

Stay-All-Day Activity (MS) – Organizer Notes



Rover Landing

Description: A design activity that involves cushioning an egg during a drop to simulate the landing of a rover on a planet. Competitive.

Special Requirements: During this activity, eggs will often get broken inadvertently. The eggs are kept in a Ziploc bag to contain the mess. To cut down on cost, the directions specify a limit of 3 eggs per team. You can reduce or increase this as you want. If the students are to follow the design-test-improve model of engineering design, though, they will need more than one egg.

Materials: At each lab station, provide

1. Building material per group: about 2 handfuls of mini- and regular size marshmallows, one pretzel rod and 5-10 pretzel sticks, one sheet of newspaper, 10-12 drinking straws, one jar of Play-Doh, half a box of toothpicks, one balloon, one roll of toilet paper, one roll of masking tape, scissors.
2. One raw egg in a Ziploc bag. (It is helpful to place the egg inside the roll of tape to keep it from rolling.)
3. A meter stick.
4. A copy of the student handout pages.

Each judge will need a meter stick and pen. In the event of a tie, a scale will be needed to weigh the containers.

Scoring: When the designated time is over, have the teams line up at the testing station for judging. The testing station should consist of a scale and a meter stick resting on the ground, taped vertically to a wall. One judge should oversee the drop of each team's container. Another judge should inspect the eggs after the drops and mark each team's score sheet. If the drop is successful (the egg is not broken at all), the team lines back up to drop from the next height. If two teams break their eggs at the same height, their containers should be weighed without eggs in them.

A decreasing number of points are awarded for the highest successful drop. For instance, if 5 teams are competing, the team with the highest drop gets 5 points, the next highest drop gets 4 points, etc. For any teams with matching highest drops, the one with the lightest container is scored above the other(s).

The U.S. Department of Energy Office of Science manages the National Science Bowl®, and sponsors the NSB finals competition. DOE's Office of Science is the single largest supporter of basic research in the physical sciences in the United States, and is working to address some of the most pressing challenges of our time. For more information, please visit <http://science.energy.gov/>.

Stay-All-Day Activity (MS) – Student Handout

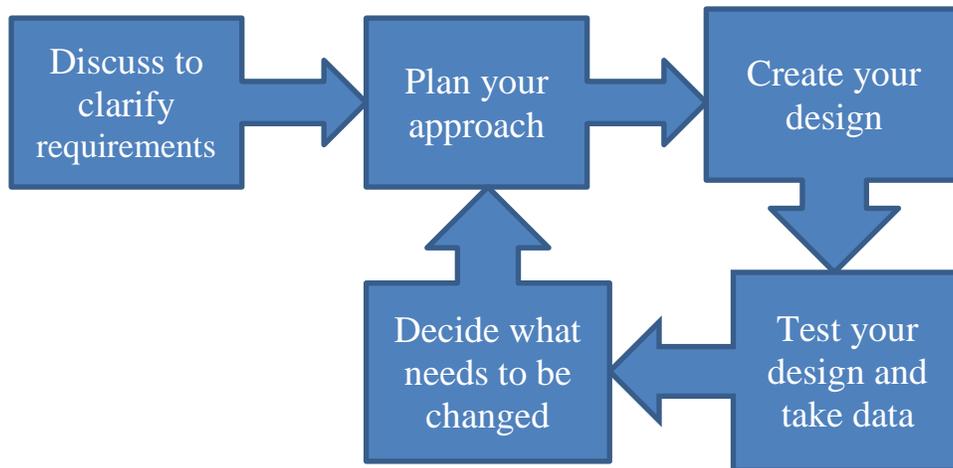


Rover Landing

Background: In 2004 NASA landed two robotic rovers named Spirit and Opportunity on the surface of Mars. But because their travel speed was approximately 12,000 mph as they approached the planet, they did not have an easy landing! A parachute was able to slow them down somewhat but NASA engineers were not sure exactly what the rovers would hit when they landed or how fast they would be moving. For that reason, they had to design a container for the rovers that protected them as they bounced off the surface of Mars until finally coming to rest.

Your Task: Create a container that will protect an egg during a drop from various heights. You will start by dropping from a relatively low level and then increase the height until your egg breaks.

Building Rules: Follow the design cycle of



- The egg must remain in the Ziploc bag! Each team will be given a maximum of 3 eggs for testing and demonstration. If you do not have an egg for demonstration, you cannot earn any points.
- You can use any of the materials on your table to build your containment device.

- The bag containing the egg must be able to be removed for inspection after every drop.
- The device must be self-contained. No attachment to any other object is allowed.
- You will have 20 minutes to refine your design before the final test.

Competition Rules:

- All teams will drop their device from each specified height until their egg is broken. “Broken” is defined as any condition in which there is damage to the egg including a crack or dent.
- A drop will consist of a clean release from each height. The bottom of the container must be at or above the starting height line at the point of release.
- A judge will oversee the drops and determine which teams may or may not move to the next height.
- In the event of a tie, the egg-less containers will be weighed and the one weighing the least will be scored ahead of the other.

Team name _____

Height	Successful?	Height	Successful?
10 cm		50 cm	
20 cm		80 cm	
30 cm		120 cm	
40 cm		150 cm	

Mass: _____

Judge’s initials: _____

Upon completion of this event, turn in your completed score sheet to the activity judge.

Good luck, and thanks for Staying-All-Day!