

Long Island's Air & Space Museum

Astronaut Challenge: Working with Space Gloves

Abstract:

Astronauts need sturdy spacesuits to help protect them from the harsh environment of outer space. But the protective gear could be bulky; limiting an astronaut's ability to move around. Students will use the gloves to do several manual tasks. They will discover how much more difficult it will be to do simple tasks with bulky gloves that are needed for space.

Background:

Periodically, astronauts have to do space walks, or Extra-Vehicular Activities (EVAs). To accomplish these tasks, astronauts are required to assemble devices and place objects in their proper location. Although already assembled and in orbit, satellites, the Hubble Space Telescope, and the International Space Station (ISS) need repairs. Assembly and maintenance in space requires astronauts to have good dexterity and hand-eye coordination. Astronauts only have 6-7 hours of life support during an EVA, so timing, efficiency and teamwork is critical while working in space. Dexterity and hand-eye coordination also play a major role in performing training tasks effectively. While in space they must also be able to manipulate tools and objects while wearing a pressurized spacesuit which includes gloves that completely cover their hands. These thick bulky gloves are worn to protect astronauts from the brutal space environment.



Objectives:

The students will be able to

- Discuss the spacesuits astronauts must wear in order to protect them from pressure differences, temperatures, and radiation in space.
- Experience a few challenges that simulate what astronauts might encounter when they must perform technical skills wearing space gloves.

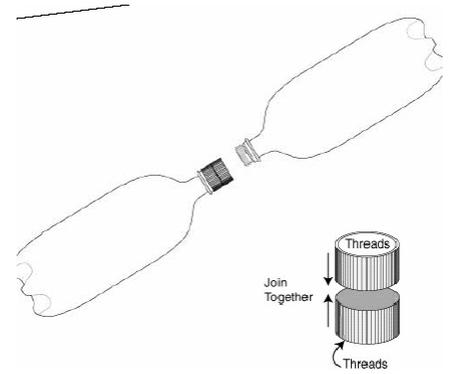
Activity:

Students must each complete a set of four manual tasks. The restrictions are that they must complete the tasks in a limited time while wearing "astronaut space gloves".

- Assign each of the participants a different color. This color will help them locate their activity packs.
- Give them each a pair of gloves. Tell the students what the four activities are. They can complete their tasks in any sequence, but they cannot move onto the next task until they complete the task at hand. Once they complete the task, they must put the items back in the bag. They cannot remove their gloves.

TASK 1

1. Remove the caps from two empty 2-liter bottles. Glue or tape the caps together with duct tape so that the screw ends point outward away from each other.
2. Have the students assemble the two bottles and the joined caps into a single structure.
3. Disassemble the bottles.



TASK 2:

Take the lid off the plastic container, pick up a penny, and put it in the container, then put the lid back on the container.

TASK 3:



Take the nut off the bolt, and then put it back on.

TASK 4:

String three Lifesavers candies in a particular color sequence (red-yellow- orange) and then tying the string so that the Lifesavers don't fall off.



Materials:

- 4 pair heavy duty rubber/leather gloves
- 4 packs of *Lifesavers*
- 4 pieces of string measuring 10 inches
- 4 plastic containers
- 4 pennies
- 4 bolts/nuts
- 8, 2 liter plastic soda bottles

Follow up

1. What did the space glove feel like?
2. What was hardest to do with one glove on?
3. How did that change with two gloves on?
4. How could you change any of the objects so they would be easier to work with?
5. Why is it important that new technology makes it easier for astronauts to move objects and operate equipment?