guess the bird is male or female?
- What colors are the beak and feet?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 30 of 'Science Field Book for Second Grade.'

Review Questions

1. **Do you think birds' wings better correspond to our arms or our legs?** A bird's wings better correspond to our arms.
2. **Why do birds flap their wings?** Birds flap their wings to fly, using them to press down against the air and lift their bodies.
3. **Can you press against the air by waving your hand?** Yes, you can press against the air by waving your hand.
4. **How are the feathers arranged on the wing so that the bird can use it to press on the air?** The wing quills overlap, preventing air from passing through and providing more lift.
5. **If you carry an umbrella on a windy morning, which catches more wind, the underside or the topside? Why is this?** Does the curved surface of the wing act in the same way? The underside of an umbrella catches more wind, because it is curved down. A wing is also curved down and catches more wind than the top side.
6. **If birds fly by pressing their wings against the air on the down stroke, why do they not push themselves downward with their wings on the up stroke?** Birds' wings swivel sideways before the up stroke and do not push the birds down.
7. **What part of birds act as their rudder?** Birds' tails act as a rudder.
8. **Why do young birds have a hard time flying?** Young birds have a hard time turning while flying because their tail feathers have not grown in yet.
9. **Do flying birds keep their tails open like a fan or closed?** Flying birds keep their tails open like a fan.

Lesson 14 Guide: Bird Migration

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

The seasonal travel of birds from place to place is called migration. Migratory birds engage in this seasonal travel, while permanent residents stay in one place all year. Summer residents are those birds which stay in a location in the summer, and winter residents are those who stay in a location in the winter. This means migratory birds are summer residents to people in certain locations, but winter residents to people in other locations. For example, American barn swallows are summer residents for much of the United States, but winter residents for much of Central and South America. Some birds, such as swallows, gather into flocks before taking their migratory journey. Other birds travel solo between their summer and winter residences.

Vocabulary

- **Migration**: Seasonal movement of animals from one region to another.
- **Migratory Birds**: Birds that engage in seasonal travel each year.
- **Permanent Resident**: Birds that stay in one location year-round.
- **Summer Resident**: Birds that stay in a location for the summer only.
- **Winter Resident**: Birds that stay in a location for the winter only.

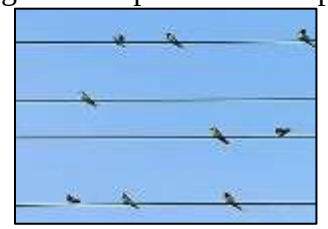
Concepts

Did you know that Arctic terns migrate between the Arctic circle and the Antarctic circle?

- Arctic terns summer in the Arctic circle and winter in the Antarctic circle.
- Arctic terns fly around 22,000 miles during their yearly migrations.
- In the summer, the sun does not set in the Arctic circle and in the winter, the sun does not set in the Antarctic circle. Arctic terns spend around 8 months in 24-hour daylight.

Did you know that some birds gather into flocks to migrate, while others travel solo?

- Swallows gather into flocks before making their fall migration journeys south. See the picture of swallows gathering on a telephone wire in preparation for their big trip south.



- Canadian geese also gather into groups to migrate. See the characteristic 'V' that geese form while flying south for the winter or north for the summer.

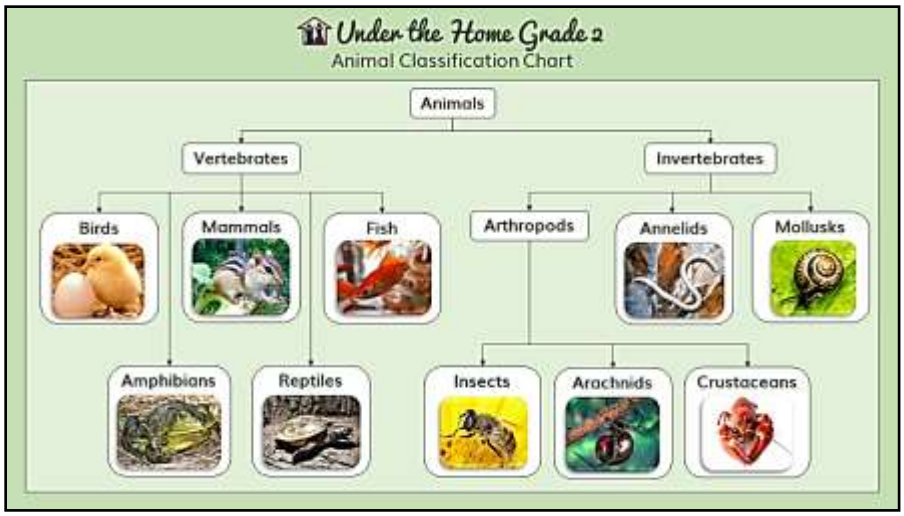
Enrichment Activities

Activity 1: Narrate the Story

After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 3: Act Out the Lesson

Reinforce that certain birds, such as North American barn swallows, migrate to the sunny south in winter and migrate back north in the spring.

- On one piece of paper, draw an icicle and write the word 'NORTH.' Place this piece of paper in your kitchen.
- On another piece of paper, draw a bright sun and write the word 'SOUTH.' Place this piece of paper in your living room.
- Pretend to be a migrating swallow. Your kitchen is the brisk north, and your living room is the sunny south.
- First, pretend it is fall and it is getting colder. Fly south from your chilly kitchen to your warm living room.
- Take a rest on your couch. Your wings are tired from all that flapping.
- Next, pretend it is spring. It is getting warmer in the north, and you can now find enough food there. Fly back from your living room in the sunny south to your kitchen in the north.

Activity 4: Color and Label a Migration Map

Complete page 31 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 32 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- Where is the bird's summer home and where is the bird's winter home? (Conduct online research to determine locations if needed.)
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 32 of 'Science Field Book for Second Grade.'

Review Questions

1. **Where do Arctic terns live in the winter?** Arctic terns live in the Antarctic circle during the winter.
2. **Where do Arctic terns live in the summer?** Arctic terns live in the Arctic circle during the summer.
3. **Which are migratory birds - American Barn swallows or cardinals?** American barn swallows are migratory birds. Cardinals are not migratory.
4. **Which are permanent residents - American Barn swallows or cardinals?** Cardinals are permanent residents. American Barn swallows are not permanent residents.
5. **Name one summer resident bird of where you live?** Answers vary. Summer resident birds in the United States include robins, bluebirds, red-winged blackbirds, geese, hummingbirds, and ducks.

Lesson 15 Guide: Bird Eyes and Ears

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Birds tend to have better vision than mammals such as humans. Birds of prey, such as hawks and owls, have such excellent vision they can spot mice on the ground from high distances up in the air. Birds have irises of many different colors including white, red, blue, yellow, brown, gray, pink, purple, and green. Some birds, such as hens, have their eyes placed on either side of their heads. This means they cannot see the same object at once with both eyes. Hens often look at something with one eye, and then turn their head to view the object with the other eye. Hens have a black pupil and a yellow iris. Owls cannot move their eyes in multiple directions. To see in different directions, owls must swivel their entire heads. We typically cannot see the ears of birds, as they often consist of small holes covered by feathers. Some birds, such as owls, have better hearing than humans. Owls can even use their sense of hearing to locate prey at night.

Vocabulary

- **Vision**: The faculty or state of being able to see.
- **Prey**: An animal that is hunted and killed by another for food.
- **Iris**: A flat, colored, ring-shaped membrane, with a pupil in the center.
- **Pupil**: The dark circular opening in the center of the iris of the eye, varying in size to regulate the amount of light reaching the retina.
- **Expand**: Become or make larger or more extensive.
- **Contract**: Decrease in size, number, or range.

Concepts

Study your own eyes in a mirror or look at someone else's eyes. Find the iris (colored part), the pupil (black circular center), and the upper and lower eyelids. Facts about pupils:

- Pupils change size to help animals see in bright light and in dim light.
- Pupils contract in bright light to reduce the amount of light that enters the eye.
- Pupils expand in dim light to allow more light to enter the eye.
- Owls have large eyes and pupils, enabling owls to see far better than humans at night.
- Study the picture of the owl. Find the owl's irises and the pupils.

Birds have different coverings for their eyes from humans.

- Humans have one upper eyelid and one lower eyelid. When humans close their eyes, the top lid goes down.
- When hens close their eyes, the bottom lid comes up.
- Hens and owls have three eyelids, an upper eyelid, a lower eyelid, and a clear nictitating membrane.
- Study the image of the owl. One nictitating membrane is partially closed and the other is fully tucked away and cannot be seen. Find the nictitating membrane.

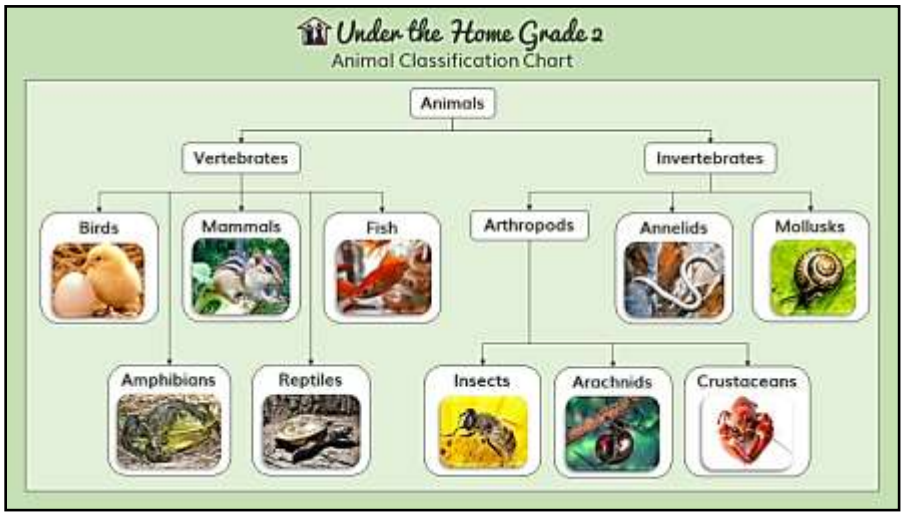
Enrichment Activities

Activity 1: Narrate the Story

After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 3: Pupils and Light
Reinforce the concept that pupils expand in dim light and contract in bright light.

- Pair up with a partner. Next to a bright lamp, look at the other person's eyes. Note the size of the person's pupils.
- Next, turn off the bright lamp and move to a dim area. Look at the other person's eyes again. Note how the size of the person's pupils changed.

Activity 4: Color and Label an Owl's Eyes
Complete page 33 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 34 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- Can you see the bird's ears? Why or why not?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 34 of 'Science Field Book for Second Grade.'

Review Questions

1. **Can owls see and hear well?** Yes, owls have good hearing and vision. Owls can spot a tiny mouse on the ground as they soar through the night sky.
2. **How many colors are owls' eyes?** Owls tend to have one color for the iris and a black pupil.
3. **Do owls have large eyes or small eyes?** Owls have large eyes.
4. **In bright light, do pupils tend to be small or large?** In bright light, pupils tend to be small.
5. **In dim light, do pupils tend to be small or large?** In dim light, pupils tend to be large.
6. **Why do hens turn their heads first to this side and then to that as they look at you?** Some birds, such as hens, have their eyes placed on either side of their heads. Hens turn their heads to see you with each of their eyes, one at a time.
7. **Do hens wink as humans do? Have they any eyelids?** Hens do wink, but differently than humans. Humans wink by closing their upper eyelid. Hens wink by closing their lower eyelid.
8. **Can owls move their eyes to see in different directions?** No, owls cannot move their eyes to see in different directions. Owls must turn their whole heads to look in different directions.
9. **Which of the following have nictitating membranes - owls, humans, and/or hens?** Owls and hens have nictitating membranes. Humans do not have nictitating membranes.

Lesson 16 Guide: Bird Beaks

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Birds' beaks serve multiple purposes. First, they act as a pick for digging into soil or bark after insects. They also serve as pliers for grabbing and holding things. Beaks act as scissors for cutting through things, and brushes for cleaning and oiling their feathers. Beaks offer protection, providing a sharp weapon in case of a fight. Finally, birds also use their beaks to turn their eggs. Different types of birds have different types of beaks. Hens have narrow, sharp, and hard beaks which allow them to dig in the hard earth for worms and bugs. Ducks have broad, flat beaks, which allow them to gather aquatic plants and strain the water out the sides like a sieve. Duck beaks are softer, for they do not need to dig through the hard earth like other birds such as hens. Modern birds do not have teeth. Birds swallow food whole and do not require teeth, for their beaks serve to grip the food, and their gizzards 'chew' the food. All birds have gizzards, which are muscular second stomachs which pulverize swallowed food before it reaches the intestines. Birds have nostrils in their beaks. It is believed birds do not smell well, for their nostrils lack the soft tissues found in dogs or humans that aid in detecting scents.

Vocabulary

- **Beak**: A bird's horny projecting jaws; a bill.
- **Aquatic**: Relating to water.
- **Gizzard**: A muscular, thick-walled part of a bird's stomach for grinding food, typically with grit.
- **Pulverize**: Reduce to tiny particles.
- **Stomach**: The internal pouch-like organ in which the major part of the digestion of food occurs.
- **Intestine**: The lower part of the alimentary canal from the end of the stomach to the anus.
- **Nostril**: Either of two external openings of the nasal cavity that admit air and scents.

Concepts

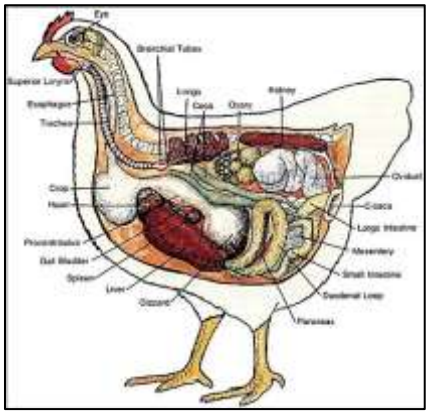
Birds have an organ that humans do not have - the gizzard.

Facts about gizzards:

- Gizzards 'chew' food for birds, earthworms, certain fish, crocodiles, alligators, and some other animals.
- Dinosaurs from long ago may also have had gizzards.
- Some birds eat grit or gravel. The grit or gravel sits in the gizzard and helps to pulverize food.

Study the picture of a hen's anatomy and find the following.

- Beak
- Nostril
- Esophagus
- Crop (pouch for storing food)
- Gizzard (second stomach for grinding food)
- Small and Large Intestines



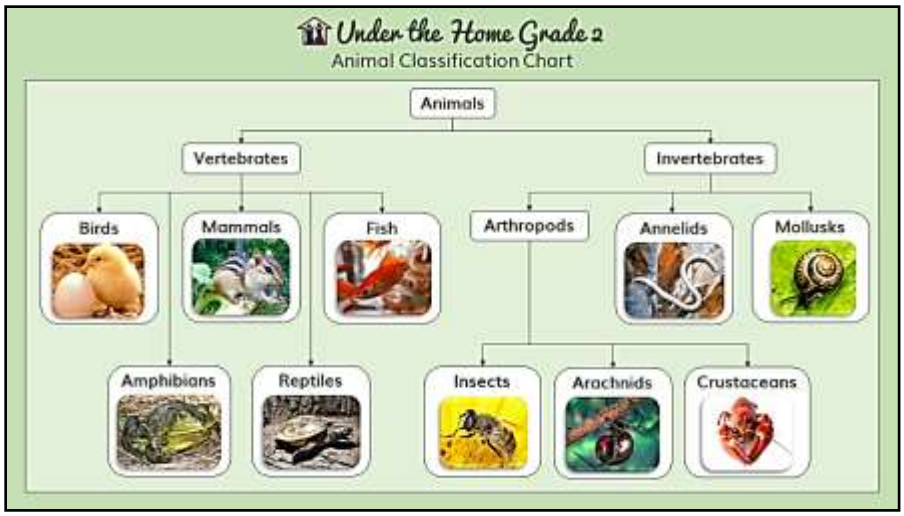
Enrichment Activities

Activity 1: Narrate the Story

After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 3: Eat Like a Bird

Reinforce the concept that birds do not have arms and hands with which to perform tasks such as cleaning and eating. Instead, birds must perform tasks with only their beaks and feet.

