

Design Challenge: Space Habitat

Description:

Students will design a space station keeping in mind the challenges of living in space.

Objective(s):

Students will design and prototype a space station that will orbit the moon.

ISTE/NGSS Standards:

4a: Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

4c: Students develop, test and refine prototypes as part of a cyclical design process.

5c: Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

MS-ETS-1.1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS-1.2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS-1.4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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Essential Question(s):

How do we design habitats for different environments?

Materials:

- Cardboard
- Tinfoil
- Graphing paper
- Toilet paper tools
- Scissors
- Glue
- Pencils
- Markers

<https://docs.google.com/document/d/1UYqqzT3aMgdNVb6-zog02Q4mY686WuM-2iHSEfsyLps/edit>

Do Now:

Make a list of things needed to survive in space.

Lesson:

1. Have students complete reading on NASA's [orbital habitat](#) around the moon.
2. Class will design the space stations with a few restrictions in mind:
 - Only five rockets will be sending supplies, so imagine that as five rooms or areas for the station.
 - The entire space can only add up to being about the size of the International Space Station, which is 300 ft. long and 200 ft.
 - The space needs to be large enough for up to six astronauts to inhabit it.
 - There needs to be space for science to happen, and a dock.
3. Create a scale on the graph paper, students will design their stations keeping in mind what is needed to survive in space for long periods of time and maximizing the room (sleep area, lab, and bathroom are mandatory).

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- If the teacher wants, they can have options for what kind of room so students can pick two of gym, hydroponic garden, additional sleeping area, workshop, or anything else the teacher decides.

Closure:

Groups or students will show their designs, and the class will workshop strengths and limitations of their design.

Extension:

Students can use available materials in the maker space to create a to scale model of their habitat.