



Moving and Working In Space

Background

Historically, a tether's primary use was to supply oxygen to the astronauts while its secondary use was to keep the astronaut anchored to the spacecraft. It was found to be cumbersome and it limited the movement of the astronauts.

Today, they are used primarily as a safety measure to keep astronauts anchored as they work in the cargo bay. Scientists and researchers introduced a slide wire along which a tether could be moved so that larger distances could be covered while completing tasks.

The Activity

Four 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 garden or rubber gloves. They must also remain attached to a line and a tether at all times in order to move around in a confined space.

The Objective

This activity teaches students about an astronaut's challenge of moving within the confines of a limited space and working within the confines of a space suit (more specifically, gloves which reduce finger sensitivity) to complete very manual tasks.

Materials, Preparation, and Game Play

Three main components need to be prepared for this activity: 1) Activity Packages (to simulate manual tasks); 2) Tethers; 3) A space within which to work (to simulate slide wires and limits of work space). Materials and preparation are listed below.

1) Activity Packages

- Four students will each be assigned a different colour.
- A set of four manual tasks/activity packages will be assigned to the students. The students must find the packs that match the colour they've been assigned.
- They will be required to complete all four manual tasks while wearing garden or rubber gloves within four minutes.
- The four tasks are: i) stringing three Lifesavers candies in a particular colour sequence (red-yellow- orange) and then tying the string so that the Lifesavers don't fall off; ii) attaching three pieces of Lego or interlocking blocks together; iii) wrapping a small present; iv) folding a letter and placing it in an envelope.

You will need:

- 16 plastic ziplock bags (4 activities x 4 people)
- 4 packs of Lifesavers
- 4 pieces of string measuring 10 inches
- 12 pieces of Lego or interlocking blocks borrowed from the primary grades
- 4 small items to wrap with wrapping paper
- Wrapping paper cut in four pieces
- 4 packages of tape
- 4 pieces of paper (8.5 x 11 inches)
- 4 envelopes
- 4 different coloured pieces of paper, each cut into four
- A marker or pen
- 4 sets of garden or rubber gloves (reduces finger sensitivity to simulate gloves in space)
- Timer





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- 4 sets of four colour-coded bags need to be packaged as follows:

Bag 1: a roll of Lifesavers, string, coloured paper
 (e.g. red for student assigned to this colour)
 labelled 1

Bag 2: 3 pieces of Lego, coloured paper (e.g. red)
 labelled 2

Bag 3: item for wrapping, wrapping paper and tape,
 coloured paper (e.g. red) labelled 3

Bag 4: piece of paper, envelope, coloured paper
 (e.g. red) labelled 4

2) Tethers

Students can make the tethers. The materials required are as follows:

- 4 pieces of thin rope to simulate a tether each measuring 1 metre (this length is ultimately determined by the amount of space you'll have to work in your classroom or gym)
- 8 carabiners (purchased from a mountain climbing store) or spring clips.
- Secure a carabiner or a spring clip at either end of the rope.
- One carabiner/spring clip is to be secured to the student's belt loop. This will simulate the D ring that appears on the lower torso of a space suit.
- The other carabiner/spring clip will be connected to the "slide wires" as indicated below.

3) The Slide Wires and Space Delineators

You will need:

- Thin rope to simulate slide wire measuring 9 metres (this length is ultimately determined by the amount of space you'll have to work in your Classroom or gym)
- 4 chairs or desks

-Set up the four chairs/desks in the four corners an imaginary square measuring 2.5 x 2.5 metres.
 -Link the four chairs or desks with the rope by joining them from corner to corner to form a square. The rope should be set at approximately waist level.

-Now join the chairs or desks by creating an "x" formation with the rope. (See diagram on following page)

-These chairs or desks can now represent destinations that the students need to reach in order to complete a task. On each of the chairs or desks, place similar activity packages together. (e.g. place all of the lifesaver tasks on one chair, and place all of the gift-wrapping tasks on another chair, etc.)

-Students can now attach the free end of their tether/carabiner to a rope at each of the four corners of the square.

The Rules

- 1) Assign each of the participants a different colour. This colour will help them locate their activity packs. Give them each a pair of gloves.
- 2) 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.
- 3) They must also remain attached to their tether and slide wire. In order to branch off to another section of rope, the participants need to slide their carabiners/spring clips to an adjacent rope and then attach themselves to that. Participants are allowed to reach for their activity packs as long as they remain connected to the rope/slide wire via their tether. If two participants are along the same rope and need to pass each other, one person will need to find an alternative route. No passing is allowed.



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- 4) Set the timer to four minutes.
- 5) The winner is the person who completes the most number of tasks successfully within the four-minute time period and does it without separating from the slide wire.

For the answers, please visit the KidStation for Cosmofans at <http://www.space.gc.ca/ks-cosmofans>

More Activities to Stimulate Interest and Learning

- What were their observations?
- What senses were key in completing the manual tasks?
- How could movement in space be improved?
- What else might tethers be used for?
- What are other means for anchoring astronauts in place?
- What are other means for maneuvering in space?

