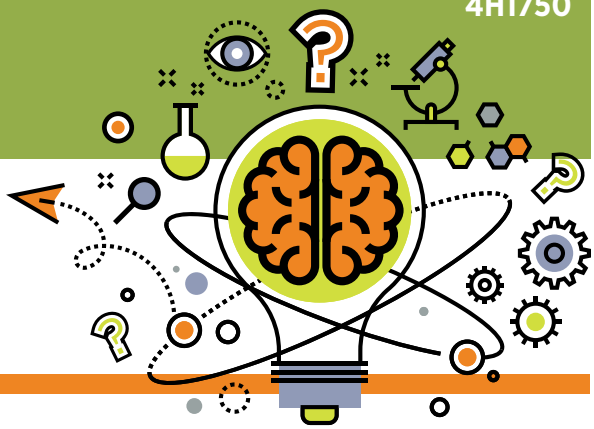
# TEACHING SCIENCE

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



# How can my sled go the fastest?

## 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:

- ❑ Sled (or a variety of sleds, also might try cardboard, garbage bags)
- ❑ Various lubricants for the sled (wax, vegetable oil, water, soap) (optional)
- ❑ A safe sledding hill with snow on it
- ❑ Stopwatch (or timer app for a smartphone)
- ❑ Bathroom scale (optional)

*SCIENCE PRACTICE:*
**Asking questions and defining problems**

1. *How can you make your sled go the fastest?* Ask youth to predict what they think will make the biggest difference in speed.

*SCIENCE PRACTICE:*
**Planning and carrying out investigations**

2. Have youth try multiple ways of sledding down the hill and see what makes the most difference on time. Create a "finish line" in the snow. Ask youth to predict before they head down if it will make the sled go faster or slower. Use the timer to measure how fast each trip is.

3. Try these variations:

   a. Weight: *Does the weight on the sled determine the speed of the sled? Why might that be?* Try sending down the sled with nobody and see how that changes things.

   b. Position on the sled: *If you lean forward or backward on the sled, do you go faster? Why? What about sitting up compared to lying down? What about on your belly versus on your back? Does going backward change anything?*

   c. Material of sled: Sleds can be made of all sorts of materials: plastic, cardboard, metal or wood. *How do you think the type of material the sled is made of changes the speed? Why?*

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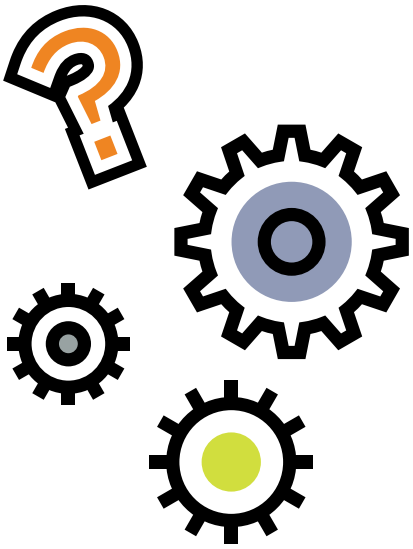
You do not need all the answers to teach science. You simply need an inquisitive mind and to be willing to carry out an investigation.



d. Shape of sled: Sleds have many different shapes. *Does the shape of the sled contribute to the speed? Do runners or ridges on the bottom of the sled affect the speed?*

e. Changing the bottom: *Can you make the sled even slipperier?* Try putting soap, vegetable oil, wax or other substances on the bottom of your sled. *Does this make the sled go faster? Why or why not?*

*SCIENCE PRACTICE:*
**Using mathematics and computational thinking**

4. Create a chart showing sled speeds and variations. See the one following for an example:

| Driver | Sled | Variation | Time | Other notes |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

*SCIENCE PRACTICE:*
**Analyzing and interpreting data**

5. *Do you think you should run several trials of the same variation? Why or why not? How many times might you need to run to be assured of your conclusions?*

*SCIENCE PRACTICE:*
**Developing and using models**

6. *Can you predict how fast someone will go sledding based on their weight? If you know the type of sled and other variations, can you predict the speed?*

*SCIENCE PRACTICE:*
**Constructing explanations and designing solutions**

7. *Based on what you observed, how would you make the "perfect" sled? If you increase speed, does that affect the ability to steer?*

8. *Based on what you observed, would you make any changes to the sledding hill?*

*SCIENCE PRACTICE:*
**Engaging in argument from evidence**

9. *What variations made the most impact on speed? Why do you say that?*

## Other thoughts:

- *If you sprinkle water on your sledding run overnight and let it freeze, what impact will that have on your speed?*
- *If you go sledding on different days, do you think the differences in outside temperature will affect the sled speed?*
- *Do you think going on the same track multiple times affects your outcome? How? Could you correct for that?*
- Contact the local 4-H horse program and ask to use their speed timers for measuring speed.

## 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

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