

## Hands-on Activity: Invent a Backscratcher from Everyday Materials

### Quick Look

**Grade Level:** 1 (K-2)

**Time Required:** 45 minutes

**Expendable Cost/Group:** US \$0.00

**Group Size:** 2

**Activity Dependency:** None

**Subject Areas:** Science and Technology

### Summary

Being able to recognize a problem and design a potential solution is the first step in the development of new and useful products. In this activity, students create devices to get "that pesky itch in the center of your back." Once the idea is thought through, students produce design schematics (sketches). They are given a variety of everyday materials and recyclables, from which they prototype their back-scratching devices.

*This engineering curriculum aligns to Next Generation Science Standards (NGSS).*

### Engineering Connection

When engineers design products, they must make sure that they meet the desired functions, as well as consider other important aspects of the designs for the users. Beyond being functional, in many cases the product must also be easy or comfortable to use, and aesthetically pleasing. Engineers also take into consideration material and labor costs, durability to withstand intended use, and efficient material use in manufacturing.



Students make their own backscratchers

### Learning Objectives

- How to use creativity and everyday materials to build something useful.
- How to utilize designs and sketches in creating a product.

### Educational Standards

- NGSS: Next Generation Science Standards - Science
- International Technology and Engineering Educators Association - Technology
- State Standards

## Materials List

- tape
- string
- scrap cardboard
- paper towel tubes
- scissors
- glue
- any other materials you wish to use; students may also bring supplies from home

## Worksheets and Attachments

Student Worksheet (doc)

Student Worksheet (pdf)

Visit [[www.teachengineering.org/activities/view/invent\\_a\\_backscratcher](http://www.teachengineering.org/activities/view/invent_a_backscratcher)] to print or download.

## Introduction/Motivation

Engineers are constantly using their creativity to find solutions to everyday problems. To solve a problem, you must first recognize that the problem exists. For example, have you ever had a pesky itch on your back that you just could not reach? Typically, when you have an itch on your body, your first reaction is to scratch it with your fingernails. However, this itch is an unreachable itch and no one is around to scratch it for you. What do you do? As an engineer, you use your creativity and the materials around you to come up with different solutions and design a backscratcher. What types of materials would you want to use for the backscratcher and why?

## Procedure

### Recommended Background Resources

- Nice demonstration about balancing a mobile (levers): <http://www.vectorpark.com/levers.html>
- Examples of different types of levers and description of lever, fulcrum, load, effort: <http://www.reachoutmichigan.org>
- Short description of different lever classes with real-world examples: <https://inventorsoftomorrow.com/2016/10/12/levers-2/>

### Before the Activity

- Gather materials.
- (optional) Build a backscratcher as an example to show the students.
- Have students bring in any backscratchers they might have at home to show.

### With the Students

#### Class Discussion:

1. Ask the students: Why is it hard to scratch your back?
2. Discuss why new products are made and innovations take place. (They solve a problem or fill a need.)
3. Have students show example backscratchers they brought in from home.
4. Discuss what a backscratcher is and why it is a useful device or tool.
5. Talk about formulating an idea and sketching a picture before construction.
6. Talk about what makes a good sketch. Why are plans/sketches an important step in the design process?

7. Point out how there is more than one way to make a backscratcher. (Bring up different brand names of the same product.)

**Activity:**

1. Prepare a station with the materials available for students to use.
2. Have students work alone or in pairs.
3. Talk about safety; do not eat the glue, careful with scissors, etc.
4. Introduce the activity to the students and let them examine the materials, brainstorm for ideas and sketch designs. Have the students explain their sketches to you before they start construction. Tell the students that they may use as much or as little of the materials available.
5. Once students have completed their backscratchers, have them lay them out on a table so that everyone in the class can see each design. Encourage them to try out the different backscratchers, but remind them to be respectful of everyone's inventions.
6. After everyone has tested the designs, have the class decide which of the backscratchers is the most useful and explain what features they liked about it.

## Vocabulary/Definitions

**Lever:** A simple machine that utilizes a ridged bar and a fulcrum (pivot point) to raise or move an object.

**Sketch:** A rough drawing or plan of an idea.

## Assessment

- Rubric for Performance Assessment (doc)
- Rubric for Performance Assessment (pdf)

## Investigating Questions

- What materials were the best to use for this project?
- What would you have done differently?
- What other materials could have worked?
- What is a good design for a backscratcher?

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## Supporting Program

Center for Engineering Education Outreach, Tufts University

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