

Pre-Show

LIFE IN SPACE

ABOUT THE SHOW

To boldly go where no man has gone before...well, actually, we have been venturing into space since the late 1950's. Along the way, we have experienced the special challenges and opportunities of space travel. In this show, we discuss the force of gravity and use Newton's third law of motion to launch a rocket. Once in space, we learn about freefall and microgravity. As we orbit, we explain how satellites help the spacecraft communicate with mission control. We will enlist a student to do some work in a simulated microgravity environment. We will discuss the many functions of the space suit, and we'll even let one lucky volunteer try on "The World's Cheapest Space Suit."

We have provided the following activities to help students preview some of the major concepts covered in our show. Please remember to use appropriate safety measures for all activities. Adults should always supervise students during experiments.

**Thank you for scheduling a Franklin Institute
Traveling Science Show.
We are excited to visit you soon!**



BE AN ASTRONAUT!

FOR GRADES 1-4

Space is a very different environment than what we are used to, and that makes it difficult to accomplish simple tasks. In these simulations, students will experience some of the obstacles astronauts face while working in space. Our Traveling Scientist will explain how astronauts overcome these challenges.

EQUIPMENT

2 2-liter soda bottles (empty)

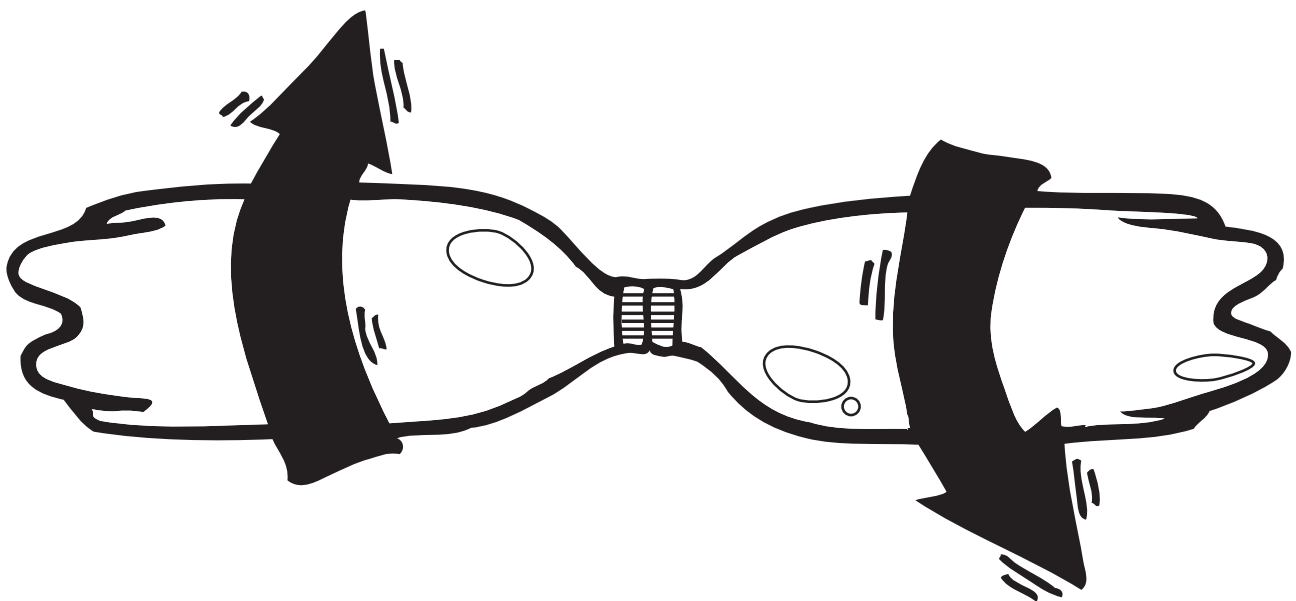
Duct tape

Heavy-duty work gloves

Swivel office chair

PROCEDURE

- 1. SPACE SUIT SIMULATION:** Take the lids off the 2-liter bottles. Tape the lids together so that the tops are flat against each other and the screw ends point out in opposite directions. Have a student wear the gloves while assembling the two bottles and the joined caps into one structure. Discuss the difficulties. How does this compare to an astronaut working in space?
- 2. MICROGRAVITY SIMULATION:** Have a student sit in the office chair with legs crossed on the seat. Challenge them to move the chair to a spot across the room. Why is it difficult? What strategies work? How do astronauts move about in space?



FOOD FOR FLIGHT

FOR GRADES 3-6

Students are often curious about how astronauts take care of basic needs, such as eating. In this activity, students conduct experiments to determine whether various foods are suitable for spaceflight. This will expose students to a few of the challenges of spaceflight, one of the themes of our show.

EQUIPMENT

Variety of foods

Assorted packaging materials (e.g. paper bags, aluminum foil, plastic wrap, shopping bags)

Mailing labels

Markers

PROCEDURE

1. Imagine you are going on a field trip and you must bring food with you.
What foods would you bring?
2. Astronauts have to bring all the food they will need with them. Brainstorm criteria for food that would be suitable for spaceflight. (You might want to do some research.) These might include: does not produce crumbs; easy to package; simple to prepare; does not spoil quickly; travels well; easy to package; nutritious.
3. Observe the food samples you have collected. Make a hypothesis about which foods are best suited for spaceflight.
4. Create tests to discover if your food would be good for spaceflight. For instance, you might test how easily it crumbles or review the nutrition label for vitamins.
5. Test each food. Collect and record your data. Based on your results, decide if each food is suitable for spaceflight.
6. Collect your packaging materials. Determine which would be best for each food.
7. Package the foods. Label each item with mailing labels and a marker.
8. Bring the foods on a picnic. Enjoy your astronaut's lunch!



TO GO OR NOT TO GO?

FOR GRADES 5-8

Manned space exploration brings many exciting discoveries, but it also comes with very serious risks and high costs. In this activity, students weigh the pros and cons of space exploration. Return to this activity after the show and see if your students' opinions have changed.

EQUIPMENT

10 counters per student (e.g. pennies or pebbles)

6-10 cups

PROCEDURE

1. As a class, brainstorm motives for exploring space. Narrow down the list to 3-5 major motives.
2. Brainstorm disadvantages of a space exploration program. Narrow down the list to 3-5 major disadvantages.
3. Label each cup with one of the motives or one of the disadvantages from your lists. Space out the cups along a table.
4. Give each student 10 counters. Allow students to walk to the cups and use the counters to cast votes for what they think are the best arguments. Students may decide to use all 10 votes for one compelling reason, or divide up the votes.
5. Count the votes and discuss the results. Is this outcome what you expected? Based on the results, how should we spend our resources on space exploration?

