

Footprints and patterns

GRADE LEVEL K - 5th

SUBJECTS Life Sciences; Patterns

DURATION Prep time: 10 minutes; Activity time: 40 minutes

SETTING Classroom and Schoolyard

OBJECTIVES

In this lesson, students will:

1. create footprint patterns by walking, running and jumping;
2. compare the footprints created by different types of movement;
3. observe animal tracks;
4. hypothesize a story based on animal footprints; and
5. work in pairs to create a map that tells a graphic story about animals' interactions by focusing on the movement and behaviors the animals exhibit before, during, and after contact.

MATERIALS

- Cookie sheets (one for each group of 3-4 students)
- Two-liter bottles (or other containers) filled with water
- Chalk
- Images of animal tracks
- Three panel "mystery footprint" images
- Sets of animal pairings (one classroom set)
- Printouts of animal footprint silhouettes
- Long pieces of white craft paper
- Black construction paper
- Pencils
- Scissors
- Ink pads of varying colors
- Cardboard
- Sticky-back foam
- Glue sticks
- Newsprint or scratch paper

VOCABULARY

- » **Footprint:** impression or image left behind by a foot or paw
- » **Animal tracks:** series of footprints left behind in soil, snow, mud, sand or other surfaces
- » **Patterns:** any natural or manmade form or event that exists or occurs in a repeating and predictable way
- » **Movement:** a change in place or position.
- » **Interaction:** reciprocal action, effect, or influence.
- » **Silhouette:** a picture of something showing only its outline as a dark shape on a light background.
- » **Printing:** making a copy by impressing paper against an inked printing surface.
- » **Stamp:** a device or tool that is used to mark something (such as a piece of paper) with a design, pattern, word, etc.
- » **Repetition:** the act of doing something over and over again.

BACKGROUND FOR EDUCATORS

Patterns are found throughout the manmade and natural worlds and can be observed by all five senses. Manmade patterns include clothing prints, floor tiles, musical sounds, and dance steps. Natural patterns include snowflakes, bubbles, leaves, waves, and animal tracks. By learning to interpret animal tracks and footprints, students can uncover shapes and patterns in nature.

TEACHER PREP

1. Gather cookie sheets and water.
2. Print out images of animal tracks or load them in a PowerPoint presentation (a great place to find images of tracks is http://commons.wikimedia.org/wiki/Main_Page; try searching "animal tracks" or "animal footprints").
3. Print out images of "mystery footprints" or load them in a PowerPoint presentation.



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PROCEDURE

Part One: Making Tracks

1. Split students into groups of three to four and head out to the playground.
2. Tell each group to choose an area of the playground to work in; each group will need an area large enough for its members to walk approximately 10 steps straight ahead several times without the steps overlapping.
3. Give each group a cookie sheet to place on the ground and fill it with water.
4. Have one student from each group step gently into the water and walk 10 steps.
5. Have someone in the group follow behind and circle the footprints with chalk.
6. Repeat steps d-e, but have students run, skip, hop, and/or jump instead of walking. Do not allow the new footprints to overlap the previous sets.
7. Dump out the water, gather up the cookie sheets, and head back to the classroom.
8. As a class, discuss the differences between tracks created by walking, running, skipping, and jumping. How did they look similar? How did they appear different? How did running, jumping, or skipping compare between the groups? Did all the footprints look the same? What does the spacing between footprints tell us about speed?

Part Two: Animal Tracks

1. Gather images of animal tracks. Give each group of students one or two images of tracks.
2. Have the groups discuss among themselves what they think is happening in each image. In what direction is the animal going? How fast is it moving? How can they tell?
3. Come back together as a class and have students share what they saw in their images. What do they think is happening? What might happen next?

Part Three: Mystery Footprints

1. Show students the first panel of the “mystery footprints” image.
2. Have students make observations. Which direction are the tracks going? How far apart are the footprints?
3. Have students hypothesize what is happening and what

will happen next.

4. Repeat steps a-c for the second and third panels.
5. Ask a student if what they thought was going to happen actually did happen. (In the story do the students think the animal was eaten or that it flew away?)

Part Four: Making Art: Tracks, Stamps, and Maps

1. Have each student select a pair of animals from the set and allow them time to brainstorm (through sketching or writing) what will happen between the two animals they have selected. The story should highlight what happens before, during, and after contact between the two.
2. Each artist will then create a stamp using a pencil, sticky-back foam, and cardboard. Students may want to reference the footprint silhouettes of the animals they are representing while creating their stamps.
3. Using pencils, students can draw the animal print directly onto a piece of sticky-back foam. Encourage them to focus on the shapes and lines they see in the animal tracks.
4. Once the animal footprint has been drawn they can cut it out, peel the adhesive off the foam and stick the animal track to a piece of cardboard, which acts as the foundation and backing for the stamp.
5. To complement the animal tracks students also can cut out shapes from black construction paper that might be relevant to the story line (e.g., to illustrate environmental features for an interaction that takes place on a mountain or near a river). The silhouettes of these objects can be glued directly onto the craft paper.
6. Once students have decided on the placement of these objects and have glued them down they can begin printing their animal tracks using their handmade stamps and inkpads. Their tracks should be able to communicate the narrative they brainstormed at the start of the activity.
7. Once artists have finished, they can let their maps dry and prepare for a gallery walk or group sharing activity.

WRAP UP

Discuss with your students: What patterns do we see in footprints? What do these patterns tell us? (Repeated footprints form tracks. Tracks can tell us how fast the animal was moving and where it was going. Tracks can provide clues



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to a narrative, but we must make a hypothesis about what happened.)