- First, while holding your hands behind your back, pick up a stuffed animal off the floor and place it on a couch.
- Next, while holding your hands behind your back, build a bird nest out of straws or toys such as blocks.
- Finally, while holding your hands behind your back, eat pieces of torn up bread or cereal scattered on a table.

Activity 4: Color and Label a Hen's Anatomy

Complete page 35 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 36 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How and what does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- Where is the bird's summer home and where is the bird's winter home? (Conduct online research to determine locations if needed.)
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?
- Can you see the nostrils of the bird?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 36 of 'Science Field Book for Second Grade.'

Review Questions

1. **What do birds use their beaks for other than eating?** Birds use their beaks as weapons for fighting, utensils for turning eggs, picks for digging into the earth or bark, pliers for grasping and holding items, and scissors for cutting.
2. **How are hens' beaks designed to help them get food?** Hens' beaks are narrow, sharp, and hard, enabling them to dig through the hard earth for worms and bugs.
3. **How are ducks' beaks designed to help them get food?** Ducks' beaks are soft, broad, and flat, enabling them to gather aquatic plants and filter the water out the sides of their beaks.
4. **Contrast the beaks of ducks and hens.** Ducks' beaks are softer, broader, and flatter than hens'.
5. **Do any modern birds have teeth?** No modern birds have teeth.
6. **Do all birds have gizzards?** Yes, all birds have gizzards.
7. **Of what use are gizzards?** Gizzards serve the same purpose as human teeth. Gizzards pulverize food to aid in digestion.
8. **Why do some birds eat gravel and grit?** Eaten gravel and grit collect in gizzards and help pulverize food to aid in digestion.
9. **Contrast the nostrils and sense of smell of dogs and hens.** Dogs have soft tissues in their nostrils and a keen sense of smell. Hens have no soft tissue in their noses and probably do not smell very well.

Lesson 17 Guide: Bird Feet

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Hens and ducks have very different feet, each type best suited for their owners' different behavior and habitats. Hens have tough claws and scaly skin that enable them to scratch in the hard dirt. While hens spend most of their time on land, ducks spend ample time swimming. To aid in swimming, ducks have a thin membrane, called a web, that stretches between its front toes.

Vocabulary

- **Web (feet)**: A membrane between the toes of a swimming bird or other aquatic animal.
- **Scale**: Each of the small, thin horny or bony plates protecting the skin of an animal, typically overlapping one another.
- **Claw**: A curved pointed horny nail on each digit of the foot in birds, lizards, and some mammals.
- **Waddle**: Walk with short steps and a clumsy swaying motion.
- **Glide**: Move with a smooth continuous motion, typically with little noise.

Concepts

Just as bird beaks vary in design, bird feet greatly differ. Hens and ducks serve as contrasting examples of design.

Hens

- Hens scratch at the hard dirt to find worms, seeds, and insects. To aid hens, their feet have long, hard, curved claws, and their legs are armored with tough scales.
- The design of hens' legs and feet and the flapping of their wings help them run fast.
- Hens also have a hind claw used for grasping branches and perching in trees.

Ducks

- Unlike hens, duck feet and legs are best suited for swimming through water, not for walking, scratching, and running on land.
- Duck legs are particularly short, so ducks cannot run fast. Ducks must slowly waddle when on land.

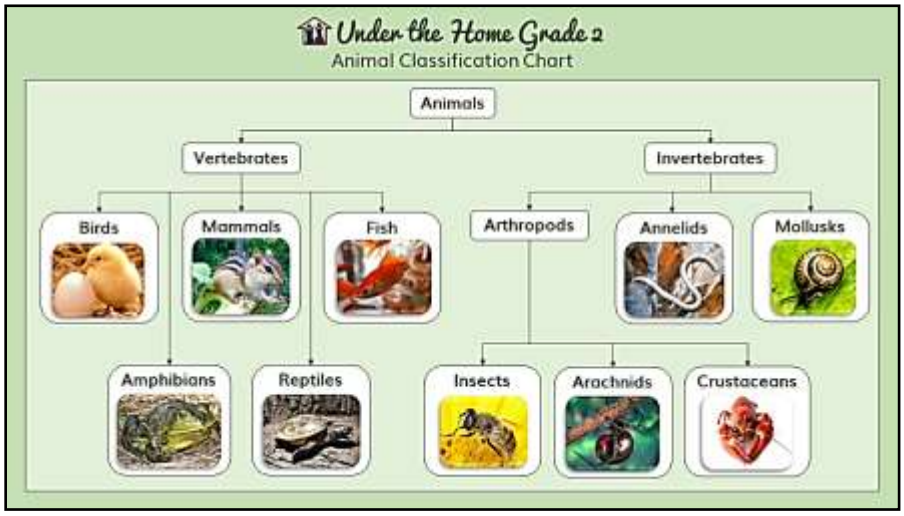
- Although awkward on land, ducks glide gracefully through the water.
- Duck feet are webbed to help them paddle through the water. Webbed feet also keep ducks from sinking when walking over the mud and marsh of wetlands and river bottoms.

Enrichment Activities

Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

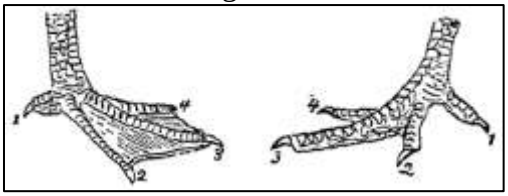
Activity 2: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 3: Compare Duck Feet and Hen Feet
Study the drawing of a duck foot and a hen foot.

- The toes of the feet are labeled as follows: 1) Hind toe, 2) Inner toe, 3) Middle toe, and 4) Outer toe.
- The duck foot has a web or membrane stretching between the toes. Which foot is the duck foot?
- The hen foot does not have a web. Which foot is the hen foot?
- Which foot has more toes - the hen or the duck?
- Point to the foot best suited for scratching in the hard dirt.
- Point to the foot best suited for swimming.
- Point to the foot best suited for running.
- Point to the foot best suited for standing on wetlands or river bottoms.



Activity 4: Number and Label Bird Feet

Complete page 37 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 38 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- Where is the bird's summer home and where is the bird's winter home? (Conduct online research to determine locations if needed.)
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?
- What do the feet look like?
- Are the toes of the feet connected by a web?
- Are legs and feet better optimized for swimming, running, scratching, and/or clinging to branches?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 38 of 'Science Field Book for Second Grade.'

Review Questions

1. **What protects and covers the legs and feet of hens?** Scales protect and cover the legs and feet of hens.
2. **Why do hens have long, sharp claws?** Hens have long, sharp claws for scratching at the earth. They may also use their claws for fighting.

3. **Which would typically win a race, a hen or a duck?** A hen would typically beat a duck at a race.
4. **Who has shorter legs, hens or ducks?** Ducks have shorter legs.
5. **Which has more toes, hens or ducks?** Hens and ducks have the same number of toes.
6. **Which has webbing between its toes, hens or ducks?** Ducks have webbing between their toes.
7. **Why do human snorkelers and scuba divers often wear flippers on their feet?** Humans do not have webbed feet, like a duck. Human snorkelers and scuba divers wear flippers over their feet to mimic the benefits of webbed feet, enabling them to swim easier and faster through the water.

Lesson 18 Guide: Bird Sounds

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Is it possible to quantify the pleasure received from hearing birds chirping, calling, and singing? The sounds of the robin, red-winged blackbird, and Canadian goose bring cheer to thousands of people every year. Indeed, it would be difficult to find anyone, except perhaps in large cities, who does not notice the arrival of at least some spring birds - the chirping of robins on the lawn, the honk of the wild geese overhead, or the red-winged blackbird as they call from the top of a shrub. Birds are interesting to most people because of their mere presence, including their cheerful songs, their bright colors, their happy hopping, and their inspiring soaring.

Vocabulary

- **Chirp**: Typically, a small bird or an insect uttering a short, sharp, high-pitched sound.
- **Sing**: For birds, to make characteristic melodious whistling and twittering sounds.
- **Honk**: The cry of a wild goose.

Concepts

Did you know that when it comes to singing songs, it is typically the male bird who sings?

- Male birds do most of their singing in the early mornings during the spring and early summer months.
- Male birds sing to attract their mates.
- Male birds also sing to defend their territory, which is a big enough area to enable them to gather food for their young.
- Some birds produce no songs, including storks and pelicans. However, those birds may make other sounds to communicate, such as the bill-clattering of the white stork and the rare squawking of the pelican.
- Birds can often be identified by their songs. Robins sing 'cheerily, cheer-up, cheerio'. The bright red cardinal sings, 'purdry, purdy, purdy.'
- Some birds mimic the songs of other birds, including the mockingbird. The mockingbird even copies the sounds of insects and amphibians.

Enrichment Activities

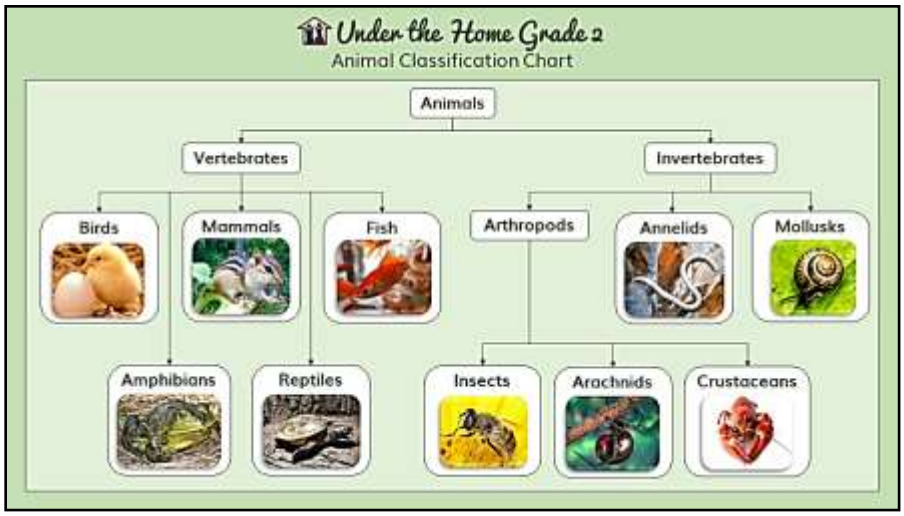
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Mimic Bird Sounds
Listen to each bird song or call below, and practice imitating their sounds.

- **American Robin** - sing along with a 'cheerily, cheer-up, cheerio'
- **Canadian Goose** - sing along with a 'honk honk honk'
- **Common Loon** - yodel along with their crazy laugh
- **Red-Winged Blackbird** - sing along with a 'conk-la-ree'
- **Spotted Owl** - sing along with a 'whoot, who who who

Activity 3: Classify the Animal

- Birds are animals and vertebrates.
- Find which categories birds fit into on the classification chart.



Activity 4: Take a Nature Walk
Take a nature walk, locate a bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 39 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which sounds does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?

- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- Where is the bird's summer home and where is the bird's winter home? (Conduct online research to determine locations if needed.)
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?
- What do the feet look like?

Activity 5: Complete a Field Book Entry
After your nature walk, complete page 39 of 'Science Field Book for Second Grade.'

Review Questions

1. **Are male or female birds more likely to sing songs?** Male birds are more likely to sing songs.
2. **During what time of day do male birds most often sing?** Male birds most often sing in the early morning.
3. **During what time of year do male birds most often sing?** Male birds most often sing during the spring and early summer months.
4. **Where do male birds sing?** Male birds usually sing from a certain perch or a narrowly defined territory.
5. **Why do male birds sing?** Male birds sing to attract mates and to mark or defend their hunting territory.
6. **Do all species of birds sing?** No, certain types of birds do not sing including storks and pelicans.
7. **You hear the robin's song, 'cheerily, cheer-up, cheerio,' but do not see the actual robin. Do you know for certain that the bird singing is a robin?** No, some types of birds, including the mockingbird, mimic the songs of other birds.

Lesson 19 Guide: The English Sparrow

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Did you know that the English sparrows we see across America are not native to our lands? They were carried over the ocean and introduced to America by people. They soon overran the country, displacing native song birds. English sparrows are considered pests by some as they feed on food crops meant for people, such as grains and fruit. The sparrows aren't all bad, for they help people by feeding on insects considered pests. English sparrows are very clever and sneak food right from under the beaks of other birds, such as robins. English sparrows are also known as house sparrows, and are today found in North and South America, Europe, Asia, Australia, and Africa.

Vocabulary

- Hatchling: A young animal that has recently emerged from its egg.
- Grain: Wheat or any other cultivated cereal crop used as food.
- Song Bird: A bird with a musical song.
- Clever: Quick to understand, learn, and devise or apply ideas; intelligent.

Concepts

Sparrows, although small and friendly, are considered pests by some other birds and people.

- Sparrows will rudely fight to take food from other birds.
- Sparrows dig up and eat seeds after planting by farmers and gardeners. Sparrows also eat both newly sprouted and ripened grains growing up from the earth, feasting on farmers' grain fields of wheat, oats, rye, corn, and rice.
- Sparrows also destroy the buds, flowers, and fruits of fruit trees.

Sparrows also have positive attributes.

- They are very clever and show capacity for learning.
- They eat pests such as weevils, grasshoppers, and cutworms.

Watch out sparrows! Other animals that prey upon sparrows include cats and birds of prey.

Enrichment Activities

Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Study Pictures of English Sparrows

- Compare the appearances of the male English sparrow and the female English sparrow.

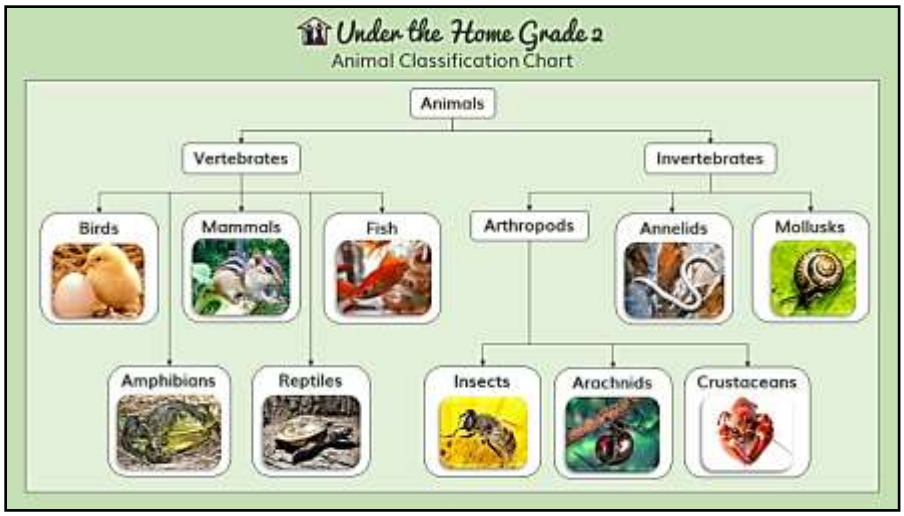
- Examine the clutch of sparrow eggs. Predict whether you think sparrow eggs are larger or smaller than ostrich eggs, chicken eggs, and hummingbird eggs?

- Study the sparrow hatchling below. Describe how a hatchling is different from a grown bird. Locate its pin feathers.

- Watch the video online and listen to the sounds made by an English sparrow.

Activity 3: Classify the Animal

- English sparrows are animals, vertebrates, and birds.
- Find which categories English sparrows fit into on the classification chart.



Activity 4: Recite an English Sparrow Poem

Recite aloud the following poem about the English sparrow by Mare Isabella Forsyth.

So dainty in plumage and hue,
A study in gray and in brown?
How little, how little we knew
The pest he would prove to the town
From dawn until daylight grows dim.
Perpetual chatter and scold.
No winter migration for him,
Not even afraid of the cold/
Scarce a song-bird he fails to molest,
Belligerent, meddlesome thing
Wherever he goes as a guest
He is sure to remain as a King.

Based on the poem, do sparrows migrate south for the winter?

