

Title

Space Station Model

Activity Overview

Description: This somewhat non-structured activity calls for collaboration and team work from a group. Children get to creatively design components of a shared project, while learning about aspects of design that aerospace engineers always need to consider.

Topic Area(s)

Mechanical Engineering, Aerospace engineering

Grade Level

P-6

Duration

1- 1.5 hrs

Learning Outcomes:

- Learn about basic components of Space Stations
- Learn the importance of strategic design
- Practice group collaboration on a project

Hook

Design your own Space Station module!

Background Information

The International Space Station is an orbiting platform to continuously explore a wide variety of space science both inside and outside the orbital lab to benefit humans and industry. Its first component launched into orbit in 1998, and the ISS is now the largest man-made body in low Earth orbit and can often be seen with the naked eye from Earth. The ISS consists of pressurised modules, external trusses, solar arrays, and other components. ISS components have been launched by Russian Proton and Soyuz rockets, and American Space Shuttles.

Materials

Per 1 group of ~20 students (*note: These are suggested materials and quantities. The actual quantities of the following materials are up to your discretion. As this type of project is un-structured, every child may use varying materials and amounts.)

- 250-300 Popsicle sticks
- 50-100 Skewers
- 20 sheets Construction paper
- 2 Egg cartons
- 4 1 or 2L Milk/juice cartons
- Optional: toy lego people or figurines to serve as “astronauts”
- Optional: other construction materials

- ~20yards of string (needed to hang final Space Station Model project)
- 2 rolls masking tape
- Scissors, to share
- 3 bottles of white glue (or hot glue guns fitted with appropriate hot glue sticks), to share

Safety Considerations

Remind the children to be cautious when using skewers and scissors.

Procedure

1. Show the group pictures of the ISS and other orbiting structures. Describe how the complete structure is usually made of a collection of smaller structures, called modules. Task the group with working together to make their own complete space station, constructed in the same way as the ISS; each person constructs their own module.
2. Have each child design their own module and decide what purpose it will serve – i.e. living quarters, a laboratory, power room, solar array. Give them an approximate size their modules should be. They can take time to draw it out, or collaborate with other children for this step.
3. Have each child select some materials and build their design as they like. Give them limits on materials – to ensure nothing is wasted, but also to teach them that engineers do not have unlimited resources when designing structures, especially for outer space.
4. When the individual modules are completed, tape a portion of string to each module and suspend them from the ceiling like they are “orbiting space”.
5. Once hung, the modules should be able to meet and attach to one another to form a complete space station structure in its entirety.

Wrap-Up/Debrief

- Talk about the importance of space stations; they are used to study gravity and its effects on various other aspects of science.

- Talk about how important it is that each module is made to very precise specifications; once these modules are sent into space, you can't easily bring them back down and fix them if they don't fit together.
- Discuss whether or not it was easy to make the modules meet one another – imagine how much work is put into making sure real modules of the ISS are able to meet! What could've been done differently to improve design, ability to meet etc.?

Additional Resources