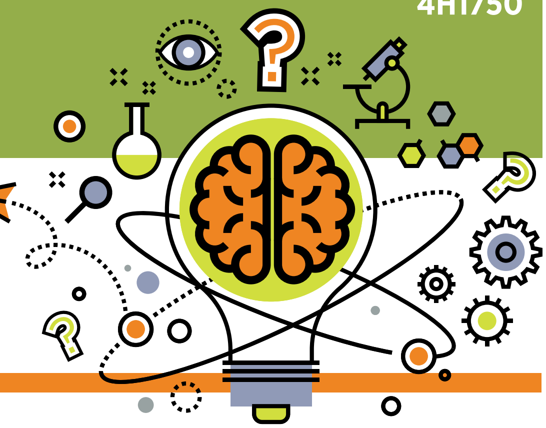
4H1750

TEACHING SCIENCE

...when you don't know diddly-squat



Can you see a pumpkin in the dark?

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:

- ❏ Pumpkin
- ❏ Flashlight
- ❏ Ruler
- ❏ Other objects

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SCIENCE PRACTICE: Asking questions and defining problems

1. Ask: *Can you see a pumpkin in the dark? Do you need light to see? How much light do you need to see? How can you test these questions?*

2. Imagine you are sitting in a room with a pumpkin and the lights go out. There is no light coming in around the door or through windows. *Can you see the pumpkin on the table? Can you see it after your eyes adjust to the dark? Can you see the shape but not the color?*

SCIENCE PRACTICE: Planning and carrying out investigations

3. Help youth test their hypotheses by finding a location where light can be easily blocked such as an interior room with no windows or a closet. Eliminate all light, block cracks under the door and make sure there are no electronic devices with lights.

4. Place the pumpkin in the room, turn on the flashlight, and then turn out the lights. Make sure all light is blocked and then turn off the flashlight. Allow time for everyone's eyes to adjust, and then ask what they see.

5. Next, slowly allow small increments of light to enter the room until everyone can see the pumpkin. If possible, try recording the amount of light entering the room indirectly by measuring the size of the opening allowing in the light. For example, you can measure how much you open the door or how much of the flashlight lens you uncover.

6. Next, use other objects. Repeat at least three times with each object. Record the opening size at the point the first person can see the object as well as the point everyone can see the object.

SCIENCE PRACTICE:
Using mathematics and computational thinking

7. Create a chart like the following.

When We Can See in Low Light

Object	Opening size when first person can see the object				Opening size when everyone can see the object			
	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
Pumpkin								
Toy Car								
T-shirt								

SCIENCE PRACTICE:
Analyzing and interpreting data

8. *Are some people better at seeing in low light than others? Older or younger people? Males or females? Are some items easier to see in low light?*

SCIENCE PRACTICE:
Constructing explanations and designing solutions

9. *Based on what you observed, can you see in the absolute dark?* (No)

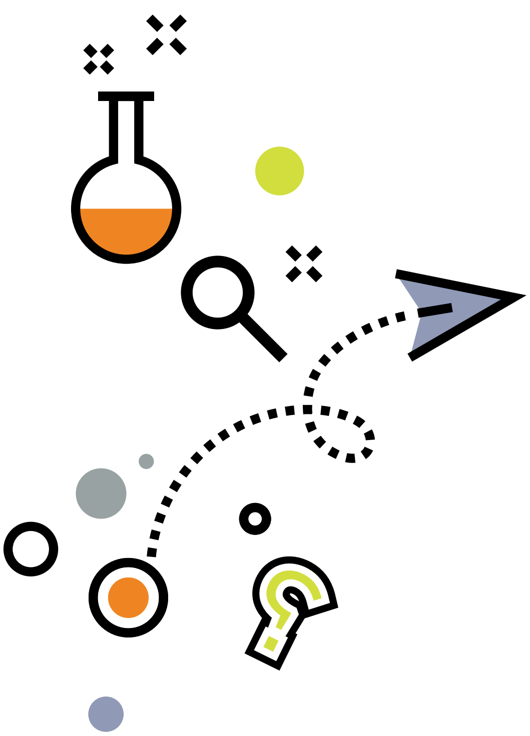
SCIENCE PRACTICE:
Engaging in argument from evidence

10. *Are some items easier to see in low light? When might this be important information to know? Can some people see easier in low light? When might this be important to know? Are there any careers where seeing in low light might be helpful?*

SCIENCE PRACTICE:
Obtaining, evaluating, and communicating information

11. Help youth discuss and summarize what they learned about seeing in the dark and record additional questions youth have because of this activity.

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.



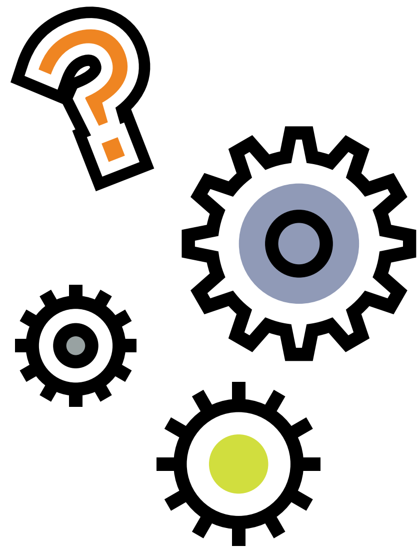
Other thoughts:

- *Did you see colors in low light? What colors do you see easier in low light? What colors are more difficult to see?*
- *Do you think some animals can see better in low light? What adaptations do they have? Bigger eyes? Different-shaped eyes?*
- *What do you think happens to your eyes in low light?*
- *Do you think there are any locations in nature with absolutely no light? Where? Do animals that exist in no light situations have different adaptations?*

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.