Activity 5: Color an English Sparrow

Complete page 40 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk

Take a nature walk, locate a sparrow or other bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 41 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- Where is the bird's summer home and where is the bird's winter home? (Conduct online research to determine locations if needed.)
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?
- What do the feet look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 41 of 'Science Field Book for Second Grade.'

Review Questions

1. **Why is an English sparrow considered a pest by farmers?** Farmers consider sparrows pests because they eat the farmers' crops.
2. **Why might other birds consider the English sparrow a pest?** Sparrows will rudely fight to take food from other birds.
3. **How do English sparrows help people?** English sparrows eat insect pests such as grasshoppers.
4. **Are English sparrows smart for birds?** Yes, English sparrows are very clever.
5. **Are English sparrows indigenous to America?** No, people brought English sparrows over the ocean to America.
6. **How can you tell a male English sparrow from a female English sparrow?** The female English sparrow is more muted and drab than the male.
7. **Do sparrows migrate south during the winter?** No, sparrows do not migrate south. They are permanent residents.

Lesson 20 Guide: The Downy Woodpecker

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Found across much of North America, the downy woodpecker is the smallest woodpecker within its range. The downy woodpecker uses its beak to drill into bark and excavate the plump grubs, cocoons, and other insects tucked within. The downy woodpecker wears a fine black, gray, and white suit. The male wears a cap of red on the back of its head. The downy woodpecker does not migrate in the winter, for it can extract the grubs and insects wintering within trees.

Vocabulary

- **Downy**: Soft and fluffy. Covered with soft feathers.
- **Grub**: The larva of an insect, especially a beetle.
- **Cocoon**: A silky case spun by the larvae of many insects for protection in the pupal stage.
- **Barbed**: Having one or more sharp projections near the end of an arrow, fishhook, or similar item, angled away from the main point so as to make removal difficult.

Concepts

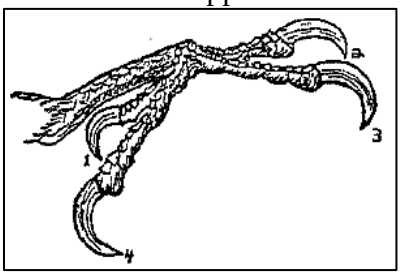
Where do downy woodpeckers live?

- Downy woodpeckers live over much of North America.
- Countries where downy woodpeckers live include Canada and the United States.

In what manner do downy woodpeckers climb the sides of trees?

- Downy woodpeckers only climb up trees. They never climb head-first down trees.
- Downy woodpeckers either hop backward down trees or fly to the ground.

- Downy woodpeckers have two backward toes that enable them to grasp the wood along with their front toes, much like humans' opposable thumb and fingers.



How do downy woodpeckers extract insects from tree bark?

- Downy woodpeckers first use their beaks to drill holes in the wood.
- Next, downy woodpeckers spear insects with their barbed tongues and pull the insects from the hole.

Why might downy woodpeckers drum their beaks against bark?

- Downy woodpeckers drum against bark to get at the insects underneath.
- Downy woodpeckers, both male and female, also drum against bark to advertise for mates.

What do downy woodpeckers' nests look like?

- Downy woodpeckers often build their nests inside trees.
- They make a small round hole in the tree as an entrance and exit.
- They nestle their eggs within a nest of sawdust-like pieces of wood.

Enrichment Activities

Activity 1: Narrate the Story

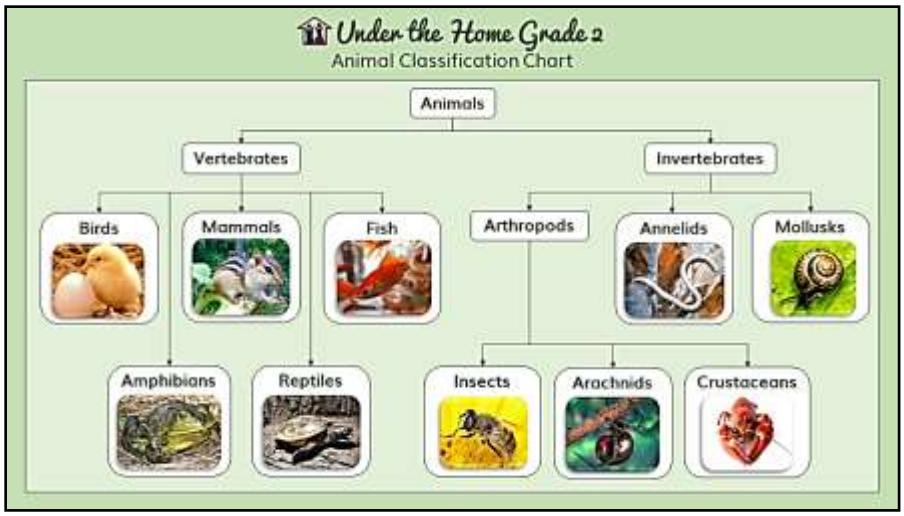
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video online, and listen to the downy woodpecker's drumming.

Activity 3: Classify the Animal

- Downy woodpeckers are animals, vertebrates, and birds.
- Find which categories downy woodpeckers fit into on the classification chart.



Activity 4: Compare Male and Female Downy Woodpeckers

- Females have white breasts, black wings with white spots, and black and white heads. Females have black stripes across their eyes that look like masks.

- Like females, males have white breasts, black wings with white spots, and black and white heads. Males also have black stripes across their eyes that look like masks. However, males also have red caps on the back of their heads.

Activity 5: Color a Woodpecker
Complete page 42 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate a woodpecker or other bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 43 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which sounds does the bird make? Does it chirp, call, sing, or drum?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- Where is the bird's summer home and where is the bird's winter home? (Conduct online research to determine locations if needed.)
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?
- What do the feet look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 43 of 'Science Field Book for Second Grade.'

Review Questions

1. **How can you tell the difference between male and female downy woodpeckers?** Only male downy woodpeckers have red caps. Females have no red color.
2. **What do downy woodpeckers use as their drumsticks?** Downy woodpeckers use their beak as drumsticks.
3. **Why do downy woodpeckers drum against trees?** Downy woodpeckers drum against trees to drill for insects, build nests, and advertise for mates.
4. **How do downy woodpeckers' toes help them climb trees?** Downy woodpeckers have two backwards toes that enable them to grasp the wood along with their front toes.
5. **Do downy woodpeckers ever climb down trees head-first?** No, downy woodpeckers either hop backward or fly down a tree.
6. **How do downy woodpeckers get at insects beneath tree bark?** Downy woodpeckers first drill a hole in the tree, then use their barbed tongue to spear the insect and draw it out.
7. **Why don't downy woodpeckers fly south for the winter?** Downy woodpeckers find enough to eat during the winter by drilling into trees and eating the insects sheltering under the bark.

Lesson 21 Guide: The Hummingbird

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

The smallest species of bird in the world is a hummingbird. Hummingbirds get their names from their wings, which flap so fast, they become a blur and make a humming noise. Aided by their fast wings, the maneuverable hummingbird hovers like a helicopter and darts like jet. As they flit from flower to flower in search of nectar and insects, they transmit pollen between flowers to help new flowers grow. The hummingbird is well-adapted for extracting nectar and insects. They have long, narrow beaks that reach deep into the cups and tubes of flower petals. The side edges of their tongues curl up into grooves for sucking nectar. Their tongues also come equipped with tiny brushes to sweep up nectar and insects. Hummingbirds often sport gorgeous iridescent plumage of greens, blues, oranges, pinks, and purples. As with many bird species, male hummingbirds are often particularly bright and beautiful to help them attract mates and to subjugate other males.

Vocabulary

- **Nectar**: A sugary fluid secreted by plants, especially within flowers to encourage pollination by insects and other animals.
- **Pollen**: A fine yellow powdery substance discharged from the male part of a flower that can fertilize the female part of a flower.
- **Maneuverable**: Able to be move skillfully and easily while in motion.
- **Iridescent**: Showing bright colors that seem to shimmer when seen from different angles.

Concepts

Hummingbird Q & A

- Where do hummingbirds live? Hummingbirds live mostly in the American tropics. Some species seasonally migrate north to the United States.
- What do hummingbirds eat? Contrary to popular belief, these tiny birds eat insects as well as nectar.
- Do hummingbirds have nests? Yes, hummingbirds have tiny nests, some around the size of a doll's teacup.

- Do hummingbirds lay eggs? Yes, female hummingbirds lay tiny eggs the size of large jellybeans.
- What do hummingbirds sound like? Hummingbirds beat their wings so fast, they make a humming sound. Hummingbirds also make squeaky noises, usually when angry or scared.
- What do hummingbird babies look like? Hummingbird babies are tiny and more closely resemble black insects than birds.
- How can people attract hummingbirds to their yard? People can attract hummingbirds by planting hummingbird-friendly flowers or hanging special hummingbird feeders filled with sugar water (nectar).

Enrichment Activities

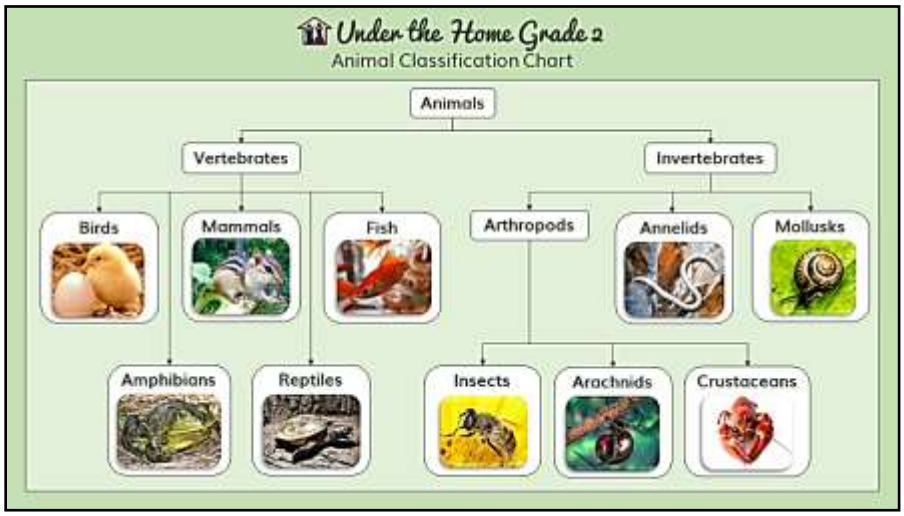
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video of a hummingbird feeding. Hear the squeaky sound made by a hummingbird.

Activity 3: Classify the Animal

- Hummingbirds are animals, vertebrates, and birds.
- Find which categories hummingbirds fit into on the classification chart.



Activity 5: Color and Label a Hummingbird
Complete page 44 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk, locate a hummingbird or other bird to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 45 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- Which noises does the bird make? Does it chirp, call, or sing?
- How does the bird move?
- How does the bird eat?
- What does the bird eat?
- How does the bird clean itself?

Habitat observations include:

- In what areas of the world does the bird live?
- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the bird live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the bird live?

Appearance observations include:

- What colors are the bird's eyes?
- What feathers does the bird wear?
- What colors are the feathers?
- What colors are the beak and feet?
- What do the feet look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 45 of 'Science Field Book for Second Grade.'

Review Questions

1. **What do hummingbirds eat in addition to nectar?** Hummingbirds eat insects in addition to nectar.
2. **What type of bird is the smallest in the world?** A hummingbird is the smallest bird in the world.
3. **Do hummingbirds build nests?** Yes, hummingbirds build tiny nests the size of a doll's cup.
4. **Do female hummingbirds lay eggs?** Yes, female hummingbirds lay tiny jelly bean-sized eggs.
5. **Describe hummingbirds' tongues.** Hummingbirds' tongues are curved up on the edges and have tiny brushes on the end.
6. **What sounds do hummingbirds make?** Hummingbirds make squeaking noises. Their wings also make a humming sound.

Lesson 22 Guide: The Fox

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

The next group of animals for study is the mammal. Mammals are warm-blooded, have hair or fur, are vertebrates (have backbones), give birth to live young, and nurse their babies. Foxes are mammals that are smaller than dogs and have longer legs. Like dogs, foxes growl and make high-pitched yelping sounds as well as smile and wag their tails to express happiness. Their narrow, pointed muzzles and triangular faces give the impression of slyness and great cunning. Fox fur runs from reddish to gray in color. Foxes have beautifully bushy, white-tipped tails, which foxes wrap around themselves like a fur coat on cold days. Unfortunately, their warm tails are both boon and bane. When weighed down with water, snow, and/or ice, tails may slow the fleeing fox and cause it to be captured by predators. Foxes live in dens or burrows and are good diggers. Dens are more open than burrows and may be in an open field or side hill. Foxes line their nests with soft grass for their babies, which are called puppies or cubs. Fox cubs are born in spring. They have gray fur and are very playful. Both fox parents are devoted to their cubs, raising them, feeding them, and caring for them. Foxes tend to be nocturnal and hunt at night, but may be seen by day. Foxes are omnivores who eat mice, rabbits, woodchucks, frogs, snakes, birds, eggs, grasshoppers, and plants. Foxes hunt and eat hens and geese, which can make foxes and farmers enemies. Foxes can also benefit farmers, since they feed on rodents and other pests. Perhaps due to their cleverness, foxes are a successful animal, residing on every continent in the world except Antarctica.

Vocabulary

- Mammal: A warm-blooded vertebrate animal of a class that is distinguished by the possession of hair or fur, the secretion of milk by females for the nourishment of the young, and (typically) the birth of live young.
- Den: A wild animal's lair or habitation.
- Burrow: A hole or tunnel dug by a small animal, especially a rabbit, as a dwelling.
- Bushy: Growing thickly into or so as to resemble a bush.

Concepts

In myth, fable, and legend, foxes tend to be untrustworthy and sneaky but extremely clever creatures. Facts about the cleverness of foxes:

- When hunted by dogs, foxes double back on their tracks and make huge sideways jumps to throw the pursuing predators off their scent.
- Foxes also walk along the tops of fences and railings, wind through herds of cattle or sheep, or cross streams on logs to hide their scents and confuse their canine trackers.
- After catching hens and geese, foxes hold the fowls' heads in their mouths and sling the bodies over their shoulders for easy carrying like Santa Claus with his sack of toys.

Enrichment Activities

Activity 1: Narrate the Story

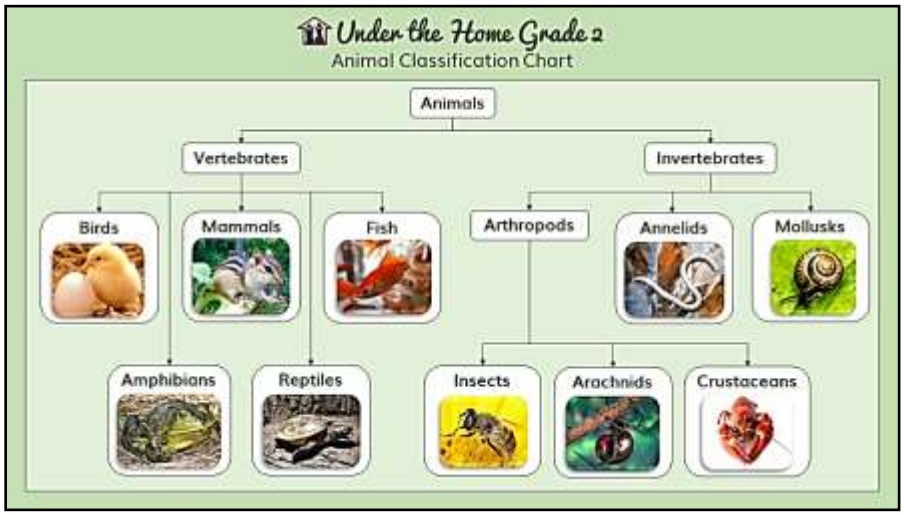
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- See a picture of a red fox, and listen to its bark.
- Note its triangular head, narrow muzzle, thick coat, sharp canine teeth, and flat grinding teeth.

Activity 3: Classify the Animal

- Foxes are animals, vertebrates, and mammals.
- Find which categories foxes fit into on the classification chart.



Activity 4: Color and Label a Fox

Complete page 46 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
You will take an early evening nature walk, locate a fox or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a fox or other animal for observation, you might make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 47 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the fox breathe?
- How does the fox move?
- How does the fox eat?
- What does the fox eat?

