



USU 4-H Animal Tracks Tote



BIG IDEA:

Organisms have specific traits that help them survive.

UNDERSTANDINGS:

Animal tracks can help us identify structures and habits that a specific animal uses to survive.

ESSENTIAL QUESTIONS:

Why is it important to understand what living things need to survive?

What clues can we find from observations to infer how an animal survives?

THREE DIMENSIONS, UTAH SCIENCE STANDARDS, AND INTENDED LEARNING OUTCOMES:

See pg. 9-12

Supplies

- Paper*
- Pencils*

Funny Feet Functions p. 2

- Animal Track Molds
- Animal Track Models
- Various Types of Shoes*
- Newspaper (or anything to protect working surface)*
- Plaster and water*

Sleuth Tracking p. 4

- Mud/Wet Sand*

Or

- Butcher paper*
- Paint*
- Old shoes*

Or

- Water and Pavement*

Finding Footprints p. 6

- Plaster and water (optional)*

*Not included in tote

**Activity 1: Funny Feet Functions**

Time: 30 min

Grade Level: 3-5

Materials:

- Animal Track Molds
- Rubber Animal Track Casts
- Shoes (snow shoes, high heels, cleats, swim fins, boots, Vibram shoes, climbing shoes)
- Newspaper (or anything to protect working surface)
- Plastic bags
- Plaster and water

To Do:

1. Gather various types of shoes (gym shoes, shoes with cleats, high heels, snow shoes, etc.). Ask the students what animal feet and our shoes have in common. We have different types of shoes to work best for different activities and animals have feet that suite them best for the way they live.
2. Explain that there are a number of shoes and some rubber animal track molds and casts. Have students pick a shoe (they can work in groups or individually) and work to identify what type of animal track it is most similar to. Have students use pre-existing knowledge, observation, and internet or books to find an animal whose foot functions like their shoe. Instruct the students to use the organizer to determine which track most closely represents their shoe and why. Information about how the shoes relate to specific animals can be found in the apply section.
3. Ask students to consider the following questions. What can we tell about where the animals lives, what it might eat, and what it needs to do to survive based off of its track? Is there anything that we could change about the animal's feet to help it survive? Use information in the apply section.
4. Prepare to make animal track molds. Cover your working surface with newspaper. Pass out the animal track molds. Have students measure out the plaster and water into their baggies. (Mix according to directions.) Footprints take about 2 cups plaster each. Have students mix the water and plaster inside their baggies. When it is all mixed together, pour the plaster into the track mold.
5. Let the cast dry. This typically takes 1 to 6 hours. The cast can often be taken out after an hour and then allowed to cure. Larger molds take longer to dry. Remove the track and display it proudly.



Funny Feet Functions Continued

REFLECT:

- What kind of shoe was at your table? What type of animal has a foot that works like your shoe? How is it like your shoe?
- Is there anything you would change about the shoe to make it more effective? What features does the animal foot have that your shoe does not?
- What adaptations have you seen in animal's feet? How have these adaptations inspired human inventions?

APPLY:

Over hundreds and thousands of years, animals have adapted to fit the particular environment they live in and to accommodate the things they need to survive. For example, a moose has long thin hooves that are split down the middle. They spend a lot of their time in marshes and very wet places feeding and the long thin hooves spread when going into the mud and “collapse” when coming out of the mud to make it so they don't get stuck.

Shoes: you find them everywhere. From young toddlers to the elderly, people of all ages wear many different shoes in order to be stylish, stay warm, protect and support the feet, or be used for specific activities. It is likely that you have your own favorite pair of shoes, but did you know that many animals have their own shoe-like adaptations? People have used the adaptations of different types of animal feet to find solutions for human needs. The following are some examples of shoes based on foot characteristics found in nature:

Snowshoes

The hind feet of a snowshoe hare are larger proportionally than the regular rabbit/hare foot and is specially adapted for its North American home, which can range as far south as the Rocky Mountains and as far north as the arctic circle. The bigger hind feet of a snowshoe hare spreads the animal's weight out, making it easier for the animal to “float” on top of deep snow drifts and escape predators without sinking. Snowshoe hares also have fur between the pads, giving the animal better grip when walking on slippery ice and providing extra insulation in the cold weather.

High Heels

There are several animals that walk on their toes: Dogs, cats, pigs, rats, and elephants. Tendons or a layer of padding support the “heel” of the animal as it moves similar to the heel of a shoe, but probably a lot more comfortable. The toe bones are much closer to the skin layer and come



Funny Feet Functions Continued

in close contact with the ground. Because of their special feet, these animals may feel vibrations in the ground from a storm or approaching animals.

Cleats

Many animals, such as dogs or wolves, have semi retractable claws. Their toenails are always out and visible. Their semi retractable claws that dig into the ground for a better grip, allowing them to run faster. Like the metal spikes on cleats, the claws of these animals can also wound their opposition.

