TEACHING SCIENCE

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

Why is a hammer shaped like a hammer?

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:

- ❑ Safety goggles
- ❑ First-aid kit
- ❑ Scrap wood to pound nails into
- ❑ Various hammers of different shapes and sizes (claw hammers, ball peen, sledge hammers, rubber mallets, rawhide mallets, wooden mallets)
- ❑ Other objects that could be used to hammer nails (rocks, bricks, logs, old shoes, wrench)
- ❑ Nails (large head nails that are shorter than the thickness of your wood)
- ❑ Weighing scale

Photo © istock.com/nine_far

SCIENCE PRACTICE: Asking questions and defining problems

1. Almost everyone has used a hammer. They are so commonplace that some people might take for granted their usefulness. *Are hammers the best things for putting nails into wood? Why? What about their shape is useful? How do you measure how effective a hammer is? Could they be made any better? Does the handle matter, or just the head?*

SCIENCE PRACTICE: Planning and carrying out investigations

2. Let the youth use different hammers and other objects to pound nails into the wood. Track how many hits the different "hammers" take to pound in a nail completely to the head (Table 1). *How many times did you miss the nail? Did you bend the nail or put it in straight?*

Table 1. Hammer Results

	Hits to pound the nail into the head	Misses	Finger hits
Hammer 1	8	3	1
Hammer 2			
Hammer 3			

SCIENCE PRACTICE: Analyzing and interpreting data

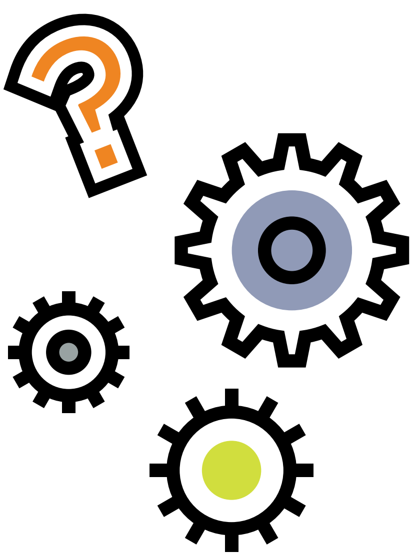
3. *Which hammer pounded in the nail with the fewest hits? Why? What made a difference? Weight? Shape? Does the person doing the hammering make a difference?*

SCIENCE PRACTICE: Using mathematics and computational thinking

4. Youth can graph the number of hits on a bar graph to show which hammer worked the best. They can also graph the number of times someone hit their fingers or missed the nail (Table 2).

Table 2. Hammer 1 Data

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.



SCIENCE PRACTICE:
Constructing explanations and designing solutions

5. *Could you design a better hammer based on your experiment? What would you do differently? Did anyone hit their fingers with a hammer? Are there ways to design a safer hammer? Could nails be designed better?*

Other thoughts:

- *Do you think hammers have changed their design over time?*
- *Can you pound a nail into wood in just one hit?*

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.

MICHIGAN STATE UNIVERSITY | Extension