



DESIGN A CREW MODULE

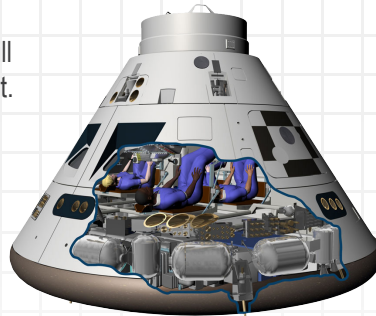
Your Challenge

Design and build a crew module model that will secure two astronaut figures during a drop test.

Do First

Watch the instructional video for this module:

go.nasa.gov/34hVUvL



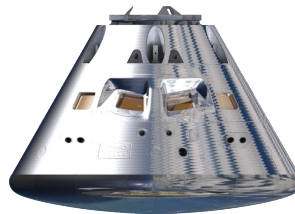
Design Constraints

- 1) The crew module must safely carry two astronauts. You must design and build a secure seat for the astronauts, without gluing or taping them in place. The astronauts should stay in their seats during each drop test.
- 2) The crew module must fit into the container you chose. This item is simply for size restraints. The crew module must not be dropped while inside the container.
- 3) The crew module must have one hatch that opens and closes easily. The hatch should remain shut during all drop tests.
- 4) Your crew module design should consider mass and strength. Mass is important in space travel. The heavier the crew module, the more expensive it is to build and, ultimately, to launch. NASA is looking for a lightweight but strong crew module.

Ask and Imagine

Think of ways to safely secure two astronauts inside of the crew module.

- What types of materials will protect the astronauts?
- How can you reduce the impact on the crew module and astronauts?
- What essential elements are needed for crew safety?



LET'S GET STARTED!

1. Plan

Draw your crew module design on blank paper. Be sure to label your design with the materials you will be using.

2. Create

Build a crew module that meets all design requirements using the materials collected.

3. Test and Improve

- You will conduct two drop tests from a height of 1 m.
- After each drop test, adjust the crew module based on the results and test again.
- Once a drop is successful from 1 m, you will then drop the crew module from at least 2 m.

4. Share

- Discuss the results of your experiment with the group.
- What techniques did you use to reduce the mass of your crew module?
- What improvements did you make to your crew module based on your first test?



Astronaut safety is of the highest importance. For Artemis missions, NASA's Orion spacecraft must be able to support astronauts for weeks at a time and operate reliably in the harsh space environment.



Learn more:

Orion Capabilities for Deep Space Enabled Crewed Artemis Moon Missions

go.nasa.gov/2GEMBN1

Top 5 Technologies needed for a Spacecraft to Survive Deep Space

go.nasa.gov/2kGrjE3

ARTEMIS ENGINEERS



<https://go.nasa.gov/2F5h46f>

Check out how you can join Artemis:
nasa.gov/joinartemis

Design a Crew Module Drop Test Data Log

Use this data log to record the results of each drop test. Be sure to identify the units you are working with by adding units to the table headings. Engineers use the modern metric system.

Trial #	Drop Test Height Units: _____	Crew Module Weight Units: _____	Results (What did you observe after your test?)	How would you improve your design?

Keep in Mind, if you simply record "1" it could mean one of anything: 1 yard, 1 meter, 1 mile, 1 millimeter. Ensure that you make your data clear to the reader.



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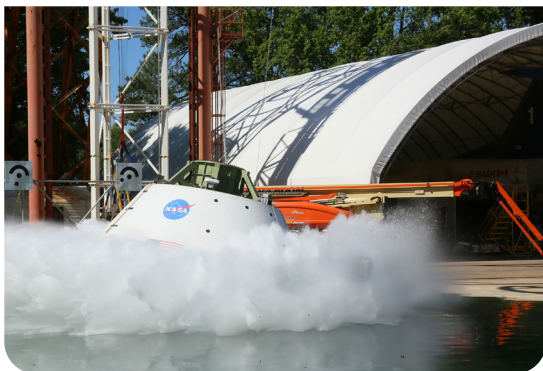
Are you ready for a challenge?
Design and build a crew module
model that will secure two 2 cm
astronaut figures during a drop test.



Student Materials List

Gather the following materials. If you can't find all of them use your own creativity to think of additional building materials.

- General building supplies:
 - 1-2 paper or foam cups (8-12 ounces)
 - 1-2 paper or foam plates
 - 2-3 index cards
 - Aluminum foil or plastic wrap (approximately 1 piece 12"x12")
- Small cylindrical container (e.g., mailing tube, oatmeal canister, or coffee can)
- Two 2-cm plastic figurines, (e.g., minifigures). If unavailable, marshmallows or other items will work.
- Tape
- Scissors
- Tabletop digital scale (optional)
- Meterstick, yardstick or tape measure
- Paper and pencil



The Orion spacecraft is built to take humans farther than ever before. Orion will launch on NASA's new heavy-lift rocket, the Space Launch System, and transport crew to the Moon, and eventually to Mars. Read about Orion at go.nasa.gov/3jF4QjH

Supplement to Activity Two:
Design a Crew Module in the NASA
Crew Transportation With Orion
Educator Guide. (NP-2020-02-2805-HQ)
go.nasa.gov/33CqsHS



NASA's Artemis mission will land the first woman and next man on the Moon by 2024! Using new technologies, NASA will explore regions of the Moon never visited before and establish a long-term human presence on the Moon. Astronauts will live and work there for weeks to months at a time. They will test technologies, conduct science experiments, mine resources, and learn how to live in extreme environments. This knowledge will help NASA take the next giant leap – sending astronauts to Mars.



NASA's Artemis program is named after Artemis from Greek mythology. Artemis is the goddess of the Moon and the twin sister of Apollo. Apollo was the name given to NASA's first human Moon missions.

Check out how you can join Artemis:
nasa.gov/joinartemis