

Capstone: Design a Space Mission

Name: _____ Date: _____

LEARNING OBJECTIVE

Students will design an original space mission (rover, satellite, or habitat), applying astronomy concepts from the quarter to justify their design choices.

MATERIALS NEEDED

- poster board or large paper
- markers or colored pencils
- ruler
- recycled materials for a small model (cardboard, foil, bottle caps, straws -- optional)
- index cards
- internet-connected device or reference book for research

HANDS-ON ACTIVITY

1. Choose a mission target: a specific planet, moon (e.g., Europa, Mars, Titan), or 'deep space' object, and research 2-3 real facts about the conditions there (temperature, atmosphere, gravity, distance from Earth) using an internet-connected device or reference book.
2. Decide on a mission type -- rover, orbiting satellite, or crewed habitat -- and sketch a labeled design on your poster board, showing at least 4 features (e.g., solar panels, heat shielding, communication antenna, life-support system) with a one-sentence justification for each feature based on the real conditions you researched.
3. Optional: build a simple 3D model of your design using recycled materials to accompany your poster.
4. Calculate (using your Week 1 solar system scale or simple research) roughly how long a signal or spacecraft would take to travel from your target back to Earth, and note this on your poster.
5. Write a mission summary (6-8 sentences) on an index card explaining your target, mission goal, key design features, and one major challenge your mission would face, presenting it to a family member.

QUESTIONS

1. What target did you choose, and what two real environmental conditions there directly shaped your design?
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2. What was the biggest engineering challenge your mission would face, and how did your design attempt to address it?

3. Approximately how long would a signal take to travel from your target to Earth, and how might this affect mission control?

4. Which concept from this quarter (scale of the solar system, moon phases, seasons, gravity/orbits, stars, light, or rockets) was most useful in designing your mission, and why?