Habitat observations include:

- In what areas of the world does the fox live?
- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 47 of 'Science Field Book for Second Grade.'

Review Questions

1. **Where do foxes make their homes?** Foxes make their homes in burrows or dens and line their nests with soft grasses.
2. **Describe the tails of foxes.** Foxes have beautiful bushy tails that end in white tips.
3. **How are bushy tails both beneficial and detrimental to foxes?** When cold, foxes can wrap their tails around themselves like a fur coat to keep warm. However, when soaked in water or encrusted with snow and ice, the tail may slow foxes and enable them to be captured and killed by predators.
4. **How do foxes carry home heavy game, such as geese?** Foxes hold the head in their mouths and sling the heavy body of the fowls over their shoulder, like Santa Claus with a sack of toys.
5. **How do foxes express happiness?** Foxes smile and wag their tails like dogs when happy.
6. **How do foxes throw pursuing hounds off their scent?** The fox has many tricks including doubling back, jumping sideways, crossing water, weaving through herds of cows and sheep, and walking on fences.
7. **How do fox cubs behave?** Fox cubs are active and playful.
8. **Are both male and female foxes good parents to their cubs?** Yes, male and female foxes are good parents, protecting their cubs, feeding them, and caring for them.
9. **Are foxes nocturnal?** Yes, foxes are mainly active at night.
10. **Are foxes carnivores?** No, foxes are omnivores. They eat both animals and plants.

Lesson 23 Guide: The Skunk

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like foxes, skunks are a type of mammal. Small and fluffy, with thick black and white hair and a delightfully bushy tail, skunks are striking and memorable in appearance. Skunks have pointed heads and narrow snouts, short legs, and shining dark eyes. Their strong forepaws have long claws, used to catch prey and dig its burrow. Their burrows may be abandoned groundhog lairs or spaces under a sheds or barns. Skunks are nocturnal and are rarely seen by day. Skunks are omnivorous and mainly eat fruits, berries, insects, eggs, mice, snakes, and frogs. Skunks can be beneficial to farmers, ridding them of rodents and other pests. In their burrows, skunks make soft nests of leaves and grass, where they hibernate over the winter and have their babies. Skunk babies are called kittens, and they are typically born in May. Upon first look, skunks seem harmless and vulnerable. Skunks might look like an animal you'd like to pet, but beware! Give wild skunks a wide berth or you will regret it. Skunks will lift their tails and spray a horrific smelling liquid at anything that threatens them. The scent is so potent, it can be smelled half a mile away. Skunks produce this liquid with two marble-sized glands near the base of the tail. Skunks are not particularly intelligent creatures, but they have little need for cleverness when they wield such a potent weapon against predators. Skunks parade about, unconcerned that they will be attacked. Consequently, they are often struck by cars on the highway and trains on the railroad tracks. Some people keep skunks as pets, after removing their scent glands.

Vocabulary

- **Nocturnal**: Done, occurring, or active at night.
- **Gland**: An organ in the human or animal body that secretes particular chemical substances for use in the body or for discharge into the surroundings.
- **Base**: The lowest part or edge of something, especially the part on which it rests or is supported.
- **Prey**: An animal that is hunted and killed by another for food.
- **Predator**: An animal that naturally preys on others.
- **Defense**: The action of defending from or resisting attack.

Concepts

Facts about predators and prey:

Prey animals develop defenses against predators.

- Some hide from predators by camouflaging themselves to blend in with their environments.
- Others duck underground or jump into the water and swim away.
- Some prey grow sharp teeth and claws to fight off their predators.
- Other prey hide under a tough armor or shell that predators cannot penetrate.
- Some prey run so fast, they can outrun their predators.

However, the skunk needs none of these defenses.

- Instead, the skunk sprays the eyes and mouth of their predators with a horribly smelly liquid.
- This liquid is so vile, that it stings the eyes and forces vomiting.
- A predator can hardly concentrate on catching and eating a skunk, when it is nauseated and unable to see.
- Skunks give predators fair warning, presenting their rears and lifting their tails.
- If you ever see a skunk lift its tail at you, quickly retreat, or you might be sprayed.
- Like many wild animals, skunks also carry rabies, so never attempt to pet wild skunks, even if they do not threaten to spray you.

Enrichment Activities

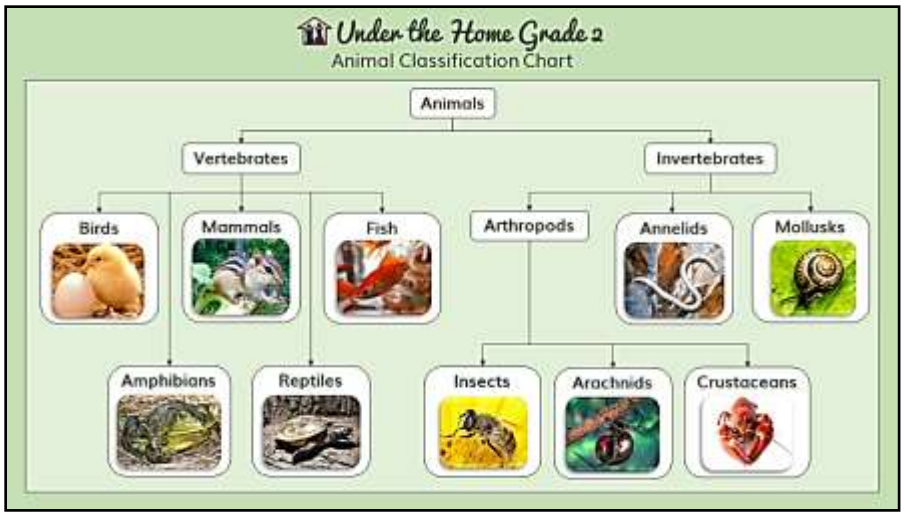
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Study the Skunk Image

- Study the image of the skunk.
- Note its narrow snout, white stripes, dark eyes, bushy tail, and claws. Do you see its burrow beneath the rock?

Activity 3: Classify the Animal

- Skunks are animals, vertebrates, and mammals.
- Find which categories skunks fit into on the classification chart.



Activity 4: Color and Label a Skunk

Complete page 48 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

You will take an early evening nature walk, locate a skunk or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a skunk or other animal, you may make a sketch based on the image of the skunk in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 49 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the skunk breathe?
- How does the skunk move?
- How does the skunk eat?
- What does the skunk eat?

Habitat observations include:

- In what areas of the world does the skunk live?
- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 49 of 'Science Field Book for Second Grade.'

Review Questions

1. **What do skunks' fur look like?** Skunks often have black and white fur. Some skunks have white stripes down their backs and tail.
2. **Can a skunk run fast?** No, a skunk has short legs and cannot run very fast.
3. **How are skunks' forepaws suited to digging burrows?** Skunks' forepaws are strong and have sharp claws for digging burrows.
4. **Describe skunks' nests.** Skunks' nests are in burrows and are lined with soft grasses and leaves.
5. **Why don't skunks need to be particularly clever or intelligent?** Skunks have no need for cleverness when they can easily defend themselves by covering their predators with their horrific smelling spray.
6. **Describe what happens to predators that are sprayed in the face by skunks.** Predators eyes sting, and they may be temporarily blinded. Predators become nauseated and vomit.
7. **How do skunks help farmers?** Skunks help farmers by eating rodents and other pests.
8. **Are skunks herbivores, omnivores, or carnivores?** Skunks are omnivores, eating both plant matter and meat.

Lesson 24 Guide: The Raccoon

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like foxes and skunks, raccoons are mammals. Raccoons have a delightfully mischievous appearance, with triangular faces and pointed snouts. They wear a black mask of fur across their eyes, reminding one of a small, furry burglar. Their tails are as distinctive, bushy with rings of black and grey. Their hair is long, coarse, and colored grey, black, and brown. Their eyes are black and beady and shine with intelligence. The hind foot has five short toes and looks a bit like a human foot. The front foot is smaller and looks like a tiny human hand, with four fingers and a thumb. The fingers and toes are equipped with sharp claws. Raccoons are scavengers that will eat almost anything including both plants and animals. They especially enjoy corn and poultry, to the frustration of farmers. They also eat fruits and aquatic animals such as fish, turtle eggs, and crayfish, which they catch with their hands. Like many omnivores, raccoons have both sharp canine teeth and flat grinding teeth. In captivity, raccoons are neat eaters, washing their food in water before eating and washing their hands afterwards. When sleeping, the raccoon covers its face with its paws and tucks its tail round its body, turning into a big ball of fur. Raccoons hibernate in a nest, often in a hollow tree and sometimes in a group of multiple raccoons. Babies are born three-to-six in a litter in April. Babies are born blind and helpless, and both parents care for the babies. Raccoons do make noises, often at night. Their cries are eerie and haunting, especially when fighting.

Vocabulary

- **Domesticated**: Tame and kept as a pet or on a farm.
- **Wild**: Living or growing in the natural environment; not domesticated or cultivated.

Concepts

Raccoons are very clever and curious and some attempts have been made to keep them as pets. However, keeping wild, non-domesticated animals as pets may come with downsides.

- One raccoon was kept chained in a yard while chickens roamed freely nearby. The raccoon would pretend to sleep, but one eye would be open and watching. Whenever a hen came too near, the raccoon would quickly ring its neck, strip it of feathers, and eat it up.

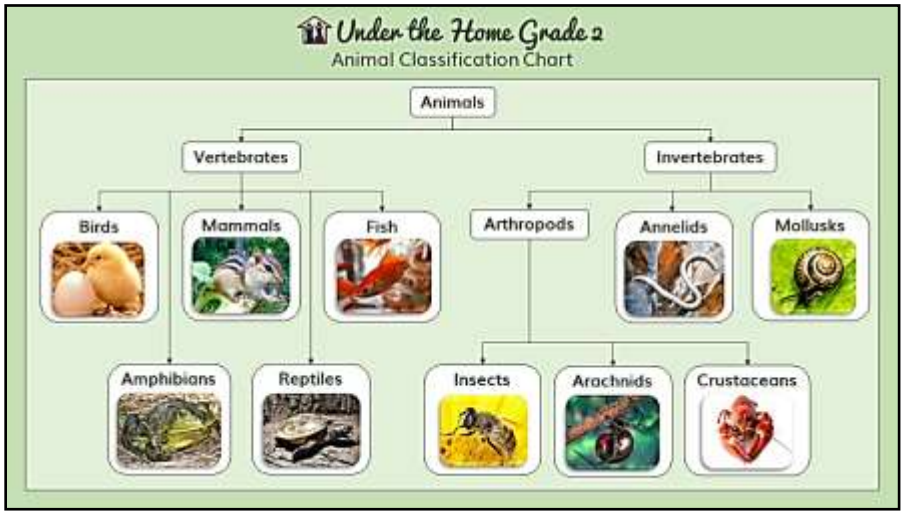
- One family had to send away their pet raccoon because it had learned to open every door or box in their house.

Enrichment Activities

Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video
- Watch fireflies floating in a dark sky, and listen to night noises.

Activity 3: Classify the Animal
- Raccoons are animals, vertebrates, and mammals.
- Find which categories raccoons fit into on the classification chart.



Activity 4: Watch the Video
Watch the online video of two grown raccoons, and listen to their chittering. Note their ringed, fluffy tails and front paws.

Activity 5: Color and Label a Raccoon
Complete page 50 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
You will take an early evening nature walk, locate a raccoon or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a raccoon, you might make a sketch based on the video in Activity 2.

Before you take the nature walk, review:
- The field book template you'll later complete on page 51 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the raccoon breathe?
- How does the raccoon move?
- How does the raccoon eat?
- What does the raccoon eat?

Habitat observations include:

- Does the raccoon live in a forest, a field, a town, or near water?
- In what type of climate does the raccoon live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the raccoon live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 51 of 'Science Field Book for Second Grade.'

Review Questions

1. **What do raccoons eat?** Raccoons are omnivores and eat a wide variety of foods. They especially like corn and poultry.
2. **How do raccoons prepare their meat before eating it?** Raccoons wash their meat in water before eating it.
3. **What distinctive fur markings do raccoons have?** Raccoons wear black masks of fur, like tiny burglars, and have tails with rings of black and gray.
4. **Describe how the raccoon has the teeth of an omnivore.** Raccoons eat both plants and meat. They have sharp canines like carnivores for ripping meat and flat grinder teeth like herbivores for grinding plant matter.
5. **How are raccoon hands and human hands alike?** Both raccoons and humans have hands with four fingers and a thumb.
6. **How are raccoon hands and human hands dissimilar?** Raccoon hands have sharp claws and human hands have softer, blunter fingernails. Raccoon hands are much smaller than human hands.
7. **When are raccoon babies born?** Raccoon babies are born in the spring, in April.
8. **Are raccoons good parents?** Yes, both the male and female raccoons are good parents. Babies are born blind and helpless and need their parents for protection and feeding.
9. **When are raccoons the plumpest and the leanest?** Raccoons are plumpest in the fall before they hibernate and leanest in the spring when they first wake from hibernation.

Lesson 25 Guide: The Chipmunk

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

The next mammal under study is the cheerful chipmunk. Smaller than squirrels and less adept at climbing, chipmunks can climb trees, but are more likely to be seen scampering along the ground. They are mainly brown, tan, and white with prominent black and white stripes stretching along their backs. One marvelous thing about chipmunks is their large cheek capacity. Chipmunks cram their cheek pouches full of nuts and other tasty treats. They use their cheeks as buckets to carry out dirt when excavating their burrows. Chipmunks dig burrows in dry earth, making narrow entrances and exits with wider, well-cushioned nesting areas. Chipmunks hibernate in these burrows during the cold winters, although they may briefly awaken on mild, sunny winter days for a snack.

Vocabulary

- **Pouch**: A small bag or other flexible receptacle.
- **Burrow**: A hole or tunnel dug by a small animal as a dwelling.

Concepts

Chipmunk Q & A

- Where do chipmunks live? Almost all chipmunks live in Canada, the United States, and Mexico. One species lives in Asia and has spread to Europe.
- Do chipmunks have teeth? Yes, chipmunks have many small, sharp teeth.
- Can chipmunks be tamed by humans? Yes, chipmunks can learn to trust humans. They are easier to tame than squirrels.
- Why does a chipmunk have stripes? Stripes help camouflage the chipmunk amidst the grass and underbrush.
- How are chipmunks different than squirrels? Chipmunks are smaller, have stripes, have shorter legs, have larger cheek pouches, have smaller, less bushy tails, and are not as good at climbing compared to squirrels.
- What do chipmunks eat? Chipmunks eat nuts, seeds, fruits, grasses and other plant life as well as insects, eggs, worms, and frogs.

Enrichment Activities

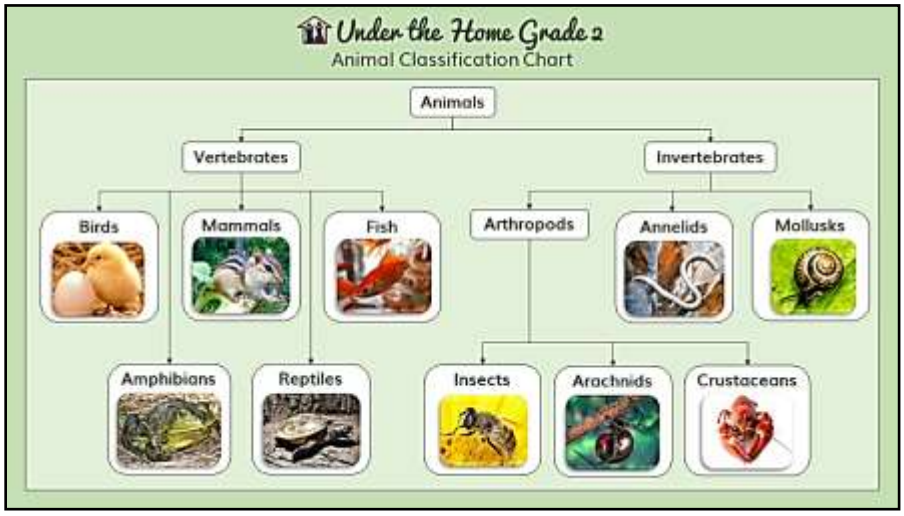
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Can You Find It?
Study the image of the chipmunk and find the following:

- Black and white stripes
- Tiny front paws
- Tiny hind claws
- Dark eye
- Nostril
- 2 Ears
- Whiskers
- Tail

Activity 3: Classify the Animal

- Chipmunks are animals, vertebrates, and mammals.
- Find which categories chipmunks fit into on the classification chart.



