

# Fourth Grade

## Pre and Post Field Trip Teacher Resources

### TEKS Objectives:

- 4.b.1A - Demonstrate safe practices during field and laboratory investigations
- 4.b.2A - Plan and implement descriptive investigations including asking well-defined questions, formulating testable hypothesis, and selecting and using equipment and technology
- 4.b.2B - Collect information by observing and measuring
- 4.b.2C - Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.
- 4.b.2D - Communicate valid conclusions
- 4.b.3C - Represent the natural world using models and identify their limitations
- 4.b.4A - Collect and analyze information using tools including calculators, safety goggles, microscopes, cameras, sound recorders, computers, hand lenses, rulers, **thermometers**, meter sticks, **timing devices**, balances, and compasses.
- 4.b.8A - Identify characteristics that allow members within a species to survive and reproduce
- 4.b.8B - Compare adaptive characteristics of various species
- 4.b.9A - Distinguish between inherited traits and learned characteristics
- 4.b.9B - Identify and provide examples of inherited traits and learned characteristics

### HISD Objectives:

- SCI.4.1A - Demonstrate safe practices during field and laboratory investigations using appropriate equipment such as safety goggles and gloves
- SCI.4.4A - Collect and analyze information using appropriate tools including calculators, safety goggles, microscopes, cameras, sound recorders, computers, hand lenses, metric rulers, metric thermometers, meter sticks, timing devices, metric balances, and compasses
- SCI.4.2B - Collect and analyze information by observing, measuring and using numerical operations such as addition and subtraction.
- SCI.4.2A - Plan, implement descriptive and simple experimental investigations that include a well-defined question, a testable hypothesis, one variable, and the use of equipment and technology
- SCI.4.2C - Analyze and interpret information to construct reasonable explanations from direct and indirect evidence
- SCI.4.3C - Represent the natural world using models and explain their limitations
- SCI.4.4B - Demonstrate that repeated investigations may increase the reliability of results
- SCI.4.9A - Distinguish between inherited traits and learned characteristics such as a spider weaving a web and a seal balancing a ball
- SCI.4.9B - Identify and provide examples of inherited traits and learned characteristics
- SCI.4.8A - Identify characteristics that allow organisms to survive and reproduce such as penguins huddling together in a tight group to retain heat
- SCI.4.8B - Compare adaptive characteristics of similar organisms such as leaf shapes and beak types in birds

### Program Overview:

Adaptations help organisms survive.



### Key Vocabulary Terms:

adaptation, inherited trait, learned characteristics, adaptive characteristic, drey

### Objectives:

Identify and compare adaptive characteristics of organisms. Use hands-on activities to explore adaptations of organisms.

**Time Allocation:** 30 minutes for each activity.

## Background Information:

An adaptive characteristic can be described as a specialized characteristic or "tool" that enables an organism to survive in its natural habitat or environment. These specialized tools help animals to find or catch food, move about in search of food or a mate, escape danger, see, breathe in air or water, or protect itself. Adaptations develop gradually over long periods of time and through many generations of the species. The strongest and more successful traits are passed on to future generations. Adaptive characteristics can be described in two ways. Physical adaptations are inherited traits which are part of the organisms' body. For example, brown fur on a swamp rabbit help to camouflage it to its predators. The shell on a turtle which protects its delicate body is also considered a physical adaptation. In addition to physical characteristics are behavioral traits or characteristics. An example of a behavioral trait is the pack mentality of wolves. Animals that migrate to warmer regions to avoid cold temperatures are using behavioral traits that benefit them.

## Pre-Field Trip Activities:

### Squirrel Background Information for Activities 1-3

Squirrels are a popular urban critter. They are very abundant in the city of Houston and at the Houston Arboretum as well. Have a discussion with your students about the interesting adaptive characteristics that squirrels possess. Discuss the adaptive characteristics that allow them to thrive in an urban environment. In a city much of the squirrel's natural habitat is removed for development, but squirrels have learned new ways to get food. They have learned how to raid "squirrel proof" bird feeders to get seed and some have even learned how to beg from visitors at public parks.

Like all rodents, squirrels have two pairs of curved, chisel-shaped incisor teeth. This inherited trait allows for efficient gnawing at nutshells and tree bark. Even with only 4 fingers and a stubby thumb they still have amazing dexterity opening nut shells as well. Human beings would have difficulty opening nuts without their thumbs.

Both cats and squirrels can climb trees, but why can a squirrel go back down the tree head first but a cat can't? Answer: Squirrels have an adaptive characteristic that allows them to turn their paws 180° which allows them to go back down the tree head first.