Swim Fins

Ducks, as well as other aquatic birds and mammals, have legs specially adapted for life in the water. Their appendages are shaped like fins or webbed feet, and help them to swim better by moving the water more efficiently. Humans also mimic these adaptations by wearing swim fins while snorkeling or SCUBA diving. These animals can also walk on land using their “fins”, but are often clumsy.

Boots

Horses “toes” are fused inside of their hoof which is made of hard keratin to protect their legs as they run. Like boots though, on hard surfaces the hoof does not provide sufficient padding and can cause injury. The hoof is also smooth on the bottom and requires care going over rocky or steep terrain to avoid falling or slipping.

Vibram shoes

Raccoons have feet very similar to human hands and feet and are well known for their dexterity. Their five fingers and toes are perfect for grabbing and feeling their prey and other objects. They can occasionally walk on two feet and climb similar to humans. Unlike humans however, raccoons can rotate their hind feet 180 degrees allowing them to descend from a tree headfirst.

Climbing shoes

Mountain goat hooves served as a template for climbing shoes. Mountain goats have small, very hard hooves that allow them to support their entire weight on a one inch mountain ledge. The compactness and shape of the hoof make it possible for the mountain goat to use very small cracks and ledges in the rock to help it quickly climb well out of the reach of its predators without losing its balance.

**Activity 2: Sleuth Tracking**

Time: 30 min

Grade Level: K-6

Materials:

- Mud/Wet Sand

Or

- Butcher paper
- Paint
- Old shoes

Or

- Water and Pavement

To Do:

1. Ask students what types of things they can learn from observing animal tracks. Along with identifying what animals are in an area, animal tracks can also help you know what they were doing.
2. Discuss various scenarios that would likely change what the tracks look like. Was the animal running, walking, stalking, or jumping? Did it stop, turn around, or pace? How many were there? Encourage students to come up with these ideas and others rather than just telling them.
3. Reading tracks is kind of like being a detective. Tell the students they are going to be detectives by reading tracks. Divide the class into two groups, the track makers and the sleuths. You can divide the class anyway you would like, half and half, one track maker, one sleuth, etc.
4. Have the track maker make tracks in/on the mud/paper/pavement without the sleuth seeing. Incorporate various movements into the track making.
5. Have the sleuth come identify as best as they can where the track maker walked and what they were doing.
6. Discuss how this activity is similar and different to looking at tracks in the wild.

Idea: For extra (and messy) fun, do this activity in bare feet. Have students try to identify whose foot prints are whose or to track one person's footprint among everyone else's.

**REFLECT:**

- How do tracks change as activities change? Does spacing change? Does imprint shape change? Does depth change?
- Does the ground change how the footprints come out? Where do you think you would find the best footprints? Where would it be difficult to find footprints?
- After doing this activity, were there new things you discovered can be learned from observing tracks? Is there a specific place you would like to look for tracks or a specific animal you would like to try to find?

APPLY:

Tracks can tell us a lot about an animal's activities. As animals run their tracks become more spaced apart. Depending on how they step they may only leave partial prints. You may observe that a part of the track is much deeper than another when the animal runs and that the track depth is more even when it is just walking. You may learn an animal visits a river at the same place every day or see that it goes into the water or stays out.

Tracking is much easier where the soil or sand is soft. Rocky areas make it difficult to find and follow tracks. However, even where there are not footprints, there are other clues to help you follow animals. Crushed and broken vegetation, pieces of fur, scat, and other evidence can enable people to follow and learn about animals.



Finding Footprints

Activity 3: Finding Footprints

Time: 30 min-1 hr

Grade Level: 2-5

Materials:

- Paper
- Pencil
- Plaster (optional)

To Do:

1. Select an area to go look for footprints. This could be on a nature trail, in a park, or simply in the backyard or playground. The ground near streams and ponds and fresh snow are excellent places to find tracks.
2. Give students a paper and pencil to record and sketch their findings on. Divide the students into pairs or trios. Have students stay within sight of their partner/s as they look for tracks.
3. Go out and look for tracks. Have students record what tracks they see and make inferences on what type of animal it was, what it was doing, where it lives, etc. Animals need water, food, and shelter. See if students can identify any water or food sources or shelter near the tracks they find. Similarly, have students find water, food, or shelter and find tracks near it.
4. Gather together as a class and discuss what students found and observed.

Optional Extension of Activity:

5. Select a well-defined track and use it as a mold. Mix plaster and fill the footprint. Remove the plaster when it has dried.

REFLECT:

- Where did you find the most footprints?
- What type of animal do you think they belonged to?
- How would the types of footprints you find be different if you were to look somewhere else? In the forest? The desert? A city? A farm?
- What types of activities do you think the animal was doing?
- What could you do to be more certain to find footprints?

APPLY:

Animals must have food and water to survive. Often that is why animals leave their



Finding Footprints

shelter, to get food or water. Many animals like to stay fairly close to their shelter so that if there is danger they can quickly run to safety. Finding sources of food, water, and shelter can lead to finding tracks.