Activity 4: Color and Label a Chipmunk
Complete page 52 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk in the woods, locate a chipmunk or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a chipmunk, you may make a sketch based on the image of the chipmunk in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 53 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the chipmunk breathe?
- How does the chipmunk move?
- How does the chipmunk eat?
- What does the chipmunk eat?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 53 of 'Science Field Book for Second Grade.'

Review Questions

1. **Are chipmunks warm-blooded?** Yes, chipmunks are mammals, and mammals are warm-blooded.
2. **Are chipmunks vertebrates?** Yes, chipmunks are mammals, and mammals have backbones (vertebrates).
3. **Do chipmunks lay eggs?** No, chipmunks are mammals, and mammals give birth to live young.
4. **Do chipmunks nurse their babies?** Yes, chipmunks are mammals, and mammals nurse their babies.
5. **What do chipmunks do when threatened with a cold and snowy winter?** Chipmunks hibernate in their burrows during cold winters, although they may periodically wake to feed.
6. **Do chipmunks eat both plants and meat?** Yes, chipmunks are omnivorous, eating both plants (nuts, seeds, grasses) and other animals (insects, frogs, and eggs).

Lesson 26 Guide: The Groundhog

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Groundhogs, also known as woodchucks, dig tunnels and burrows under the earth. Groundhogs are mammals like chipmunks, but are larger, plumper, and have dark brown shaggy fur. Groundhogs are rodents and considered large squirrels. Groundhogs keep mostly to the ground, but are adept swimmers and can climb trees to reach fruit or escape predators. Groundhogs engineer their burrows so that they don't flood in times of rain. Groundhogs accomplish this flood-proofing by digging down with their sharp claws and then slanting back upwards before hollowing out their burrows and lining them with soft grasses. Groundhogs also make sure to dig multiple backdoors to their burrow for easy escape. Groundhogs love to eat grasses, clover, fruit, and crops. They eat early and late in the day and take a nice siesta during midday. People, foxes, and dogs are groundhog predators. When encountering predators, groundhogs run straight for their burrows and disappear into the earth. Groundhogs are rumored to enjoy music, even joining in with the singing on occasion. Baby woodchucks, called 'chucklings' are born in spring, between March and May.

Vocabulary

- **Woodchuck**: A North American marmot, also known as a groundhog, with a heavy body and short legs.
- **Flood**: An overflowing of a large amount of water beyond its normal confines, especially over what is normally dry land.
- **Hollow** (verb): Form by making a hole.
- **Chuckling**: A baby woodchuck.
- **Chuck**: To throw.
- **Tongue Twister**: A sequence of words or sounds, typically of an alliterative kind, that are difficult to pronounce quickly and correctly, as, for example, tie twine to three tree twigs.

Concepts

Groundhog Q & A

- What is 'Groundhog Day?' People in the United States celebrate 'Groundhog Day' on February second. The legend is that on this day the groundhog will emerge from its burrow. If the sun is shining and the groundhog sees its shadow, the groundhog will be scared back into its burrow, and this indicates there will be six more long weeks of winter.
- Do groundhogs have teeth? Yes, groundhogs have prominent teeth that never stop growing.
- Do groundhogs have ears? Yes, groundhogs have small round ears and good hearing.
- Do groundhogs make sounds? Yes, groundhogs make grunts, growls, and whistling noises.
- Do groundhogs have claws? Yes, groundhogs have sharp claws for digging their burrows and defending themselves against predators.
- How do groundhogs dig their burrows? Groundhogs loosen the earth with their front legs and kick the earth out of their burrow with their hind legs.
- Can woodchucks actually chuck wood? Despite the tongue twister (see Activity 3), woodchucks cannot chuck wood.

Enrichment Activities

Activity 1: Narrate the Story

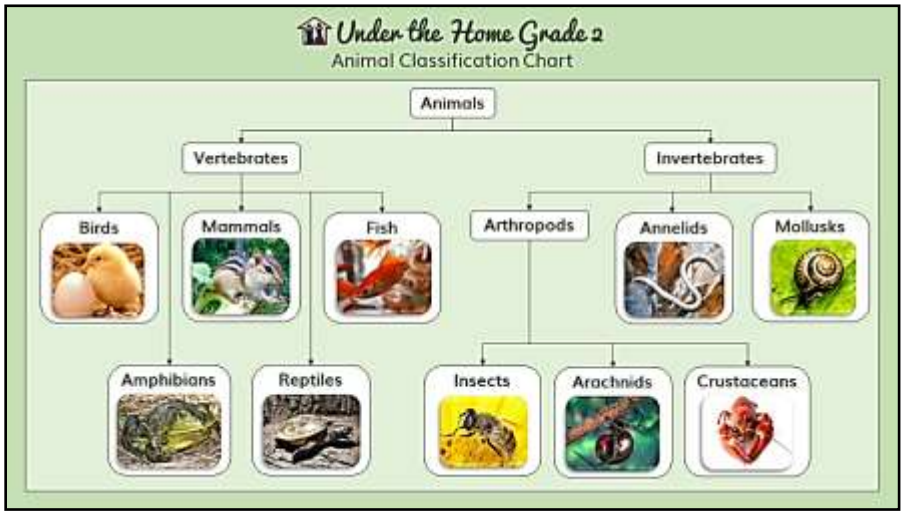
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the online video of a groundhog standing on its hind legs to survey the area.

Activity 3: Classify the Animal

- Groundhogs are animals, vertebrates, and mammals.
- Find which categories groundhogs fit into on the classification chart.



Activity 4: Say the Tongue Twister
Say the tongue twister 5 times - 'How much wood could a woodchuck chuck if a woodchuck could chuck wood?'

Activity 5: Color and Label a Groundhog
Complete page 54 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk in the woods, locate a groundhog or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a groundhog, you may make a sketch based on the video of the groundhog in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 55 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the groundhog breathe?
- How does the groundhog move?
- How does the groundhog eat?
- What does the groundhog eat?

Habitat observations include:

- Does the groundhog live in a forest, a field, a town, or near water?
- In what type of climate does the groundhog live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the groundhog live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 55 of 'Science Field Book for Second Grade.'

Review Questions

1. **What is the difference between woodchucks and groundhogs?** There is no difference. They are the same animal.
2. **Can woodchucks really chuck wood?** No, woodchucks cannot throw wood. 'Woodchuck' is a bit of a misnomer (inaccurate name).
3. **Can groundhogs swim and climb trees?** Yes, groundhogs can swim and climb trees.
4. **Why might groundhogs chew hard things such as roots?** Groundhogs chew hard things to trim their teeth, which constantly grow.
5. **What is a 'chuckling?'** A chuckling is a baby groundhog.
6. **How many paths lead to groundhogs' burrows?** Typically, at least three, one entrance and two or more backdoors.
7. **Contrast how groundhogs look during fall versus spring.** Groundhogs hibernate and do not eat much during the winter. In the fall, they are plump. In the spring, they are thinner.
8. **Do you think groundhogs' feet are webbed?** Why or why not? Groundhogs' feet are not webbed, because they are optimized for digging, not swimming.

Lesson 27 Guide: The Muskrat

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Like foxes, skunks, chipmunks, and groundhogs, muskrats are mammals. Muskrats have small but plump bodies covered in brown, gray, and white fur. Their long, scaly tails look like big brown earthworms. Muskrats sport an overcoat of coarse hairs and a waterproof undercoat of fine fur. Muskrats' scaly brown tails are used in the water both as oars to propel the muskrats and as rudders to turn the muskrats. Their front paws have claws and are used for grasping things and digging. Their back paws are larger, have claws, and are webbed for swimming. Muskrats have very short legs, making them slow runners, but they are far more agile in the water. Muskrats have small ears, tucked down among the fur, and eyes that shine like round black buttons. Muskrats have an apt name, as they mark their territory with a musky smell. Muskrats live near water, especially streams, marshes, and ponds. Muskrat tracks can be seen in the mud around water sources. The tracks show small clawed front feet, larger clawed hind feet, and a narrow, hairless tail. Tracks can also be seen in the snow on mild days in February and March, when muskrats venture out for food.

Vocabulary

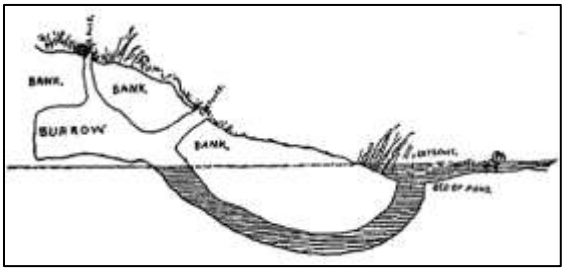
- **Aquatic**: Relating to water.
- **Apt**: Appropriate or suitable in the circumstances.
- **Overcoat**: A long warm coat worn over other clothing.
- **Coarse**: Rough in texture or grain.
- **Fine**: Of a thread, filament, or person's hair, thin.
- **Waterproof**: Impervious or impenetrable to water.

Concepts

Muskrats Q & A

- Where do muskrats live? Muskrats are native to North America but have spread to Europe, Asia, and South America.
- Do muskrats have teeth? Yes, muskrats have two pairs of top and bottom front teeth, followed by a large space and then a set of flat teeth for grinding plants.

- What do muskrats eat? Muskrats are omnivorous, eating aquatic plants and roots and some shellfish.
- Do muskrats wash their food before eating? Yes, muskrats clean their food in the water, dipping it until free of mud and other debris.
- Do muskrats make sounds? Yes, muskrats make a high-pitched squealing noise. People can mimic the noise to call them out.
- What types of homes do muskrats live in? Some muskrats build a dome of aquatic plants such as reeds and rushes over the water. Under the dome, muskrats build a burrow covered in soft leaves and moss. From the burrow, there leads a tunnel down to the water. Other muskrats might build a burrow directly under the riverbank with a tunnel that leads down under the water.



- When are muskrat babies born? Muskrats mothers have up to three litters of three to seven babies over a single summer. Muskrat babies are born starting in April.

Enrichment Activities

Activity 1: Narrate the Story

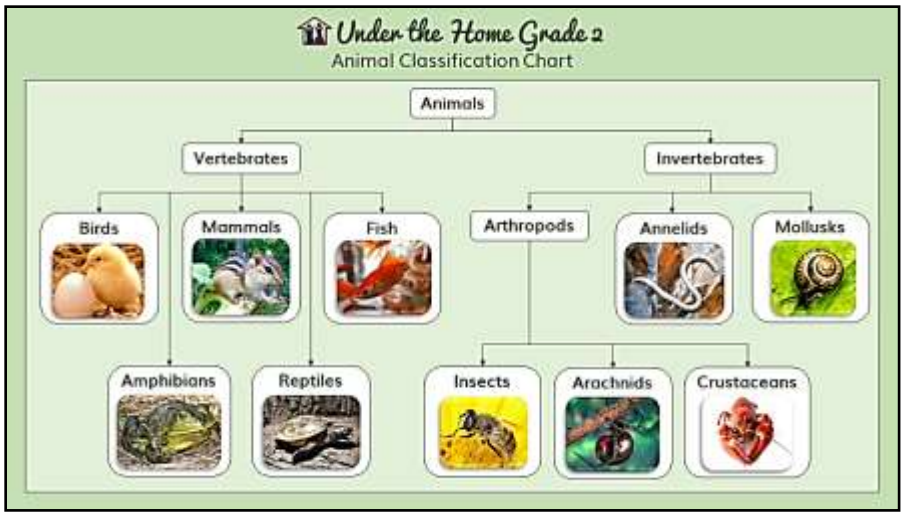
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video of a muskrat making sounds on a riverbank.

Activity 3: Classify the Animal

- Muskrats are animals, vertebrates, and mammals.
- Find which categories muskrats fit into on the classification chart.



Activity 4: Color and Label a Muskrat

Complete page 56 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

Take a nature walk near a pond or river, locate a muskrat or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a muskrat, you may make a sketch based on the video of the muskrat in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 57 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the muskrat breathe?
- How does the muskrat move?
- How does the muskrat eat?
- What does the muskrat eat?

Habitat observations include:

- Does the muskrat live in a forest, a field, a town, or near water?
- In what type of climate does the muskrat live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the muskrat live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 57 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do muskrats prepare for cold winters?** Muskrats build winter burrows for hibernation. They may wake from time to time during the winter to eat.
2. **Do muskrats eat anything in addition to aquatic plants?** Yes, muskrats also eat shellfish.
3. **Can muskrats outrun rabbits?** No, muskrats cannot outrun rabbits. Muskrats have short legs and are slow runners.
4. **Approximately how many babies can mother muskrats have during the spring and summer of a single year?** Muskrats mothers can have up to three litters of three to seven babies each. This means muskrat mothers may have between 3+3+3 (9) to 7+7+7 (21) babies in a given year.
5. **What do muskrat tracks look like?** Muskrats leave tracks that show small clawed front feet, larger clawed hind feet, and narrow, hairless tails.

Lesson 28 Guide: The Bat

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

Although bats have wings and fly, they are not birds. Bats are the only mammals that truly fly. Bats are highly skilled flyers, executing quick turns and darting through masses of branches untouched. Bat wings consist of very long fingers and a rubbery membrane stretched between the fingers and ankles. Bats use these wing membranes like nets to scoop up insects. A hook projects from each wing, which bats use to drag themselves along the ground, to scratch themselves, and to aid in hanging upside down. Bats use their tiny clawed feet to hang upside down when they are sleeping. Bats have soft brown fur and clean themselves like cats, using their wings to rub themselves and then licking their wings clean. Bats make a high pitched squeaky noise to communicate with other bats or to express alarm. Bat babies are born in July as twins. As bats are mammals, bat babies nurse from their mothers. Like human children piggybacking on their parents, bat babies often soar through the air on their mothers' backs. In cold climates, some bats hibernate over the winter in a cave or hollow tree. Bats have a bad reputation among humans. Some people believe bats will attack them or write stories where bats turn into vampires. Bats are actually beneficial to humans, controlling insect populations including the mosquito.

Vocabulary

- **Rubbery**: Having a tough elastic texture, like that of rubber.
- **Membrane**: A thin pliable sheet or skin of various kinds.
- **Piggyback**: A ride on someone's back and shoulders.
- **Fiction**: Literature such as short stories and novels, that describes imaginary events and people.
- **Echolocation**: The location of objects by reflected sound, in particular that used by animals such as dolphins and bats.

Concepts

Bats Q & A

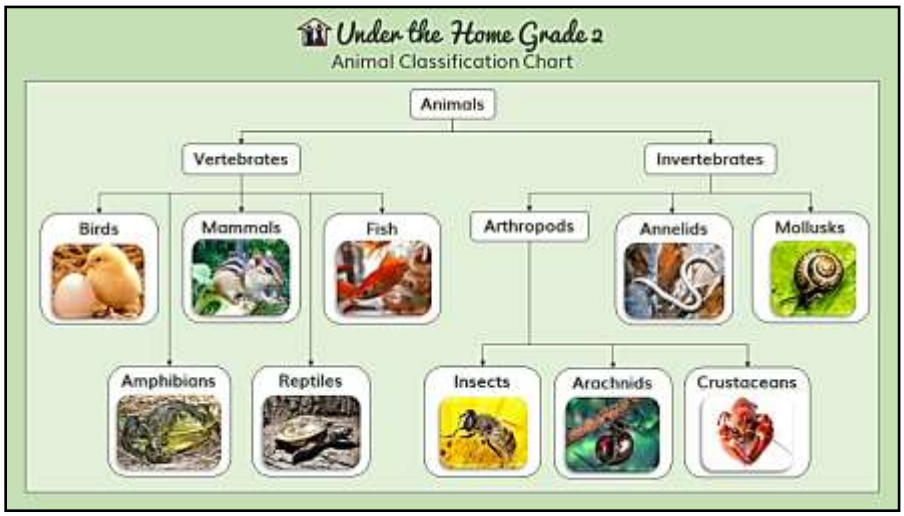
- What do bats eat? Depending on the type of bat, bats eat insects, fruit, or even animals such as fish and frogs. Some bats only eat plants, some eat plants and animals, and other eat only animals.
- When do bats sleep? Bats sleep during the day, hanging upside down.
- When do bats hunt? Bats hunt for food at night.
- Are bats blind? Despite the saying, 'blind as a bat,' bats can see almost as well as humans. Bats use their eyes to see during the daytime. At night, bats use echolocation, where the bat uses sound to sense the environment.
- Do bats have teeth? Yes, bats have a set of tiny, sharp teeth that the bat uses for climbing.
- How long are a bats 'fingers' in their wings? Bats have extremely long 'fingers.' If human fingers were as long as bat fingers in proportion to their bodies, we'd have fingers that were four feet long!