Squirrels must always be alert or they may become meals for predatory foxes, hawks, or tree-climbing snakes. An alert squirrel can remain motionless for long periods of time. A bushy squirrel's tail serves as a blanket during cold weather and shades it during the summer. In order for a squirrel to be an acrobatic expert, it uses its tail for balance as it leaps from tree to tree or along a fence post.

Each year squirrels bury large numbers of nuts to prepare for fall. This inherited knowledge allows them to have food in the winter. They don't always remember where they buried the nuts, but the ones they do find are found with their good sense of smell. The unfound nuts that they bury often will germinate becoming seedlings of future trees.

### Activity One (Squirrely Adaptations)

Review with students the special adaptive characteristics that make squirrels so unique using the Squirrel Background information above and the [picture of a squirrel](#). Then have students work individually or in groups to complete the "[Squirrely Adaptations](#)" [worksheet](#) to review the adaptations that help a squirrel thrive in Houston. [Click here for the answer sheet](#).

## Activity Two (Opposable Thumbs)

Squirrels can crack open a nut with no problem. How easy is it for you to do it without opposable thumbs or chisel-like incisors?

Materials:

- Masking or packing tape
- Variety of shelled nuts (peanuts, almonds, hazel)

Tape each student's thumb alongside the palm of their hand. (If you cannot tape their hands, you can tell your students to pretend the thumb is taped down, tight against the hand.) Instruct them to pretend they are a squirrel trying to open a nut using only their 4 fingers and their teeth. Giving each student a few varieties of nuts, allow them to try cracking open a nut using only their fingers and teeth. After giving students 5-10 minutes doing this activity, have them evaluate the importance of the opposable thumb. Would human beings be an advanced society without them? Would we have the same technology? How often do we use our thumbs in our daily tasks? Investigate what animals have opposable thumbs and which ones don't.

## Activity Three (Acorn Hide and Seek)

Print copies of the [acorn sheet](#) ([Click here for master copy](#)) on card stock so that each student receives 10 "acorns". Pass out the acorns to each student. Students will pretend they are squirrels and will have to hide their acorns within a specific area to prepare for winter. Remind your students that most squirrels will hide individual acorns in different spots rather than all in one location. After your students are finished hiding their acorns, move onto another activity. Later, return to your spot and tell your students it is time to find their acorns. Some may remember where they hid all of them, but most likely many will have forgotten where they hid some of them. Some may inadvertently collect acorns from another "squirrel".. This is all okay; it will help you lead into a discussion about what naturally happens in the wild. Some squirrels do forget where acorns were hidden, some acorns are found and eaten by other animals, and some of the acorns will never be found and might possibly sprout into new trees. Approximately 80% -90% of caches are found by squirrels. Did your students find enough food (8-9 acorns) for winter? Vary this activity by giving students a variety of nuts printed on different colored cardstock. Practice probability by burying and locating the number of different nuts found again.

## Post Field Trip Activities:

### Activity One (A Warm Place to Stay)

Explore behaviors that help animals survive in the winter such as hibernation and migration. These two examples are considered behavioral adaptations because they are things the animal actually does to adjust to cold weather.

One reason squirrels nest is for shelter from the elements. Their nests are found in a variety of places. They can build a nest that is referred to as a drey between the branches of trees using twigs, branches, leaves, grass and moss. Squirrels will construct a roof for their dreys to protect themselves from rain and sun. They might also build a nest inside the hollow of a tree. This nest will be lined with grass, moss, and shredded leaves.

In this activity students will evaluate a behavioral adaptation; finding shelter to keep warm. Students will do an experiment to choose which of the 4 shelters they would choose as a squirrel to provide them the best protection from the cold.

#### Materials:

- 4 identical drinking glass of equal size (large enough to hold a 12 oz bottle)
- 4 12oz empty plastic soda bottles
- 4 alcohol based outdoor thermometers
- Modeling clay
- Funnel
- Wood chips
- Leaves and pine needles
- Sand
- Clock or watch
- Masking tape
- Marker
- Small pitcher
- Very hot tap water

Create four model animal shelters for the 4 identical glasses. (Make sure each glass is big enough to hold the 12 oz bottle and an inch of space between the bottle and glass.) Using the masking tape and marker, label one glass "open air", another one "sand burrow", another one "wood chips" and the last one as "leaves and pine needles. Have an adult fill the pitcher with very hot tap water. Insert a thermometer into the pitcher and record the temperature. Now you will create your "squirrels". Using the funnel, fill the four bottles so they are three-quarters full of hot water. Place a thermometer in each bottle. Put modeling clay around the mouth of each bottle to hold the thermometer in place and to seal the opening of the bottle. Place one "squirrel" or bottle into each of the four glasses. Add nothing to the glass labeled "open air". Pour sand into the glass labeled "Sand burrow" until it comes up to the neck of the bottle. Stuff wood chips evenly into the glass labeled "wood chips" until they come up to the neck of the bottle. Stuff leaves and pine needles into the last glass. For eighteen minutes read the temperature of the "squirrels" in each shelter every three minutes. Have students record temperatures in their science journals. Repeat the experiment again. Which shelter was most effective in preventing heat loss from each "squirrel"? Based on the results, what materials would a squirrel use to build his shelter during the winter?

