



Drexel-SDP GK-12 ACTIVITY

Activity: Egg Drop Competition

Subject Area(s) Problem Solving
Associated Unit Astronomy, module 2
Associated Lesson N/A
Activity Title Activity: Egg Drop Competition
Grade Level 6 (3-12)
Activity Dependency None
Time Required 10 minutes per day for 1 week
Group Size 1-3
Expendable Cost per Group \$0



Summary

The Mars Rover is an example of a piece of astronomical research equipment that had to be dropped to the surface of the planet to perform its job. The impact on the rover caused by the gravitational force exerted on the object had to be overcome in some way to reduce or eliminate the possibility of damage to the equipment. In this activity, students will use a raw egg to represent the Mars Rover, and design a shelter to protect the egg from a 4-story drop.

Engineering Connection

Engineers are mostly known for designing technology to be the subject of, or as a means to conduct research. Often such equipment must be transported to remote or inhospitable locations and cannot be gently guided to their final destination. In this activity, students will be faced with the dilemma many engineers face, “okay, so I have this piece of equipment... now, how do I

save it from damage or destruction en route to its destination?” The answer to this question is, of course, an engineering project of its own.

Keywords

Astronomy, Mars Rover, egg drop competition

Educational Standards (PA)

- Science: Inquiry and Design – Forces and Motion, 3.4.C, Scientific Method 3.2.C, Physical Science, Chemistry and Physics - Astronomy 3.4.D
- Math: Measurement and Estimation 2.3

Pre-Requisite Knowledge

None.

Learning Objectives

After this lesson, students should be able to:

- Work as a team to complete a design
- Keep a notebook showing design iterations of their egg shelter
- Express what aspects of their design succeeded/failed

Materials List

Each group needs:

- Any construction materials from students’ homes except for styrofoam
- One egg
- Pencils/paper or computer

Introduction / Motivation

Ever wonder how the scientists who designed the Mars Rover planned to drop it on the surface of the planet? How do they prevent damage to the vehicle? What type of materials do they use to protect it? In this activity, we will pretend to be Mars Rover engineers, whose job it is to safely deliver the Rover to the planet by means of dropping it from a spacecraft. Our designs will be tested and evaluated on several criteria including weight, dimension and survivability.

(The Egg Drop Contest is an experiment usually performed by students to engage in scientific and technical pursuits such as physics and engineering. The egg drop competition is often used as a fun way to introduce students to the process of engineering. If students are asked to work in teams, the exercise then becomes one of teamwork.)

Vocabulary / Definitions

| Word | Definition |
|------------------|---|
| Design iteration | One in a series of well thought-out ideas |

| | |
|----------------|---|
| Drag inducer | Any construct that can be used to resist motion |
| Shock absorber | Any material can reduce the effect of impact |

Procedure

Background

In order to keep the competition safe and fair for all competitors, restrictions are usually placed on the nature of the containers used. Common restrictions are:

Weight Limits (commonly 100 grams)

Size limits

Materials Limits (usually in the form of a list of prohibited materials, or in a specified list of allowable materials)

Design limitations (limitation on drag devices, mechanical complexity etc.)

Cost Limits

Before the Activity

Obtain permission from the school principle to carry out the competition, and agree on a drop site and date.

Review the design specification and judging criteria for the competition:

Specifications – Egg shelter must be:

<= 6 inches on any side

<= 2 lbs.

NO styrofoam

All materials supplied by the students

All competition eggs supplied by the teacher

Judging criteria:

50 points for teamwork

50 points for meeting specification

-10 points for every inch over 6 inches

-10 points for every 2 oz. over 2 lbs.

50 points for team notebook and report

50 points for surviving the drop

Awards:

Lightest design surviving drop

Smallest design surviving drop

Most unusual design surviving drop

(Inter-classroom competition) Classroom having highest ratio of designs surviving:designs entered receives the honor of being Top Dog Engineers

With the Students

Step 1: Give the students 10 minutes of time each day for a week to meet with teammates and make progress on their design. Require that they keep a notebook for their own reference, and for you to check on their progress.

Step 2: Ask the students to either pre-prepare their egg shelter, or bring everything they need to construct it on the day of the competition. Give the students a finite amount of time to prepare their shelter on the day of the competition.

Step 3: Follow safety discretion in conducting the drop competition. Evaluate the shelters on the criteria discussed above, prior to the competition.

Step 4: Ask the students how they would modify their engineering design to improve their egg shelter in the future. Do they think their shelter would work for an even longer drop? Why or why not?

Safety Issues

- MAKE SURE NO ONE IS IN THE PATH OF THE DROPPED/HURLED EGG

Troubleshooting Tips

Students are often frustrated on competition day because they did not test the design first. The best way to help ensure success is to test each iteration of the design, and to keep a notebook of what they think or observed to have succeeded and failed about each design.

Remind students who might be bickering about design ideas that they should build them and test them by throwing the eggs to simulate the drop. If more than one competing design survives the “drop,” then they can evaluate the designs on weight and size parameters (remember, awards are given for lightest and smallest designs surviving the drop).

Investigating Questions

What would have made your task easier?

What materials would you use next time?

Why do you think your design succeeded/failed?

How did working in a team make the project easier/harder?

Assessment

Pre-Activity Assessment

None

Activity Embedded Assessment

Each individual/team completes a design description and marketing report.

Post-Activity Assessment

Evaluate the teams based on the following criteria:

50 points for teamwork

50 points for meeting design specification

-10 points for every inch over 6 inches

-10 points for every 2 ounces over 2 lbs.

50 points for design drawing and marketing report

50 points for surviving the drop

Activity Extensions

Egg drop activity websites from other schools across the country:

<http://www.wsfceggdrop.com/>

http://staff.hartdistrict.org/glyle/projects/egg_hurl_project/index.htm

Owner

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