Enrichment Activities

Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video
- Watch the online video of bats hanging from a tree.

Activity 3: Classify the Animal
- Bats are animals, vertebrates, and mammals.
- Find which categories bats fit into on the classification chart.



Activity 4: Color and Label a Bat
Complete page 58 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
You will take an early evening nature walk, locate a bat or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil

and a small notebook to jot down sketches and observations. If you can't find a bat, you may make a sketch based on the video of the bat in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 59 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the bat breathe?
- How does the bat move?
- How does the bat eat?
- What does the bat eat?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the fur?
- What colors are the eyes?
- What do the nose, paws, and legs look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 59 of 'Science Field Book for Second Grade.'

Review Questions

1. **Are bats blind?** No, bats can almost see as well as humans. At night, bats depend more on their hearing than their sight to navigate.
2. **Are bats birds or mammals?** Bats are mammals" />
3. **Do bats lay eggs?** No, bats are mammals and give birth to live young.
4. **What do bats eat?** Bats eat insects, fruit, and animals.
5. **Are bats herbivores?** Some bats are herbivores, some are omnivores, and others are purely carnivores.
6. **How do bats catch insects?** Bats use their wings like a net to snag insects.

Lesson 29 Guide: The Fish

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson moves on from insects, birds, and mammals to introduce a new group of animals called fish. Fish are cold-blooded animals with backbones (vertebrates). Fish maneuver through the water by waving their fins. Fish do not have legs, although some fish "walk" on land using their fins. Fish are covered in either smooth skin or armored scales, and are coated with a layer of slippery slime to help them slide through the water. Most fish lack lungs like birds or mammals, and instead use gills for breathing. One exception is the lungfish, which uses its lung sacs for breathing air. Fish have nostrils which are used for smelling and moveable eyes with no eyelids.

Vocabulary

- Fin: A flattened appendage on various parts of the body of many aquatic vertebrates and some invertebrates, including fish and cetaceans, used for propelling, steering, and balancing.
- Gill: The paired respiratory organ of fishes and some amphibians, by which oxygen is extracted from water flowing over surfaces.
- Scales: Each of the small, thin horny or bony plates protecting the skin of fish and reptiles, typically overlapping one another.
- Hatchery: A place where the hatching of fish or poultry eggs is artificially controlled for commercial purposes.
- Aquarium: A transparent tank of water in which fish and other water creatures and plants are kept.

Concepts

Fish Q & A

- What do fish eat? Some fish eat plants such as algae, sea grass, and plankton, some eat meat such as other fish, worms, and crustaceans, and some eat both plants and meat.
- Do fish make sounds? Various species of fish make all sorts of noises, such as grunts, drumming noises, barks, and hums.
- Why do fish open and close their mouths? Fish open and close their mouths to breathe by forcing water over their gills.

- Do fish have nests like birds? Yes, some fish, such as sticklebacks, do make nests out of mud, algae, and slime.
- Do fish lay eggs? Yes, most fish lay jelly-like eggs in the water, although some fish keep the eggs inside their bodies until the babies hatch.
- What do fish babies look like? Fish babies start out as eggs. Tiny larvae hatch from the eggs and eventually grow into adult fish.
- Do adult fish take care of their babies? Some fish care for their babies, watching over the eggs, larvae, and young fish. Other adult fish lay eggs and swim off, leaving the eggs to fend for themselves.

Fish vs Birds

- Both fish and birds are animals.
- Both fish and birds are vertebrates (have backbones).
- Both fish and birds lay eggs.
- Birds have feathers while fish have a layer of slime and either smooth skin or scales.
- Birds are warm-blooded while fish are cold-blooded.
- Birds breathe with lungs while almost all fish breathe with gills.
- Birds locomote with wings, legs, and feet while fish locomote with gills.

Gills vs Lungs

- Lungs are two sacs that extract oxygen from air.
- Gills are membranes that extract oxygen from the water.

Enrichment Activities

Activity 1: Narrate the Story

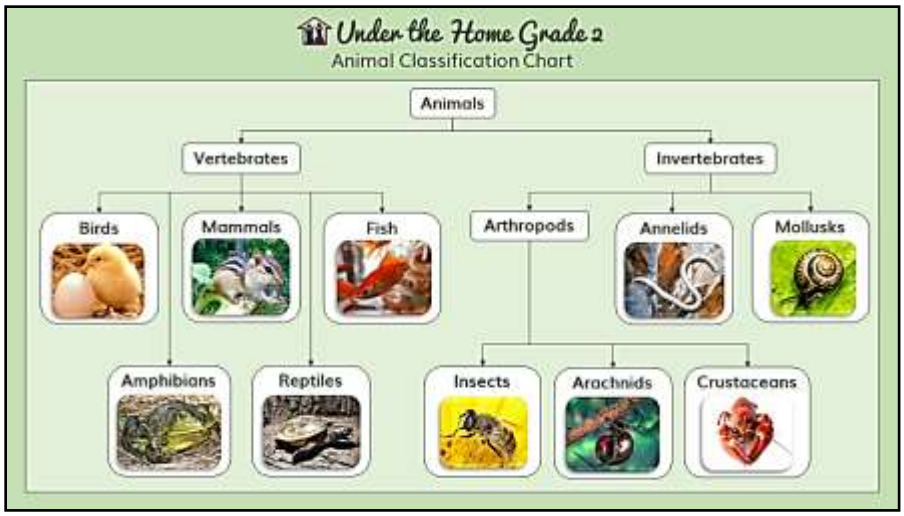
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video of fish swimming in an aquarium. See their mouths open and close while their fins and gills wave in the water.

Activity 3: Classify the Animal

- Fish are animals and vertebrates.
- Find which categories fish fit into on the classification chart.



Activity 4: Color and Label a Fish

Complete page 60 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

Take a nature walk near water (or perhaps an aquarium or pet store), locate a fish to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 61 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the fish breathe?
- How does the fish move?
- How does the fish eat?
- What does the fish eat?

Habitat observations include:

- What special environment is needed to keep the fish alive?
- In what type of water does the fish live (e.g. fresh water, salt water, warm tropical water, cold water)?

Appearance observations include:

- What colors are the fish?
- Does the fish have scales or smooth skin?
- What colors are the eyes?
- What do the fins look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 61 of 'Science Field Book for Second Grade.'

Review Questions

1. **What do fish use to breathe?** Fish use their mouths and gills to breath.
2. **Are fish warm-blooded or cold-blooded?** Fish are cold-blooded.
3. **What do fish use to navigate through the water?** Fish use fins to navigate through the water.
4. **Do fish lay eggs or are their young born alive?** Fish lay eggs.
5. **Do fish have backbones?** Yes, fish have backbones.
6. **Do fish make nests?** Yes, some species of fish, like sticklebacks, make nests of algae and slime.
7. **Do fish have eyelids?** No, fish do not have eyelids.

Lesson 30 Guide: The Tadpole

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson advances from insects, birds, mammals, and fish to introduce a new group of cold-blooded vertebrate animals called amphibians. The word 'amphibian' is derived from the Greek 'amphibios,' meaning 'double life.' Amphibians include frogs, toads, newts, and salamanders. Amphibians start their lives breathing with gills in water and transform into animals that live on land and breathe air. Amphibians that live this double life include frogs and toads, which start their lives as aquatic tadpoles. Tadpoles hatch from eggs laid in the water by toads or frogs. When they hatch, tadpoles look like tiny fish. They breathe with gills and have fins. As tadpoles mature, they absorb their tails, develop lungs, grow legs, and develop into frogs, toads, or other amphibians.

Vocabulary

- **Amphibian**: A cold-blooded vertebrate animal that includes frogs, toads, newts, and salamanders. They are distinguished by having an aquatic gill-breathing larval stage followed (typically) by a terrestrial lung-breathing adult stage.
- **Lungs**: The pair of organs within the rib cage, consisting of elastic sacs into which air is drawn, so that oxygen can pass into the blood and carbon dioxide be removed.
- **Fin**: A flattened appendage on various parts of the body of many aquatic vertebrates and some invertebrates, including fish and cetaceans, used for propelling, steering, and balancing.
- **Gill**: The paired respiratory organ of fishes and some amphibians, by which oxygen is extracted from water flowing over surfaces.

Concepts

This lesson introduces a new group of animals called amphibians. Exactly what is an amphibian?

Facts about amphibians:

- Amphibians are cold-blooded like fish.
- Amphibians live double lives since many live part of their lives in water and part on land.
- To reproduce, many amphibians lay eggs in water.

- Young amphibians that hatch from eggs are commonly called tadpoles. Tadpoles live as fish in the water.
- There are two types of amphibians: tailed (salamanders, newts) and tailless (frogs, toads).
- Grown amphibians have lungs and moist skin.

Tadpoles are immature amphibians that live in the water. Read the below description of the lifecycle of tadpoles that grow into toads.

- The mother toad lays jelly-like strings eggs in May and June in freshwater ponds or streams.
- As the tadpoles develop, they can be seen wiggling inside the clear eggs.
- The tadpoles eventually wiggle out.
- The tadpoles grow a bigger head and tiny external gills on either side of the throat.
- The gills move inside the throat, and the mouth opens and closes, enabling water to flow over the gills for oxygen.
- As the tadpole continues to grow, it begins to absorb its tail and develops legs.
- The tadpole loses its gills and develops lungs for its transition to dry land as a full-grown toad.

Enrichment Activities

Activity 1: Narrate the Story

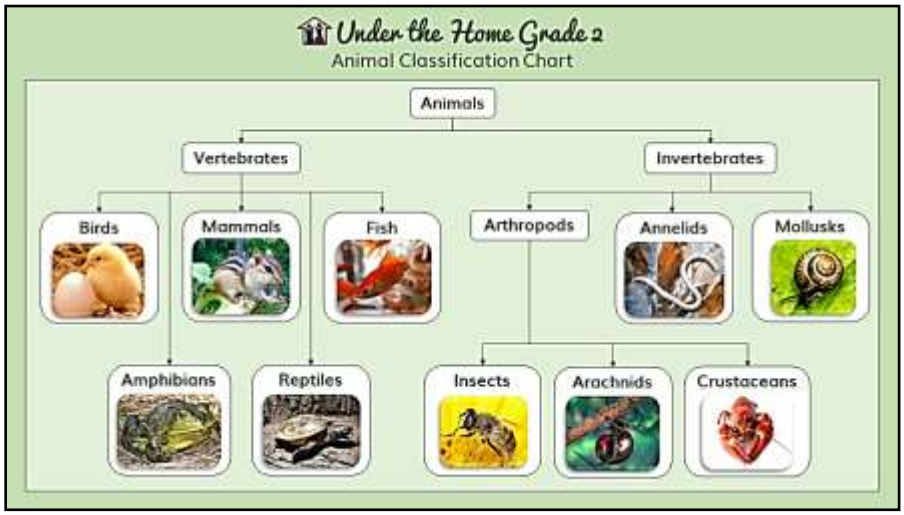
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video of tadpoles swimming in water. See their fins and tails wave in the water.

Activity 3: Classify the Animal

- Tadpoles are animals, vertebrates, and amphibians.
- Find which categories tadpoles fit into on the classification chart.



Activity 4: Color and Label the Life Cycle of a Tadpole/Frog

Complete page 62 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
Take a nature walk near water, locate a tadpole to observe, gather data and notes, and use that information to create a field book entry. If you can't find a tadpole, you can make a sketch based on the video of tadpoles in Activity 2. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 63 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the tadpole breathe?
- How does the tadpole move?
- How does the tadpole eat?
- What does the tadpole eat?

Habitat observations include:

- What special environment is needed to keep the tadpole alive?
- In what type of water does the tadpole live (e.g. fresh water, salt water, warm tropical water, cold water)?

Appearance observations include:

- What colors are the tadpole?
- Does the tadpole have scales or smooth skin?
- What colors are the eyes?
- What do the fins look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 63 of 'Science Field Book for Second Grade.'

Review Questions

1. **Do tadpoles hatch from eggs?** Yes, tadpoles hatch from eggs.
2. **What do tadpoles use gills for?** Tadpoles use gills for breathing oxygen.
3. **What are the tadpoles gills replaced with for breathing?** Tadpole gills are replaced with lungs for breathing.
4. **Is a tadpole a fish or an amphibian?** A tadpole is an amphibian.
5. **The word 'amphibios' means 'double life.' How do frogs, toads, and other amphibians live double lives?** Amphibians live double lives since they start life in the water and move to the land.

Lesson 31 Guide: The Frog

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

With their slippery, moist skin, frogs are amphibians and spend most of their lives near the water. When compared to their cousins, the toads, frogs are slimmer, not covered in bumps, and tend to be brighter in color. Frogs escape their predators, including snakes, lizards, birds, and skunks, by virtue of their slick skin and powerful jumping legs. Several types of frogs also evade predation by changing their color to blend in with their environments. Frogs are adept swimmers and many have webbed feet. Frogs have nictitating membranes that slide up to cover their bulging eyes. Frogs have grayish, round ears and small nostrils which they close under the water. Frogs hibernate in the winter by burrowing deep into mud to escape freezing.

Vocabulary

- **Moist**: Slightly wet; damp or humid.
- **Predator**: An animal that naturally preys on others.
- **Prey**: An animal that is hunted and killed by another for food.

Concepts

Frog Q & A:

- What do frogs eat? Frog mainly eat insects such as flies.
- How do frogs catch insects? They stick out their long sticky tongue, which sticks to the insects and pulls them back to the frog's mouth.
- Do frogs make sounds? Frogs make croaking noises with their sound-sacs near their throats.
- Do frogs lay eggs? Yes, frogs lay large masses of jelly-like eggs in the water.
- Do frogs have teeth? Yes, frogs have teeth.
- Where can people go to find frogs? People can travel to stream, a pond, or other water source to find frogs.
- Which types of animals feed on frogs? Snakes, lizards, birds, and skunks love to eat frogs. Did you know people eat frogs too? Frog legs are a delicacy in France.
- How does a frog escape its enemies? Frogs are slippery and can slip from the grasp of a predator. They use their powerful legs to leap to the water and swim away.

Enrichment Activities

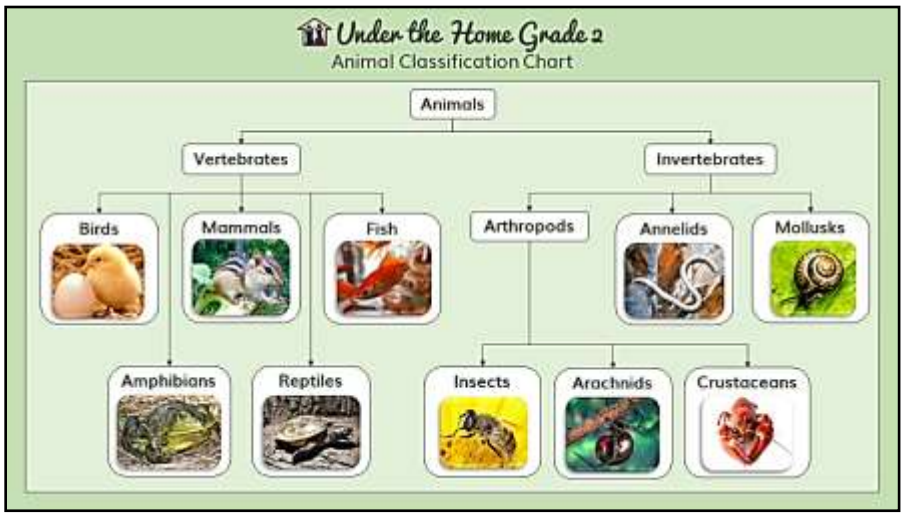
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the video of the amphibian breathing air and croaking. Note its bulging eyes, moist skin, rising and falling chest, its opening and closing nostrils, and its expanding and contracting throat.

