



Airbags on the Moon

Engineering Design Brief (Student page)

Narrative: Getting scientific equipment to the Moon safely and in workable condition is a challenge for NASA scientists and engineers. Airbags in missions to Mars and in future missions to the Moon are used to cushion the landing of equipment on terrain that is rough and rocky. Sensitive scientific gear is essentially crash landed on the surface using inflatable airbag technology.

Problem: You are part of a team of NASA engineers who have been asked to design and create a prototype of an airbag landing system for future Moon voyages.

Learning Standards

Technology/Engineering

Appropriate materials, tools, and machines enable us to solve problems.
Engineering design is an iterative process involving modeling and optimizing for developing technological solutions to problems within given constraints.
Ideas can be communicated through engineering drawings, written reports, and pictures.

Research the Need or Problem: There are many good reasons to use airbag technology to land sensitive science gear on the Moon. You can learn more about airbag construction and inflatable structures at the following websites:

http://marsrovers.jpl.nasa.gov/mission/spacecraft_edl_airbags.html

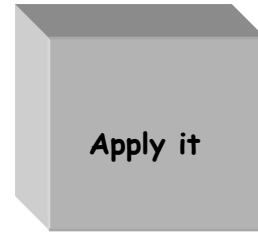
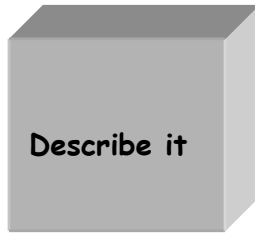
<http://marsrovers.jpl.nasa.gov/gallery/press/spirit/20040106a.html>

<http://www.lgarde.com/programs/iaearticle/awarticle.html>

Materials: Balloons, hand pumps, scotch tape, meter sticks, raw egg

CUBING

Airbags on the Moon Design



RULES FOR CUBING

1. Use all six sides of the cube in any order.
2. Move fast. Don't allow yourself more than 3 to 5 minutes on each side of the cube.
3. Jot down your ideas as you progress from side to side.

For the cubing technique, you need to use all six sides. This is not an exercise in describing, analyzing, or arguing. It is simply a technique to help you brainstorm and look at airbags from different perspectives. There are no wrong answers in a brainstorming activity.

- Describe it. What do you think an airbag looks like? Color, shape, size, and so forth. Describe it.
- Compare it. What is it similar to? What is it different from?
- Associate it. What comes to mind when you think of an airbag? Just let your mind go and see what associations you can make.
- Analyze it. What materials would you need to make an airbag?

- Apply it. Tell what you can do with it. How can it be used?
- Argue for or against it. Go ahead and take a stand. Make an argument based on how you would design an airbag.

Now go back and reread the notes you have jotted down and prepare to share your team's perspectives with the rest of the class.

Sketch it. Based on available materials, make a sketch of the airbag your team will create. Your team must then work together to create a proposal, which you will present to the class, about what your team's airbag will look like.