Similar types of animals have similar types of tracks. Dogs, wolves, and coyotes have similar tracks as do birds, cat-like animals, and so on. Field books can help people identify animal tracks, but even just knowing a few basic tracks can enable people to make educated guesses about what type of animal track they found.

Different environments often mean different types of animals which mean different types of tracks. On farms you might find more mouse, skunk, and raccoon tracks. In a city, you may find mainly pigeon tracks or a rat and other rodent tracks. In the desert, snakes can leave particularly interesting tracks in the sand. You could observe that an area gets more activity at night, or in the morning or evening. Tracks do not only show things about an animal, but also about the environment it lives in.



Other Activities

Other Activities

- Measure, count, and classify different types of animal prints.
- Create a memory matching game with pictures of tracks that match up with the animal it belongs to.
- Make a scavenger hunt that includes tracking clues (footprints, crushed vegetation, etc.)
- Discuss predators and prey. How can you identify interactions between predators and prey by looking at their tracks?

Contents of Animal Track Tote

Contents of Animal Track Mold Tote

- Front and hind otter paw sets with molds
- Types of scat
- Front and hind opossum paw set with front mold
- Front and hind raccoon paw set with molds
- Front and hind red fox paw set with molds
- Front and hind coyote paw set with molds
- Types of bird feet
- Front and hind bison hoof set with molds
- Varieties of front and hind cloven hooves

(11 total molds and 28 total casts)



Three Dimensions, Utah Science Standards, and Intended Learning Outcomes

Note: These applications of National and State Science Standards are not comprehensive. They are meant to serve as suggestions. While only standards for elementary levels have been listed, standards for more advanced grade levels can also be applied. Additionally, this tote is an excellent tool to facilitate inquiry for any age group.

THREE DIMENSIONS

K-LS1-1. Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment (Activity 2: Sleuth Tracking, Activity 3: Finding Footprints)

Use observations to describe patterns of what plants and animals (including humans) need to survive.

Science and Engineering Practices:

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.
- Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas:

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

Crosscutting Concepts:

- Patterns in the natural and human designed world can be observed and used as evidence.

K-ESS3-1. Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment (Activity 2: Sleuth Tracking, Activity 3: Finding Footprints)

Use a model to represent the relationship between the needs of different plants and animals (including Humans) and the places they live.

Science and Engineering Practices:

- Use a model to represent relationships in the natural world.

Disciplinary Core Ideas:

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

Crosscutting Concepts:

- Systems in the natural and designed world have parts that work together.



1-LS1-1 Structure, Function, and Information Processing (Activity 1: Funny Feet Functions)
Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Science and Engineering Practices:

- Use materials to design a device that solves a specific problem or a solution to a specific problem.

Disciplinary Core Ideas:

- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

Crosscutting Concepts:

- The shape and stability of structures of natural and designed objects are related to their function(s).
- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.

2-LS4-1 Interdependent Relationships in Ecosystems (Activity 1: Funny Feet Functions)

Make observations of plants and animals to compare the diversity of life in different habitats.

Science and Engineering Practices:

- Make observations (firsthand or from media) to collect data which can be used to make comparisons.
- Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas:

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

3-LS4-3 Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms (Activity 3: Finding Footprints)

Construct and argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Science and Engineering Practices:

- Construct and argument with evidence.

Disciplinary Core Ideas:



- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

Crosscutting Concepts:

- Cause and effect relationships are routinely identified and used to explain change.

4-LS1-1 Structure, Function, and Information Processing (Activity 1: Funny Feet Functions, Activity 2: Sleuth Tracking, Activity 3: Finding Footprints)

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Science and Engineering Practices:

- Construct an argument with evidence, data, and/or a model.

Disciplinary Core Ideas:

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Crosscutting Concepts:

- A system can be described in terms of its components and their interactions.

UTAH SCIENCE STANDARDS

K-Grade 2

Standard 1 (Activity 1: Funny Feet Functions, Activity 2: Sleuth Tracking, Activity 3: Finding Footprints):

- The Processes of Science, Communication of Science, and the Nature of Science. Students will be able to apply scientific processes, communicate scientific ideas effectively, and understand the nature of science.

Standard 4 (Activity 1: Funny Feet Functions, Activity 2: Sleuth Tracking, Activity 3: Finding Footprints):

- Life Science. Students will gain an understanding of Life Science through the study of changes in organisms over time and the nature of living things.

Grade 3

Standard 2 (Activity 1: Funny Feet Functions, Activity 2: Sleuth Tracking, Activity 3: Finding Footprints):

- Students will understand that organisms depend on living and nonliving things within their environment.

Grade 4

Standard 5 (Activity 3: Finding Footprints):

- Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.



Grade 5

Standard 5 (Activity 1: Funny Feet Functions):

- Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

INTENDED LEARNING OUTCOMES (ILO'S):

1. Use science process and thinking skills.
2. Manifest science interests and attitudes.
3. Understand important science concepts and principles.
4. Communicate effectively using science language and reasoning.
5. Demonstrate awareness of the social and historical aspects of science.
6. Understand the nature of science.