Activity 3: Classify the Animal

- Frogs are animals, vertebrates, and amphibians.
- Find which categories frogs fit into on the classification chart.



Activity 4: Color and Label a Frog
Complete page 64 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk
Take a nature walk near water, locate a frog to observe, gather data and notes, and use that information to create a field book entry. If you can't find a tadpole, you can make a sketch based on the video of tadpoles in Activity 2. You may wish to take a pencil and a small notebook to jot down sketches and observations.

Before you take the nature walk, review:

- The field book template you'll later complete on page 65 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the frog breathe?
- How does the frog move?
- How does the frog eat?

- What does the frog eat?

Habitat observations include:
- Does the animal live in a forest, a field, a town, or near water?
- In what type of water does the frog live (e.g. fresh water, salt water, warm tropical water, cold water)?

Appearance observations include:
- What colors are the frog?
- Does the frog have scales or smooth skin?
- What colors are the eyes?
- What do the eyes and legs look like?
- What do the feet look like?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 65 of 'Science Field Book for Second Grade.'

Review Questions

1. **What happens to frogs in winter?** Frogs burrow deep into the mud to avoid freezing and hibernate.
2. **What are some differences between frogs and tadpoles?** Tadpoles breathe with gills. Frogs breathe with longs. Tadpoles live in the water. Frogs can go in the water or on land. Tadpoles have fins, and frogs have four legs.
3. **Describe frogs' eggs.** Frog eggs are laid in a large mass in the water. The eggs are round and jelly-like.
4. **On what do frogs feed?** Frogs feed mainly on insects.
5. **What eats frogs?** Snakes, lizards, birds, and skunks eat many frogs. Some people also eat frogs.
6. **How do frogs feel to your hand?** Frogs feel slippery in your hand.
7. **What happens to frog nostrils when frogs submerge beneath the water?** Frogs close their nostrils under the water.
8. **Where do frogs go to escape predators?** Frogs escape predators by jumping into the water and swimming away.

Lesson 32 Guide: The Snake

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

So far, these lessons have covered birds, fish, mammals, and amphibians. This lesson introduces snakes, which fall into a new group of animals called reptiles. Reptiles are cold-blooded and have dry skin covered in bony plates or scales. Reptiles include snakes, lizards, turtles, crocodiles, and alligators. Some reptiles live near water, and others live in deserts. This lesson focuses on the snake, a type of reptile whose species range from those that can swim to those that live in dry deserts. Snakes are well known for their forked, flickering tongues, the translucent skins they shed, their sharp fangs, and their tubular bodies. Snakes have neither legs nor fins for moving. Instead, snakes make their graceful, silent motions by moving their ribs, connected to crosswise plates covering snakes' undersides. Snakes have no eyelids, cannot blink, and sleep with their eyes open. However, they do have a protective scale that covers and protects the eye. Snakes come in a rainbow of colors including green, blue, black, and red. Snakes eat insects, eggs, fish, birds, frogs, lizards, and small mammals and are the only animals that can swallow prey larger than themselves. Some snakes even eat large mammals such as pigs and deer. The bite of some snakes is poisonous, but others render a harmless bite. Snakes kill their prey either by their bite or by crushing their prey to death. Snakes can be beneficial to humans, preying on animals such as rodents.

Vocabulary

- **Fang**: The tooth of a venomous snake, by which poison is injected.
- **Crosswise**: Diagonally, at an angle or slant.
- **Ribs**: Each of a series of slender curved bones connected in pairs to the backbone.
- **Rodent**: A gnawing mammal of an order that includes rats, mice, squirrels, hamsters, porcupines, and their relatives.
- **Desert**: A dry, barren area of land, especially one covered with sand, that is characteristically desolate, waterless, and without vegetation.

Concepts

Snake Q & A

- Where do snakes live? Snakes live on every continent other than Antarctica. Some also live in the sea.
- Why snakes stick out its tongues? Snakes' tongues aid them in hearing and sensing the environment.
- Do any snakes have legs? Snakes do not have legs.
- Do snakes lay eggs? Some snakes lay eggs, others give birth to live young.
- How do snakes breathe? Snakes have lungs, like grown frogs, birds, and humans.
- Do snakes jump or leap? Snakes do not jump or leap.
- Are all snakes poisonous? Some snakes such as rattlesnakes or copperheads are poisonous, but others, like garter snakes, are not poisonous.
- Do snakes have teeth? Almost all snakes have multiple rows of teeth.
- Do all snakes have fangs? Not all snakes have fangs. Only poisonous snakes have fangs, with which they inject poison into their victims.
- Do snakes hibernate? Some snakes do hibernate in cold climates.

Enrichment Activities

Activity 1: Narrate the Story

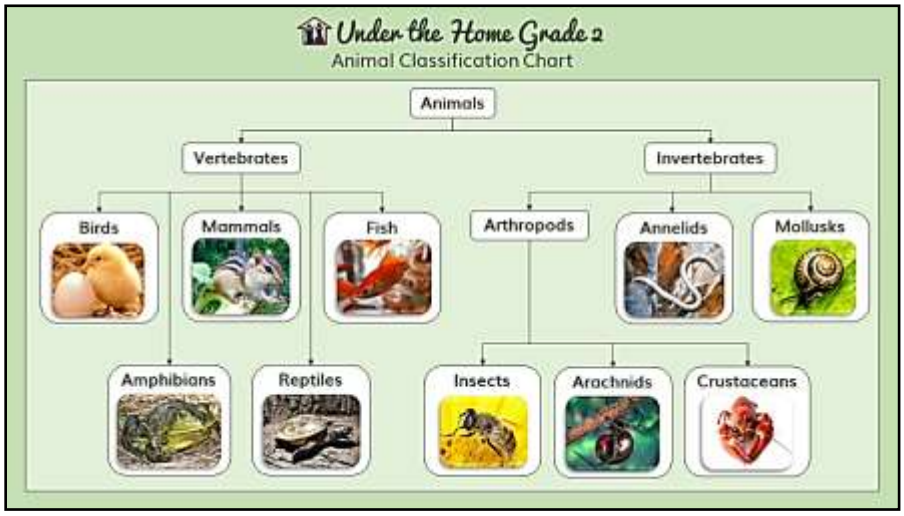
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the online video of a snake. Note its forked, flickering tongue, its dry scales, and the rhythmic movement of its breathing. Also listen to the hiss.

Activity 3: Classify the Animal

- Snakes are animals, vertebrates, and reptiles.
- Find which categories snakes fit into on the classification chart.



Activity 4: Identify the Mystery Object
Identify the white mystery object in the photo below. Hint: a snake used to wear it.

Activity 5: Color and Label a Snake
Complete page 66 of 'Science Field Book for Second Grade.'

Activity 6: Take a Nature Walk
Take a nature walk near water, locate a snake or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a snake, you may wish to choose another animal, to visit a zoo or a pet store, or make a sketch based on the video of the snake in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 67 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the snake breathe?
- How does the snake move?
- How does the snake eat?
- What does the snake eat?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the snake?
- Does the snake have scales or smooth skin?
- What colors are the eyes?
- What do the eyes and legs look like?

Activity 7: Complete a Field Book Entry
After your nature walk, complete page 67 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do snakes use their tongues?** Snakes use their tongues to sense its environment and to aid in hearing.
2. **What is a forked tongue?** A forked tongue is one that is split in two at the end.
3. **Where do snakes live?** Snakes live on every continent on Earth except for Antarctica.
4. **Do snakes close their eyes while they sleep?** No, snakes have no eyelids. They sleep with their eyes open.
5. **What do snakes eat?** Snakes eat a variety of foods including insects, eggs, reptiles, amphibians, and mammals.
6. **How do snakes move?** Snakes move their ribs, which are connected to plates covering their bellies.
7. **What is the difference between fangs and teeth?** Only poisonous snakes have fangs. Fangs are used to inject poison, whereas teeth do not inject poison.

Lesson 33 Guide: The Turtle

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson introduces turtles, which like snakes are reptiles. Turtles are found in a variety of habitats including lakes and oceans. Like snakes, turtles are found on every continent except for Antarctica. The turtle carries with it not just a house, but a shell fortress that protects its soft body from the sharp teeth of predators, such as sharks, whales, dogs, raccoons, skunks, foxes, and even people. In times of safety, a turtle will stretch out its neck and head and its legs and tail will emerge from its shell. The turtle has an upper shell, connected to its backbone, and a lower shell, connected to its breastbone. Turtles enjoy eating insects, worms, small fish, and other turtles. Some turtles also consume certain vegetables and fruit. Turtles do not have teeth, instead they have beaks. Watch out for snapping turtles in lakes. They have very strong, sharp beaks and may bite people. A turtle is different than a tortoise. Tortoises spend their time on land, whereas turtles spend part or most of their time in the water.

Vocabulary

- **Tortoise**: A reptile, typically an herbivorous one that lives on land.
- **Shell**: The hard protective outer case of an animal, such as oysters, lobsters, snails, or turtles.
- **Breastbone**: A thin, flat bone running down the center of the chest and connecting the ribs.

Concepts

Turtle Q & A

- Where do turtles live? Turtles live in or near fresh water and the salty water of the sea.
- Do turtles make any sounds? Turtles make noises such as grunts and may hiss when threatened.
- Do turtles have legs? Some turtles have legs with webbed toes to help them swim, and some have flippers.
- Do turtles have bones? Yes, in addition to its shell, turtles have bones.
- How do turtles breathe? All turtles have lungs and breathe air, including turtles that live in the sea.

- Do turtles lay eggs? Yes, turtles lay eggs with soft, leathery shells. Most turtles bury their nests of eggs to protect them from being eaten by predators.
- Do turtles hibernate? Some turtles do hibernate in cold climates.

Enrichment Activities

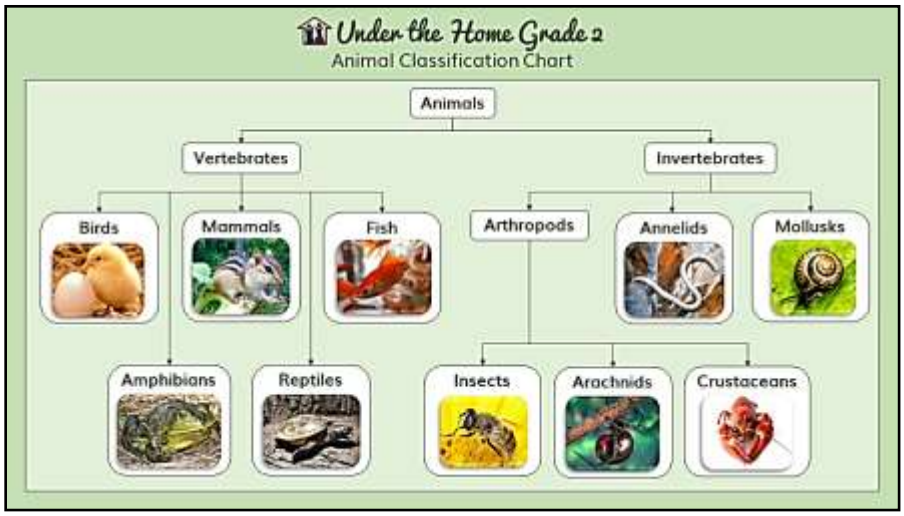
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the online video of baby turtles leaving their nests and journeying to the sea.
- Note that sea turtles do not have legs and claws like land turtles. Instead, these turtle babies have flippers to help them swim.

Activity 3: Classify the Animal

- Turtles are animals, vertebrates, and reptiles.
- Find which categories turtles fit into on the classification chart.



Activity 4: Identify the Mystery Objects

- Identify the round, white mystery objects in the photo below.
- Hint: they have to do with baby turtles.

Activity 5: Find Your Breastbone

- Breastbones are thin, flat bones running down the center of the chest and connecting the ribs. The lower shells of turtles are connected to their breastbones.
- Find your breastbone. First, find your ribs on the right and left sides of your chest.
- Next, find where the ribs meet in the middle to locate the breastbone.

Activity 6: Color and Label a Turtle
Complete page 68 of 'Science Field Book for Second Grade.'

Activity 7: Take a Nature Walk
Take a nature walk near water, locate a turtle or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a turtle, you may also wish to choose another animal, to visit a zoo or a pet store, or to make a sketch based on the video of the baby turtles in Activity 2.

Before you take the nature walk, review:
- The field book template you'll later complete on page 69 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:
- How does the turtle breathe?
- How does the turtle move?
- How does the turtle eat?
- What does the turtle eat?

Habitat observations include:
- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:
- What colors are the turtle?
- Does the turtle have rough or smooth skin?
- What colors are the eyes?
- What do the eyes and legs look like?

Activity 8: Complete a Field Book Entry
After your nature walk, complete page 69 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do turtles use their shells?** Turtles hide inside their shells to protect themselves from predators.
2. **Where do turtles live?** Turtles live on every continent on Earth except for Antarctica.
3. **What do turtles eat?** Turtles eat a variety of foods such as insects, worms, small fish, other turtles, vegetables, and fruit.
4. **What eats turtles?** Turtles are eaten by many different predators include sharks, whales, skunks, foxes, and dogs. Some people also eat turtles too.
5. **How do turtles move?** Snakes move their ribs, which are connected to plates covering their bellies.
6. **How are tortoises and turtles different?** Tortoises live on land, and turtles live much of their lives in water. Tortoises may be able to float in water, but most are not good at swimming.

Lesson 34 Guide: The Crayfish

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson introduces crayfish, which are in a new group of animals called crustaceans. Crayfish are notable for the magnificent pair of nippers on each of the front legs. Like a thumb and finger, the thumb joint can move back and forth freely. The nippers are edged with saw teeth and armed with a sharp claw at the tip for capturing prey and fighting. Crayfish have five pairs of legs. The second and third pairs have nippers like the first, and the fourth and fifth pairs have only a single claw. Crayfish have two compound eyes set on extendable stalks that can be swiveled in any direction to look for danger. Crayfish breathe oxygen from water using the gills on their legs. Crayfish have long, segmented antennae that are thick at their base and thin at the threadlike tips. Above the antennae on each side is a pair of shorter ones called antennules. The antennae and antennules are used for sensing the environment around the crayfish. Crayfish have a cephalothorax, six abdominal segments, and a flaring tail. The tail can be opened and closed like a fan; it can be lifted up or curled beneath. The abdomen has some very beautiful feather-like organs called swimmerets that, along with the tail, help propel the crayfish through the water. In the spring, the mother crayfish covers the swimmerets with glue and plasters on the grapelike clusters of eggs she lays. Even after the little ones hatch, they remain clinging to the maternal swimmerets until they are large enough to scuttle around on the brook bottom and look out for themselves. Crayfish haunt ponds and still pools along brooks and rivers. There they hide beneath sticks and stones, or in caves of their own making. Crayfish are omnivorous, eating both plants and small animals such as worms and fish.

Vocabulary

- **Compound Eye**: An eye consisting of an array of numerous small visual units, as found in insects and crustaceans.
- **Gill**: The paired respiratory organ of fishes and some amphibians, by which oxygen is extracted from water flowing over surfaces.
- **Antennules**: A small antenna, especially either of the first pair of antennae in a crustacean.
- **Cephalothorax**: The fused head and thorax of spiders and other chelicerate arthropods.
- **Swimmerets**: A forked swimming limb of a crustacean, five pairs of which are typically attached to the abdomen.

