DESIGN challenge

To design and test a Reusable Launcher for the Crew Exploration Vehicle (CEV). The CEV should travel 5 meters when launched.

OBJECTIVE

To demonstrate an understanding of the Engineering Design Process while utilizing each stage to successfully complete a team challenge.

PROCESS SKILLS

Measuring, calculating, designing, evaluating

MATERIALS

Model CEV that was built last session

General building supplies

Meter stick or measuring tape

C-clamps

Rubber bands of various sizes and thickness

STUDENT PAGES

Design Challenge

Ask, Imagine and Plan

Experiment and Record

Quality Assurance Form

Fun with Engineering at Home

PRE-ACTIVITY SET-UP

See next page.

MOTIVATE

- Show the first two minutes of the video titled “Constellation: Flight Tests”. (if time permits, show all)

  www.nasa.gov/mission_pages/constellation/multimedia/index.html

- Ask the students what was the most important lesson learned from those images? (test, test and test again!)

SET THE STAGE:

ASK IMAGINE **& PLAN**

Share the *Design Challenge* with the students.

- Emphasize that the objective is to create a launcher producing repeatable results. It is more important for the CEV to reach the same distance each time than for the CEV to travel the farthest.
- Remind students to imagine a solution and draw their ideas. All drawings should be approved before building.

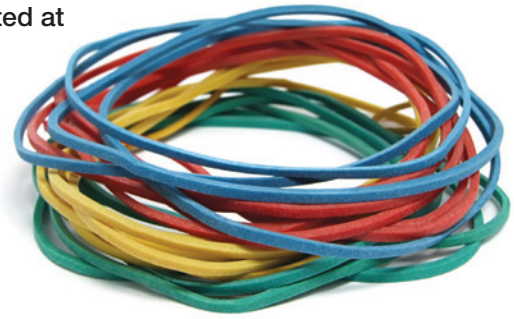
CREATE

- Challenge the students to build a Reusable Launcher based on their designs and ideas.

EXPERIMENT

- Students will test different rubber bands and different distances the rubber band is pulled back. One rubber band is used per experiment, but tested at three different “pull lengths”. All data is recorded in the data table.
- Students should graph the CEV distance results as a line graph and analyze. Feel free to share the BEST graphing video with your students as a refresher on how to build a graph:

  http://svs.gsfc.nasa.gov/goto?10515



IMPROVE

- Students *improve* the Reusable Launcher based on results of the tests.

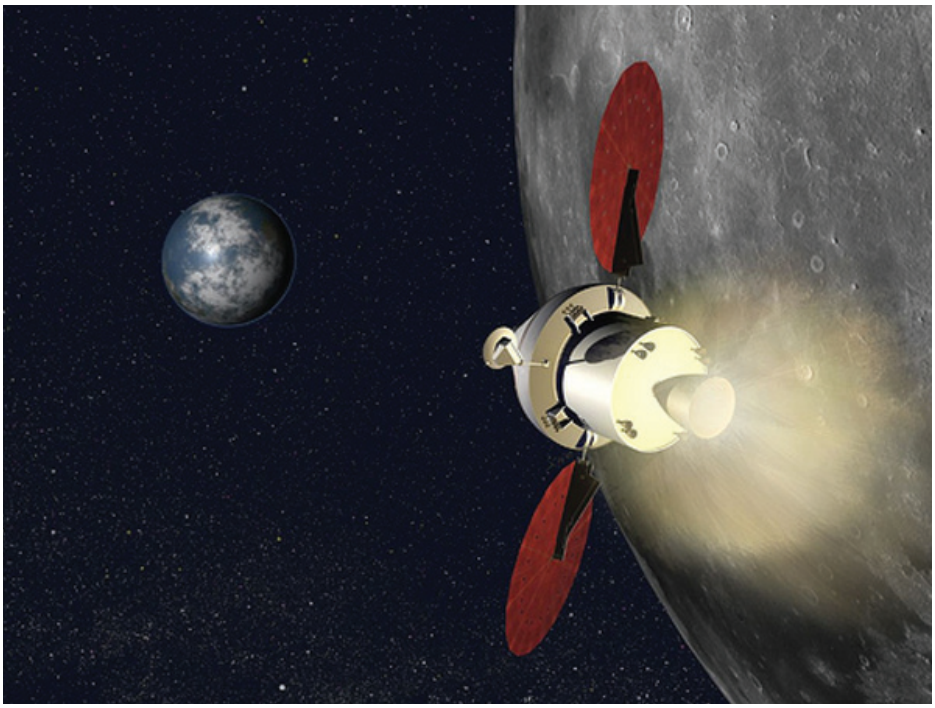
CHALLENGE CLOSURE

Engage the students with the following questions:

- *Why was it important that the launcher be reusable?*
- *Why was it important that your results were repeatable?*

PREVIEWING NEXT SET OF ACTIVITIES (SERIES 3)

The Moon is a very harsh environment. There is no atmosphere to protect astronauts and their equipment from solar radiation and the extreme temperature swings between night and day. Next session, we will begin to find ways to protect astronauts from those extreme temperature changes.



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Launch Your CEV
Teacher page

launch your CEV