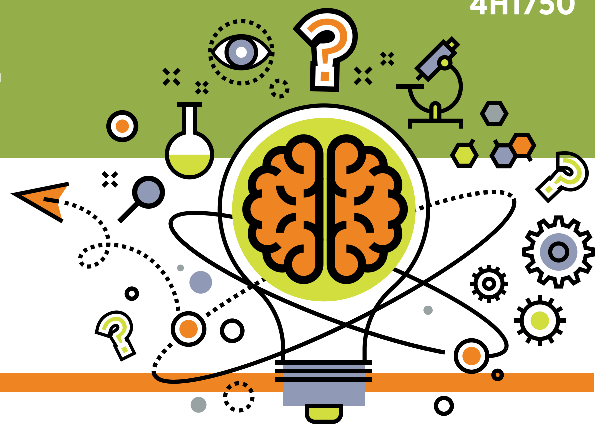
4H1750

TEACHING SCIENCE
...when you don’t know diddly-squat



Why are animals’ feet different?

Purpose:

The purpose is **not** to teach specific content, but to teach the process of science – asking questions and discovering answers. This activity encourages young people to try to figure things out for themselves rather than just read an answer on the internet or in a book. As a leader, try not to express your opinion, but let the youth engage in arguments based on evidence.

Time required:

20 minutes or multiple days depending on the interest and questions the youth have

Materials:

- ❑ Balloons
- ❑ Masking or first-aid tape
- ❑ Flip-flops
- ❑ Scrap cardboard
- ❑ Flippers or swim fins (optional)
- ❑ Toe spacers or separators (as used in pedicures)
- ❑ Materials for an obstacle course (be creative; examples include a two-by-four to use as a balance beam, bricks or stepping stones, tires or hula-hoops to step in and out of, logs to step over, mud)
- ❑ A safe place to walk barefoot

Note: Before beginning, talk to the participants about safety. They should have fun while learning, but trying to rush with unsure footing could lead to a fall or a twisted ankle.

SCIENCE PRACTICE: Asking questions and defining problems

1. Ask: *Are animal feet different from human feet? How are they different? Do you think animals’ feet give them any advantages or disadvantages as compared to human feet? How and why are chicken feet different from duck feet? How and why are horse feet different from cow feet?*

SCIENCE PRACTICE: Developing and using models

2. *Could you modify your own feet to make them more like animal feet?* Tape a balloon under each heel so you are walking more on your toes. (Horses essentially walk on a single toe, similar to the balloon taped under the heel.) *What will happen if you tape toes together?* (Cattle, pigs, sheep and goats also walk more on their toes, but they have two toes. Tape the participants’ toes together in two groups. Then put a balloon under each heel.) Some animal toes are spaced apart more than ours are. Place toe spacers turned upside down between each toe on both of your feet. *How does that affect your walking?* (Chickens and other birds have splayed toes, like with the toe spacer.) *How might flip-flops or flippers be more like animal feet?* (Ducks have webbed feet like the flippers.) *What will happen if you tape a piece of cardboard larger than the flip-flops to the bottom of the flip-flops?* (Some animals have broad feet for walking in snow or mud, like rabbits.) *What are the limitations of these models? Is there anything you can do to make them more accurate to be more like an animal foot?*

SCIENCE PRACTICE: Planning and carrying out investigations

3. Set up an obstacle course with various objects as described under “Materials.” Participants go through the course with different types of feet and observe how it affects their balance, speed and coordination.

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SCIENCE PRACTICE:
Engaging in argument from evidence

4. *Do you think any feet are better than others for speed, stability or quick turning? Why do you think certain animals have certain feet? Are there animals that live in the same habitat that have totally different feet? Why or why not?*

SCIENCE PRACTICE:
Constructing explanations and designing solutions

5. *Based on what you observed, is there anything you could do to make better shoes? Would you use different shoes for running on trails than you would for running on a track? Should a shoe for a marathon runner be different from a shoe for a sprinter? Why or why not? Would a shoe for a basketball player be different from a shoe for a football player? Why or why not? Could you design better prosthetic feet?* (Explain that **prostheses** are artificial devices that replace missing parts of the body.)

SCIENCE PRACTICE:
Obtaining, evaluating, and communicating information

6. *Could you predict where an animal lives by looking at its feet? Would this be helpful information to share with sports team coaches? Would it be helpful for physical therapists? Why or why not?*

Science & Engineering Practices:

These eight Science and Engineering Practices come from *A Framework for K–12 Science Education* (National Research Council, 2012, p. 42). These research-based best practices for engaging youth in science are connected to in-school science standards that all children must meet.

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Reference

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.

You do not need all the answers to teach science. You simply need an inquisitive mind and to be willing to carry out an investigation.