Concepts

Facts about crustaceans:

- Crustaceans include shrimp, lobsters, woodlice, hermit crabs, and barnacles.
- Crustaceans do not have bones. They have an exoskeleton. To grow larger, they shed, or molt their exoskeleton and grow a new one.
- Crustaceans have two pairs of antennae.
- Crustaceans have jointed appendages to enable movement.
- Most, but not all crustaceans live in the water.

See a picture of an aquatic shrimp below.

See a picture of land-living woodlice below.

Enrichment Activities

Activity 1: Narrate the Story

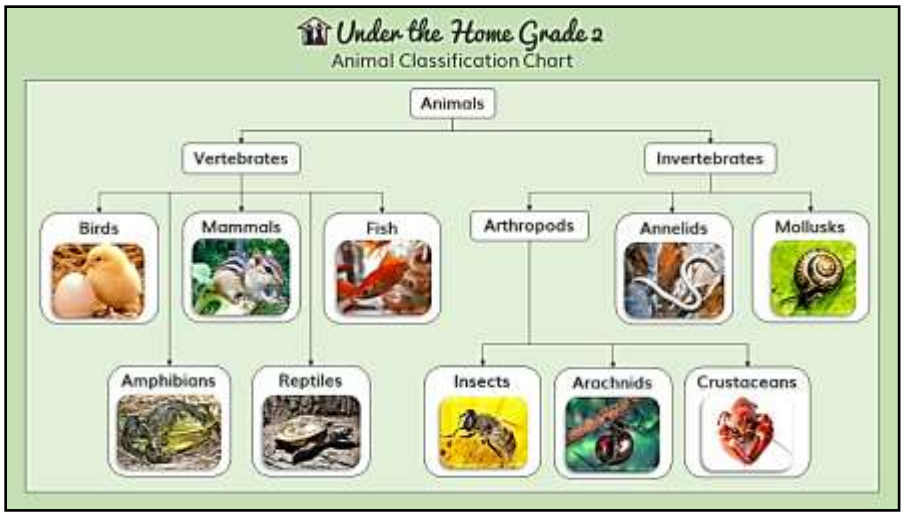
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the online video, and observe some crayfish.
- Look for their claws and segmented legs.

Activity 3: Classify the Animal

- Crayfish are animals, invertebrates, arthropods, and crustaceans.
- Find which categories crayfish fit into on the classification chart.



Activity 4: Color and Label a Crayfish

Complete page 70 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

Take a nature walk, locate a crayfish or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a crayfish, you might make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 71 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the crayfish move?
- How does the crayfish eat?
- What does the crayfish eat?
- How does the crayfish sense the world?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the wings and body?
- How many legs does it have?

- How many antennae does it have?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 71 of 'Science Field Book for Second Grade.'

Review Questions

1. **For what do crayfish use their great front nippers?** Crayfish use their great front nippers for catching prey and defending themselves.
2. **What do crayfish eat?** Crayfish plants and small animals such as fish and worms.
3. **Do crayfish have bones?** Crayfish do not have bones. Instead, they have exoskeletons.
4. **What happens to the exoskeleton as crayfish grow larger?** Crayfish molt, or shed, their exoskeletons and grow new ones as they get larger.
5. **Of what use are swimmerets to crayfish?** Crayfish use their swimmerets to locomote through the water. Mother crayfish glue their eggs to the swimmerets. Even after hatching, the baby crayfish remain clinging to the maternal swimmerets until they are large enough to move on their own.
6. **How many legs do crayfish have?** Crayfish have ten legs.

Lesson 35 Guide: The Earthworm

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson introduces earthworms, which are in a new group of animals called annelids. Annelids are also called the 'ringed worms' or 'segmented worms' and also include leeches. Earthworms are very beneficial to humans, known as Earth's original farmers, plowing the land, fertilizing the land, and adding tunnels in the soil for drainage. Earthworms dig anywhere from mere inches to eight feet under the soil's surface, breaking up the soil with the sand and gravel in their gizzards. Earthworms plow the land by bringing soil to the surface and dragging organic matter such as seeds, leaves, flowers, and animal bones under the surface. Earthworm stomachs add lime to fertilize the soil, just like human gardeners. For clinging and crawling, earthworms use tiny bristles on the undersides of their bodies called setae. Their muscles also aid in movement, which earthworms contract and expand. Earthworms can feel vibrations, but cannot hear. They can sense light and darkness, but have no eyes. They cannot smell much, but their senses of taste and touch are well-developed. Earthworms dig tunnels which end in a larger chamber, where they hibernate during the winter. Earthworms are nocturnal, not appearing by day unless they are rained out of their burrows. Earthworms are omnivores, eating earth, leaves, flowers, meat, and even fellow earthworms. An earthworm begins life as a yellow-brown football-shaped cocoon containing between one to five worms. Tiny white worms hatch from these cocoons and grow into reproducing adults in around six weeks.

Vocabulary

- **Fertilize**: Make soil or land more fertile or productive by adding suitable substances to it.
- **Lime**: A white caustic alkaline substance consisting of calcium oxide.
- **Organic**: Derived from living matter.
- **Nocturnal**: Done, occurring, or active at night.

Concepts

Earthworm anatomy includes the following parts:

- **Segment**: Each of the series of similar anatomical units of which the body and appendages of some animals are composed, such as the visible rings of an earthworm's body.

- **Clitellum**: A raised band encircling the body of oligochaete worms and some leeches, made up of reproductive segments.
- **Proboscis**: Extension of the upper lip used to push food into the mouth.
- **Pharynx**: Muscular pump that draws food into the earthworm.
- **Crop**: A pouch where food is stored or prepared for digestion.
- **Esophagus**: A narrow tube connecting the pharynx to the crop.
- **Gizzard**: Muscular organ with sand or fine gravel, used to for grinding up food or earth.
- **Setae**: A stiff hair-like or bristle-like structure, especially in an invertebrate.

Enrichment Activities

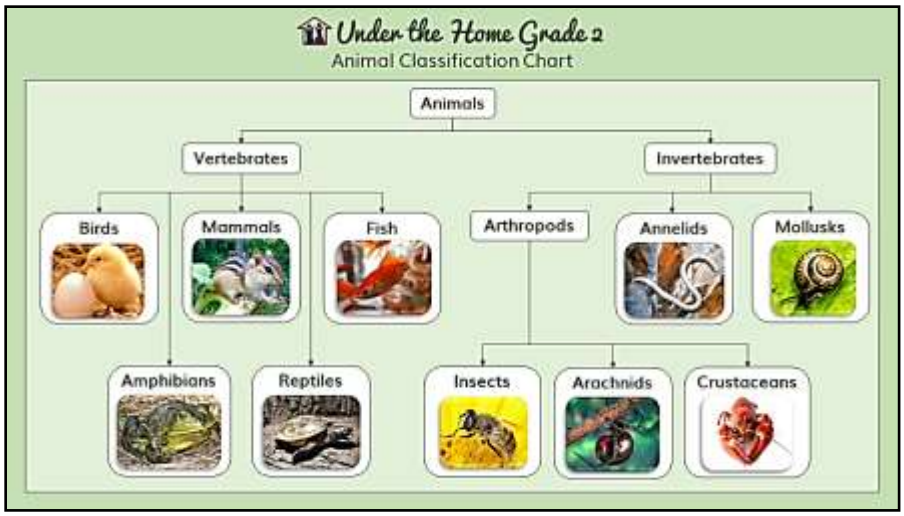
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Learn How to Find Earthworms

- Locate some dark, moist soil around your house or in the woods or a nearby field.
- Dig carefully in the soil using a spade or shovel to find earthworms.
- Dig up a pile of earth so that it is soft and loose and place an earthworm on the pile. How long does it take the earthworm to submerge itself?

Activity 3: Classify the Animal

- Earthworms are animals, invertebrates, and annelids.
- Find which categories earthworms fit into on the classification chart.



Activity 4: Color and Label an Earthworm

Complete page 72 of 'Science Field Book for Second Grade.'

Activity 5: Take a Nature Walk

Take a nature walk, locate an earthworm or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find an earthworm, you might make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 73 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the earthworm move?
- How does the earthworm eat?
- What does the earthworm eat?
- How does the earthworm sense the world?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What color is the body?
- Can you find the proboscis?
- How many legs does it have?
- How many segments does it have?
- How many antennae does it have?

Activity 6: Complete a Field Book Entry
After your nature walk, complete page 73 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do earthworms crawl?** For clinging and crawling, earthworms use tiny bristles on the undersides of their bodies called setae. They also move using their muscles, which they contract and expand.
2. **Do earthworms have legs?** No, an earthworm does not have legs.
3. **How well do earthworms hear?** Earthworms cannot hear. They are deaf.
4. **How well do earthworms smell?** Earthworms have a well-developed sense of smell.
5. **Describe the home of earthworms in which they hibernate for the winter.** Earthworms dig tunnels which end in a larger chamber, where they hibernate during the winter.
6. **How are earthworms like farmers?** Earthworms plow the land, fertilize the land, and add tunnels for drainage.
7. **Are you more likely to see earthworms by day or by night?** On a hot sunny day or a rainy day? Earthworms are nocturnal, so they come out at night. However, they are often seen on rainy days when they come to the surface to avoid being drowned in their burrows.
8. **What do earthworms eat?** Earthworms are omnivores, eating earth, leaves, flowers, meat, and even fellow earthworms.
9. **Are earthworms friends or foe to humans?** Earthworms are very beneficial to humans as they improve the quality of our soil for growing food.

Lesson 36 Guide: The Snail

Directions

Study the lesson for one week.
Over the week:

- Read the story.
- Review the animal synopsis.
- Study the vocabulary words.
- Learn the concepts.
- Complete the enrichment activities.
- Study the review questions.

Synopsis

This lesson introduces snails, which are in a new group of animals called mollusks. In addition to snails, the mollusk group includes marine animals such as clams, scallops, oysters, octopuses, and squid. Snails hatch from soft-shelled eggs that are the size of peas. Baby snails hatch already possessing shells with single spirals. As the babies grow, they add layer after layer to the opening rims of their shells, adding on additional spirals. Snails are best known for carrying these houses with them wherever they go and for their slow pace of travel. Each snail travels using their single foot, which secretes an adhesive substance that helps them cling, even when upside-down. This substance leaves a shining trail of ooze behind the snail. Snails have two stalks on their heads, each bearing an eye. These eye stalks are retractable and can be extended around corners or over edges. In the event of danger, the snail can pull its eyes inward for protection. Below the eyes are two feelers which are also retractable. The snail breathes through an opening called a breathing pore. The snail opens and closes the breathing pore to suck air into the shell, where it bathes the snail's lung and is forced out again. Snails have a set of brown upper teeth for chewing and a round tongue. Most land snails are herbivores, eating vegetation such as leaves, vegetables, and fruits. A few species of snail are omnivores or carnivores. Snails live on average two to three years, but some larger species can live for up to ten years.

Vocabulary

- **Marine**: Of, found in, or produced by the sea.
- **Retractable**: Able to be drawn back or back in.
- **Feelers**: An animal organ such as an antenna or palp that is used for testing things by touch or for searching for food.
- **Stalk**: A slender support or stem of something.
- **Adhesive**: Able to stick fast to a surface or object; sticky.
- **Secrete**: Produce and discharge a substance.
- **Spiral**: Something winding in a continuous and gradually widening (or tightening) curve.

Concepts

Did you know snails hibernate during cold winter months? Facts about snail hibernation:

- Snails bury themselves beneath objects.
- Snails secrete multiple mucus doors to close their shell openings.
- Snails leave only a tiny opening in their door to allow air to enter.
- Upon prolonged attack, snails will also withdraw into their shells and secrete mucus doors across their shell openings.

Enrichment Activities

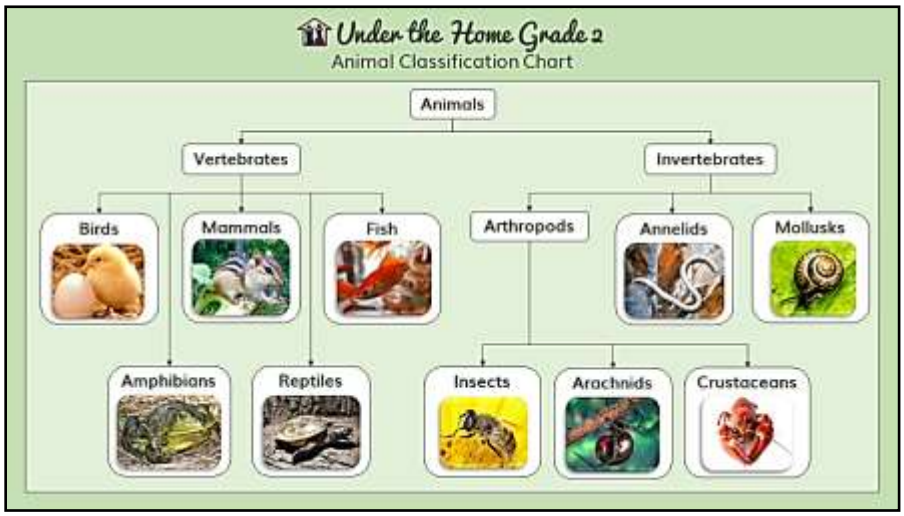
Activity 1: Narrate the Story
After reading or listening to the story, narrate the story events aloud using your own words.

Activity 2: Watch the Video

- Watch the slow but steady progress of a snail.
- Identify its shell, foot, head, eye stalks, and feelers.

Activity 3: Classify the Animal

- Snails are animals, invertebrates, and mollusks.
- Find which categories snails fit into on the classification chart.



Activity 4: Sketch Clockwise and Counterclockwise Spirals

- Snails have shells that spiral both clockwise and counter-clockwise.
- Sketch and label both types of spirals, as shown below.
- Clockwise:

- Counter-clockwise:

Activity 5: Recite a Poem

Little Diogenes bearing your tub, wither away so gay,
With your eyes on stalks, and a foot that walks, tell me this I pray!
Is it an honest snail you seek that makes you go so slow,
And over the edges of all things peek? Have you found him, I want to know,
Or do you go slow because you know, your house is near and tight?
And there is no hurry and surely no worry lest you stay out late at night.

Activity 6: Color and Label a Snail

Complete page 74 of 'Science Field Book for Second Grade.'

Activity 7: Take a Nature Walk

Take a nature walk, locate a snail or other animal to observe, gather data and notes, and use that information to create a field book entry. You may wish to take a pencil and a small notebook to jot down sketches and observations. If you can't find a snail, you might make a sketch based on the video in Activity 2.

Before you take the nature walk, review:

- The field book template you'll later complete on page 75 of 'Science Field Book for Second Grade.'
- The suggested list of observations below.

Behavioral observations include:

- How does the snail move?
- How does the snail eat?
- What does the snail eat?
- How does the snail sense the world?

Habitat observations include:

- Does the animal live in a forest, a field, a town, or near water?
- In what type of climate does the animal live (e.g. temperate, tropical, arid, arctic)?
- In what type of house does the animal live?

Appearance observations include:

- What colors are the shell and body?
- How many feet does it have?
- How many feelers does it have?

Activity 8: Complete a Field Book Entry
After your nature walk, complete page 75 of 'Science Field Book for Second Grade.'

Review Questions

1. **How do snails use their shells?** Snails use their shells for protection in times of danger, dry spells, and cold winters.
2. **You see a snail with only one spiral. Is it a young snail or an old snail?** Snails are born with a single spiral and grow more as they age. It is a young snail.
3. **How do snails breathe?** Snails open and close their breathing pores to draw air into its shell. Snails bathe their lung in the air and then expel the air from the shell.
4. **What do snails like to eat?** Snails like to eat leaves, vegetables, and fruit.
5. **How many feet does each snail have?** Each snail has only a single foot.
6. **How do snails cling to surfaces?** Snails secrete a sticky substance from their feet to help them cling.
7. **Describe what snails leave behind as they move over a surface.** Snails leave a shiny, clear trail of mucus behind themselves.
8. **How do snails protect their eyes in times of danger?** Snails retract their eye stalks in time of danger.
9. **How do snails protect themselves from drying out in times of danger?** Snails secrete a mucus barrier over its opening to protect themselves in times of danger.
10. **How do snails prepare themselves for hibernation?** Snails bury themselves beneath objects and secrete multiple mucus doors to close their shell openings.