## Activity Two (Blubber Hands)

Animals use a variety of techniques to protect themselves from cold temperatures. They might hibernate, migrate or huddle together. Blubber on seals and whales, is an inherited adaptive characteristic that protects these mammals from freezing water temperatures. Heat loss is much greater in water than in air. Insulation prevents the passage of heat out of the body. Blubber acts as an insulator which conserves body heat. To demonstrate the effectiveness of blubber as a protector from freezing temperatures, try the following experiment.

Materials:

- Thermometer
- Large spoon
- Crisco solid vegetable shortening
- Quart or pint size Ziploc bags
- Ice and water
- Dishpan
- Duct or packing tape

Prep Work:

1. Spoon the vegetable shortening into one of the Ziploc bags until the bag is about  $\frac{3}{4}$  full.
2. Take another bag and turn it inside out. Put this bag in the bag of Crisco.
3. Push down gently so that the top of the bag on both bags matches up.
4. Carefully lock the two bags together and wipe the top of the bags with a paper towel.
5. Fold a piece of tape over the top of the two joined bags and press down tight. You now have a blubber bag.
6. Place ice and water into dishpan. Record the temperature of the water.

First instruct students to place one of their hands into the dishpan filled with water. Time how long they can hold it in. Next, place their other hand inside the blubber bag and then place it in the dishpan. Time how long they can hold it. Compare the difference in how long students could hold their hand in the water without the blubber bag vs. wearing the blubber bag. Explain to students that when they covered their hands with the shortening, they surrounded their hand with a fatty substance that resembles blubber. How important is blubber to seals, whales and dolphins? Are there any other animals that use blubber as a way to protect themselves from extreme cold temperatures? What do we use in our homes to insulate against extreme temperatures? What other animal adaptations protect them against extreme hot or cold temperatures?

## Activity Three (Adaptation Bingo)

Play "Adaptation Bingo". Your students can cut out the animal pictures and glue them to their bingo boards in random order, then mark off each animal as you read its [adaptation clue](#).

## **Cross-Curricular Activities:**

### **Math:**

See Pre-Field Trip Activity Three.

### **Social Studies:**

Have students research unusual animals that live in different habitats around the world. Write a report on one of these animals identifying three adaptations and the habitat that it lives in. Instruct students to build a diorama of the animal showing its physical adaptations and the habitat it lives in.

### **Language Arts:**

Write a thank you letter to the naturalist or docent who led your walk during your field trip. Ask students to describe a favorite plant or animal and its adaptive characteristics that allow it to survive in its habitat. The address for the Houston Arboretum is 4501 Woodway Drive , Houston , TX 77024

## **List of Suggested Readings:**

Davies, Nicola. "Extreme Animals: The Toughest Creatures on Earth. Candlewick. 2006

Goodman, Susan. "Claws, Coats, and Camouflage" Millbrook Press. 2001

Halfmann, Janet. "Plant Tricksters" Franklin Watts. 2004

Kneidel, Sally. "Skunk Cabbage, Sundew Plants, and Strangler Figs: And 18 More of the Strangest Plants on Earth". John Wiley & Sons. 2001

Rose, Elizabeth. "Animal Adaptations" Powerkids Press. 2006

Silverstein, Alvin. "Adaptation" Twenty-First Century Book. 2007

## List of Suggested Websites:

National Wildlife Federation-

<http://www.nwf.org>

The Children & Nature Network-

<http://www.cnaturenet.org/>

Acorn Naturalists-

<http://www.acornnaturalists.com/>

Specializes in nature-related educational materials for kids.

Texas Park and Wildlife-

<http://www.tpwd.state.tx.us/learning>

Hooker Oak Elementary School-

<http://www.csuchico.edu/%7Epmaslin/nature/honature.html>

Here is a wonderful example of what one group of parents and teachers did at their school! It's truly turned into a community project. The page has links at the bottom to some other very useful information and teaching materials, all hosted by California State University at Chico .

PBS-

<http://www.pbs.org/kratts/world/content.html>

This is a great resource for students to use to do research on different animals around the world. They can even make a movie!