# TEACHING SCIENCE

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

# What thread is the strongest?

## 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 argument based on evidence.

## Time required:

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

## Materials:

- ❏ Several different types of thread (as based on thickness, materials, purpose)
- ❏ Scale
- ❏ Bucket with a handle
- ❏ Measuring cups
- ❏ Water
- ❏ A place to suspend a bucket such as a stepladder or swing set

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

1. *What thread is the strongest? Why might you want a strong piece of thread? What might make one thread stronger than others? Can you look at a piece of thread and determine how strong it is?* Examine the different types of thread and make a prediction on which one is the strongest.

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

2. Use the thread to tie an empty bucket and suspend it in the air. (Hopefully, the thread can at least hold the weight of the bucket.) Measure the weight of one cup of water. Add the water, one cup at a time, until the thread breaks. *Should you add the water slowly or quickly? Why? Do you think the thread will stretch before it breaks?* Note: When the thread breaks, water may spill. Take that into consideration when you set up the experiment.

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

3. Create a chart like the following one:

**Thread Comparisons**

| Thread type | Number of cups of water added before thread broke | Weight of one cup of water | Total weight held (weight of one cup of water times number of cups) | Notes |
|---|---|---|---|---|
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*SCIENCE PRACTICE:*
**Analyzing and interpreting data**

4. *What type of thread held the most weight?*

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

5. *Why do you think that thread was the strongest?*

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

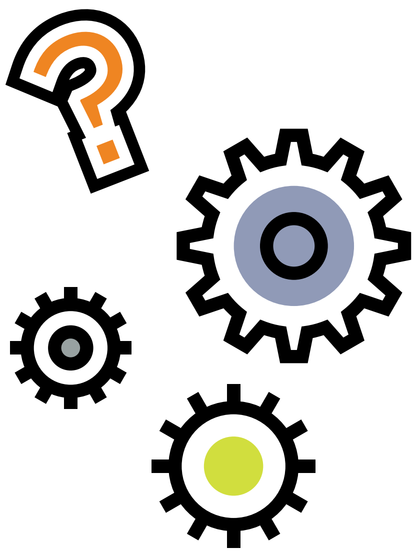
6. *Based on what you observed, what makes thread stronger? What kind of material makes the strongest thread? Why do you think that?*

7. *What thread would you use in your clothing? Would you use the same thread in all types of clothing? Why? Would you use a different thread for other applications, such as making a necklace? Why or why not? What thread would be best for cross-stitch and other methods of embroidery?*

*SCIENCE PRACTICE:*
**Obtaining, evaluating, and communicating information**

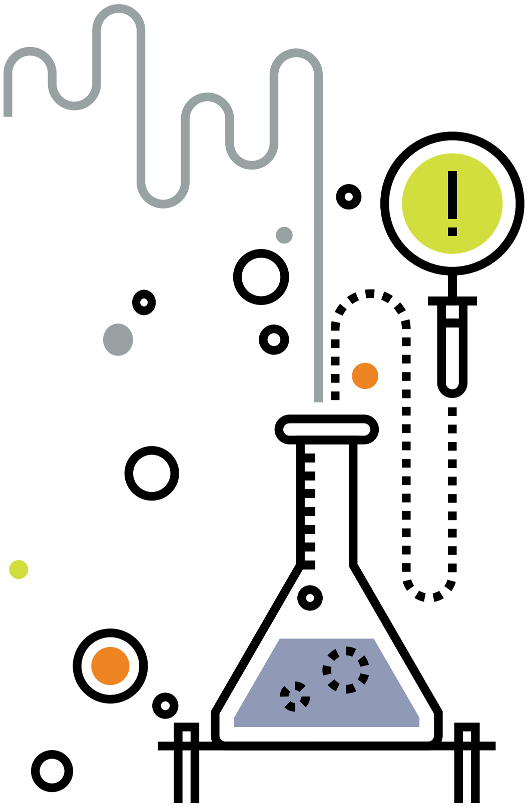
8. *Would it be helpful to share this information with people you know who sew? Should you share this information with stores that sell thread? What would you tell them?*

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:

- *Do you think the threads might perform differently if they were wet? How about in a cold or hot environment?*
- *Do you think the age of the thread makes a difference?*
- *Where did the thread break? Was it closer to the bucket, closer to where it was tied up, or right in the middle? Why do you think that was?*
- *How might it change your results if you doubled up the thread?*
- *Could this be repeated with fabrics? Or yarn?*
- *Does the knot you use make a difference for how much the thread can hold?*



## 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*. National Academies Press.