EXTENSIONS

For younger artists, the animal track stamps can be prepared ahead of time. Encourage artists to tell you the shapes they see as part of the print and perhaps even do a sketch. Then teachers can create the stamps for the artist and help them with the stamping process.

Once artists have completed their maps, pairs can share information about their animal and slowly reveal portions of their maps as other students attempt to decipher what is happening based on the prints they see, and what they think will happen next.

Artists also can develop a story that is written, sketched, or shared with the class around what happens next in their story line between the two animals.

REFERENCES

Achieve Inc. Next Generation Science Standards (2013). www.nextgenscience.org/next-generation-science-standards.

R. Curtis. Outdoor action guide to animal tracking. Retrieved January 4, 2013 from <http://www.princeton.edu/~oa/nature/tracking.shtml>.

P. Rezendes, Tracking and the Art of Seeing: How to Read Animal Tracks and Signs. Charlotte, VT: Camden House Publishing Inc., 1992.

I. Sheldon, Animal Tracks of Northern California. Auburn, WA, Lone Pine, 1998.

Patterns in Art and Science

The *Framework for K-12 Science Education* identifies **patterns** as one of the seven cross-cutting concepts of the Next Generation Science Standards. These concepts are described as bridging disciplinary boundaries and holding value across all the sciences as well as in engineering. Meanwhile, **patterns** are also a key concept across the spheres of art education, appearing in California's *Visual and Performing Arts Content Standards* in the contexts of visual arts, dance, and music.

Whether patterns are encountered in art, science, math, history, or everyday life, we can approach them with a few consistent processes. These steps can help students understand and give meaning to patterns of any kind.

recognize	students can: <ul style="list-style-type: none">• recognize simple patterns found in the environment and works of art;• identify patterns in the natural and designed worlds
describe	students can: <ul style="list-style-type: none">• describe repeated patterns in nature, in the environment, and in works of art;• use observations to describe patterns
interpret	students can: <ul style="list-style-type: none">• interpret rhythm and movement in works of art and the environment;• use similarities and differences in patterns to sort, classify, and analyze natural phenomena
predict	students can: <ul style="list-style-type: none">• formulate questions and predict reasonable outcomes based on patterns

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STANDARDS ADDRESSED

Next Generation Science Standards

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
This activity does not directly address any Science and Engineering Practices.	LS1.A: Structure and Function 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. (1-LS1-1)	Patterns K-2: Patterns in the natural world can be observed, used to describe phenomena, and use as evidence. 3-5: Patterns of change can be used to make predictions. Patterns can be used as evidence to support an explanation.

Common Core State Standards

Reading Standards for Literature

Kindergarten

3. With prompting and support, identify characters, settings, and major events in a story.
7. With prompting and support, describe the relationship between illustrations and the story in which they appear (e.g., what moment in the story an illustration depicts).

Grade 1

3. Describe characters, settings, and major events in a story, using key details.
7. Use illustrations and details in a story to describe its characters, settings, or events.

Grade 2

3. Describe how characters in a story respond to major events and challenges.
5. Describe the overall structure of a story, including describing how the beginning introduces the story and the ending concludes the action.

Grade 3

3. Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.

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Writing Standards

Kindergarten

3. Use a combination of drawing, dictating and writing to narrate a single event or several loosely linked events, tell about the events in the order they occurred, and provide a reaction to what happened.

Grade 1

3. Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened use temporal words to signal event order, and provide some sense of closure.

Grade 2

3. Write narratives in which they recount a well-elaborated event or short sequence of events, include details to describe actions, thoughts, and feelings, use temporal words to signal event order, and provide a sense of closure.

Grade 3

Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

- a. Establish a situation and introduce a narrator and/ or characters; organize an event sequence that unfolds naturally.
- b. Use dialogue and descriptions of actions, thoughts, and feelings to develop experiences and events or show the response of characters to situations.
- c. Use temporal words and phrases to signal event order.
- d. Provide a sense of closure.

Speaking and Listening Standards

Kindergarten, Grades 1, 2, and 3

1. Participate in collaborative conversations with diverse partners about kindergarten / grade 1 / grade 2 / grade 3 topics and texts with peers and adults in small and larger groups.

Kindergarten

5. Add drawings or other visual displays to descriptions as desired to provide additional detail.

Grade 1

5. Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Grade 2

5. Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.



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VISUAL AND PERFORMING ARTS CONTENT STANDARDS

Pre-K

Creating

Cr1.2PKa Engage in self directed, creative making.

Cr2.1PKa Use a variety of art making tools

Cr2.2PKa Share materials with others.

Cr3.1PKa Share and talk about personal artwork.

Responding

Re8.1PKa Interpret art by identifying and describing subject matter.

Kindergarten

Cr1.2Ka Engage collaboratively in creative art making in response to an artistic problem.

Cr2.3Ka Create art that represents natural and constructed environments.

Responding

Re7.2.Ka Describe what an image represents.

Re8.1.Ka Interpret art by identifying subject matter and describing relevant details.

Grade 1

Creating

Cr1.2.1a Use observation and investigation in preparation for making a work of art.

Grade 2

Creating

Cr1.1.2a Brainstorm collaboratively multiple approaches to an art or design problem.

Cr3.1.2a Discuss and reflect with peers about choices made in creating artwork.

Grade 3

Creating

Cr1.1.3a Elaborate on an imaginative idea.

Cr2.1.3a Create personally satisfying artwork using a variety of artistic processes and materials.

Responding

Re7.2.3a Determine messages communicated by an image.

