Engineering Bandages

Learning Objectives

- Students will learn the history of bandages and the two main parts of adhesive bandages.
- Students will explore what makes an effective bandage by looking at different shapes and materials used.

Activity Overview

- Students will design and create a bandage that can stay clean from dirt.

Standards Addressed

- ***SC.3.P.8.3*** – Compare materials and objects according to properties such as size, shape, color, texture, and hardness.
- ***SC.3.N.1.3***- Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.

Materials

Item	Quantity Needed	Notes
Craft Foam	12	*To make model cut cuffs*
Masking tape	2 rolls	
Soil	1 cup	*For testing*
Aluminum trays	2	*For testing*
Clear tape	1 roll	
Gauze	1 roll	
Painter's tape	1 roll	
Aluminum foil	24 sheets	*2" x 2"*
Cheesecloth	24 sheets	*2" x 2"*
Cotton balls	1 bag	
Cotton fabric	24 sheets	*2" x 2"*
Scissors	1 per group	*As needed*
Dish soap	1 bottle	*Fake blood, for testing*

Preparation

- Create a model cut cuffs for each pair of students:
- Cut 2 pieces of craft foam: a 1.5" x 7" strip and a 1" x 2" piece.
- Fold the larger strip of foam in half to help cut a 1 inch slit in the middle of the strip.
- Place the smaller piece of foam over the slit and secure it with tape.

- Curve the strip around your hand to find an approximate size. Staple the strip to form a loop that can fit over a child's hand.
- Set up a testing station by pouring about ½ cup of soil into 2 aluminum trays.

Science Content

Bandages are an important first-aid technology used to dress and protect wounds. Initially bandages were handmade. The first adhesive bandage, Band-Aid, was invented in 1920 by Johnson and Johnson. The adhesive in the new design allowed people to dress their own wounds without assistance. Today, adhesive bandages are used by people worldwide. An adhesive bandage typically includes two key components: the **adhesive** and **pad**.

Innovations in the design of the adhesive have led to bandages that are waterproof, designed for sensitive skin, and produced in a range of shapes and sizes to fit various body parts. The pad of a bandage has changed much less. Usually, a sterile piece of gauze that absorbs fluids and keeps the wound clean.

Source: https://yesinfo.mos.org/yes-bandages

Facilitation Guide

Engage (10 minutes)

1. Introduce the activity by showing the students different bange types. Why do you think there are so many bandage designs?
2. Ask the following questions:
   - What parts of the bandage help keep the dirt out? *The pad covers the cut so dirt won't get in, and the sticky parts help make sure dirt can't get underneath.*
   - Do you think the size of the pad or adhesive part matters? Why or why not? *The bigger the bandage, the better; a big pad can cover a big cut and a lot of adhesive sides so the bandage stays on.*
3. Show the students a model cut cuff and demonstrate how the cuff fits over your hand. The side with the cut should be on the palm. Explain that they will use this model when testing their bandage designs by applying their bandage to the model cut and testing how well it works.

4. Tell the students that they will design and create a bandage that can keep the cut clean from dirt. Show students the materials at the supply table.

Activity (30 minutes)

1. Have students pair up and let them plan with their partner what their bandage will look like and what materials they will use. Before students can start creating their bandage, they first must get approval by the facilitator but showing them their design and what materials they want to use.
2. Once their plan has been approved, hand out a cut cuff and dismiss them to gather their materials.
3. Circulate around the room as students create their design.
    - How are you helping each other create your bandage?
    - Have you made any changes to your initial plan? If so, what did you change and why?
    - What do you think will happen when you test your bandage and why?
4. After about 15 minutes of creating, have students test their design. Call 2 pairs up at a time to test.
    - Have a student put on the cut cuff and insert a dropper full of "blood" (dish soap) into the cut.
    - Have students apply the bandage onto the cut cuff.
    - Students will place their palm with the bandage into the soil. Move it around for 10 seconds.
    - Carefully take the bandage off to inspect the cut for dirt.
5. Allow students about 7-10 minutes to improve their designs. Circulate around the room to check in on pairs.
    - What parts of your initial design worked well?
    - How are you improving your design?
6. Test again using the same procedures as above.

Reflect (10 minutes)

1. How did you work together to improve your bandage designs?
2. What do successful bandage designs have in common?
3. Why is protecting a cut from dirt important?

Ideas for Extension or Adaptation

- Give some additional testing stations to evaluate the effectiveness of the bandage design:
    - Have students make a tower out of stacked cups or do jumping jacks to see if any "blood" leaks from the bandage.