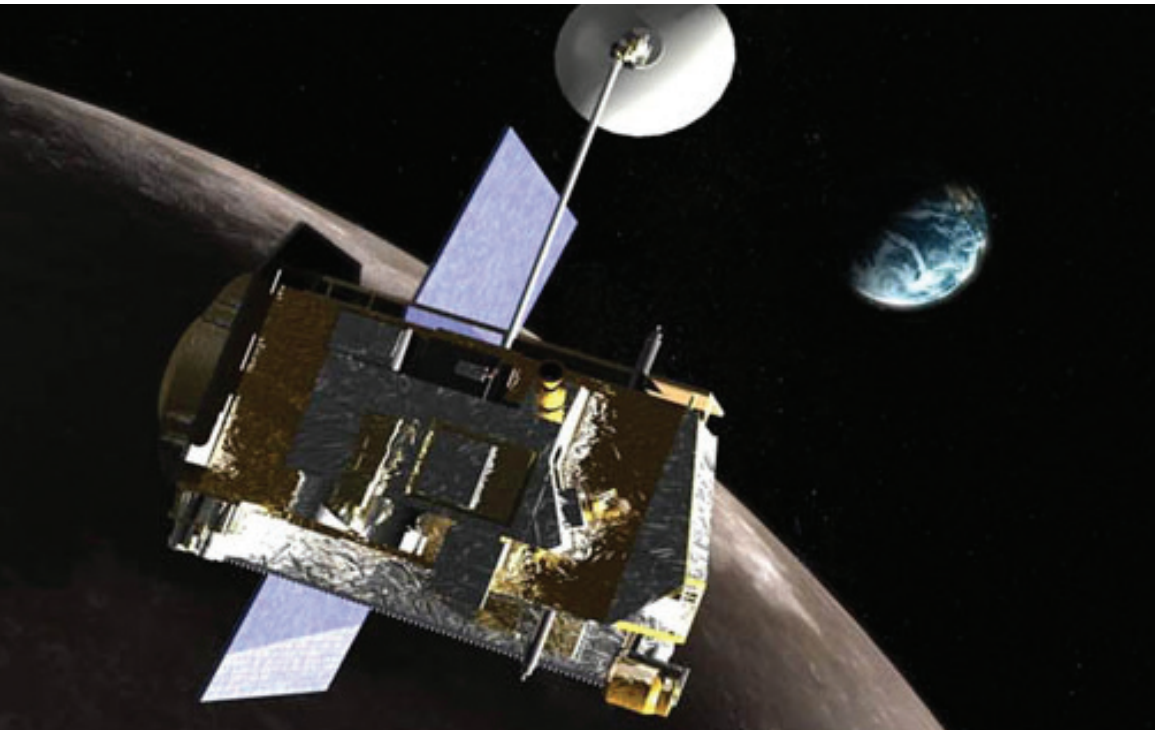


# Build a Satellite to Orbit the Moon

## DESIGN challenge

*To design and build a satellite that meets specific size and mass constraints. It must carry a combination of cameras, gravity probes, and heat sensors to investigate the Moon's surface. The satellite will need to pass a 1-meter Drop Test without any parts falling off of it.*



### 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

*General building supplies*

*Bag of various sized buttons*

*1 Mailing tube, oatmeal canister or other container (used as a size constraint)*

### STUDENT PAGES

*Design Challenge*

*Ask, Imagine and Plan*

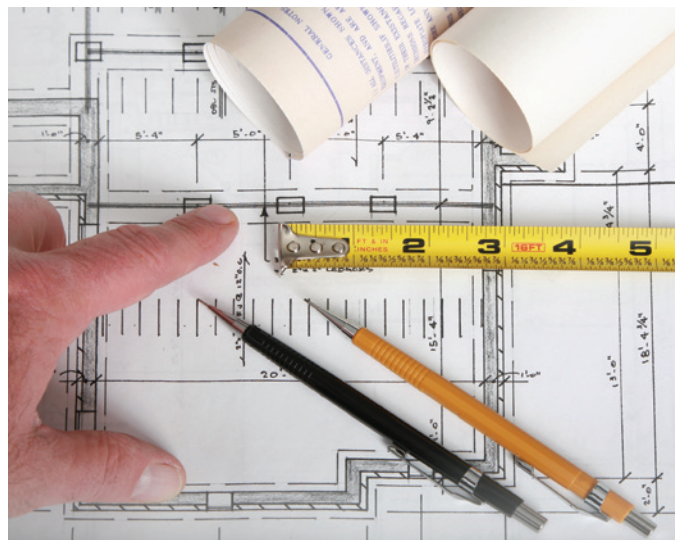
*Experiment and Record*

*Quality Assurance Form*

*Fun with Engineering at Home*

## MOTIVATE

- Spend a few minutes asking students if they know what engineers do, then show the NASA's BEST Students video titled, "What is Engineering":  
<http://svs.gsfc.nasa.gov/goto?10515>
- Using the Engineering Design Process (EDP) graphic on the previous page, discuss the EDP with your students:
  - **Ask** a question about the goal.
  - **Imagine** a possible solution.
  - **Plan out** a design and draw your ideas.
  - **Create** and construct a working model.
  - **Experiment** and test that model.
  - **Improve** and try to revise that model.



## SET THE STAGE: **ASKIMAGINE &PLAN**

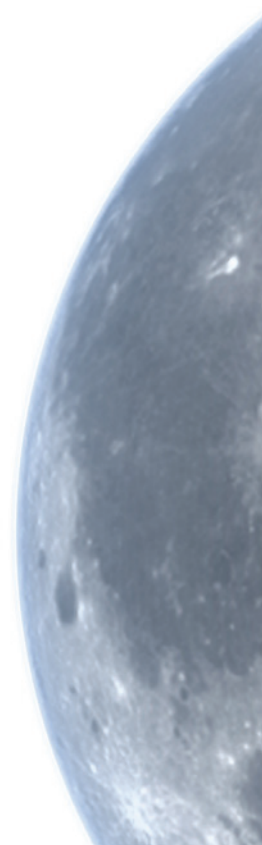
- Share the Design Challenge orally with the students (see next page).
- Have students brainstorm ideas, solve the given problems and then create a drawing of their satellite. All drawings should be approved before building begins.

## CREATE

- Distribute materials for students to build their satellites based on their designs and specifications.
- Ask teams to double check mathematical calculations, designs and models. Visit each team to make sure their model can fit within the size specification of the cylinder or box you are using.

## EXPERIMENT

- Have students test their satellites by dropping them from a 1-meter height and to record their observations.
- Emphasize the importance of experimenting with a new design and receiving feedback for optimizing success in engineering.





## IMPROVE

- Have students evaluate their satellite and rework their designs if needed.

## CHALLENGE CLOSURE

Engage the  
with the

- *List two about what building your*
- *What was your team to complete*
- *How did problem?*

**Heat Sensor**  
Total Mass = 1 g

students in a discussion  
following questions:

*things you learned  
engineers do through  
satellite today.*

*the greatest difficulty  
had today while trying  
the satellite challenge?*

*your team solve this*

## PREVIEWING

## NEXT SESSION

Ask teams to bring back their satellite models for use at the next session. You may want to store them in the classroom or have one of the club facilitators be responsible for their safe return.

# DESIGN challenge

*To design and build  
a satellite that meets  
specific size and mass  
constraints. It must carry  
a combination of cameras,  
gravity probes, and heat  
sensors to investigate  
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satellite will need to pass a  
1-meter Drop Test without  
any parts falling off of it.*

Build a Satellite  
**Teacher page**