

Get A Grip!

Objective: To model the problems spacewalkers have when doing jobs that involve finger dexterity and to look for solutions to the problems.

Standards:

Science Content Standards

Motions and forces

Universals of Technology

Physical Systems

Linkages

Utilizing Technological Systems

Materials (one set for the class):

- 2 soft drink bottles (2-liter size) with caps
- Duct tape
- Scissors
- Heavy duty (rubber-coated) work gloves

Background:

The greatest challenge in making space suits flexible is to construct flexible gloves. When a spacesuit is pressurized, the glove fingers tend to pop out and become stiff. Although it is possible for the astronaut inside to bend the fingers to grab things, fingers get very tired in time, causing the astronaut's efficiency to diminish.

In this activity, students will don heavy-duty rubber-coated work gloves and try to join two 2 liter soft drink bottles together. The caps of the bottles are fastened together with duct tape. The object is to then connect the bottles to each other. This activity gives students experience with large and small objects at the same time.

At the completion of the activity, discuss with your students their observation of the problems they encountered trying to join the bottles together. Ask them to come up with ideas on how the problems could be solved.

Procedure:

1. Remove the caps from two empty 2-liter bottles. Tape the caps together with duct tape so that the screw ends point outward in opposite directions.
2. Have a student put on heavy work gloves and try to assemble the two bottles and the joined caps into a single structure. Also have the student try the job without gloves. Which assembly operation was easier? Which one took less time?

Extensions:

- Obtain a pair of rubber surgical gloves and inflate and tie them. What happens to the fingers and palms of the gloves? Ask students to come up with ways to make the gloves flexible. Test the ideas on the surgical gloves.
- Play games of skill with and without gloves. Compare completion times. Do students improve their scores with practice?

