
Engineering Design Challenge: Safe Travels

NASA and its industry partners are currently working on a space vehicle called Orion that will take astronauts to the Moon, Mars, and other destinations in space. Because Orion will transport astronauts beyond low Earth orbit and back again, it must be designed to serve multiple functions and operate in a variety of environments.

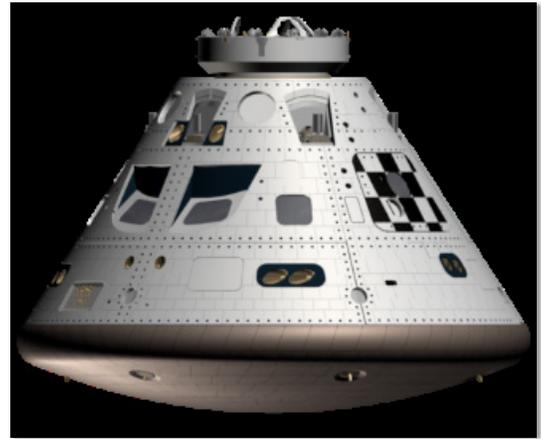


Figure 3. Illustration of the Orion command module. (NASA)

The Challenge

Teams of up to four students will design and build a model of a spacecraft with the goal to safely transport two astronauts on a mission to the Moon, Mars, or other destinations in space. A drop test will determine how well the astronauts are protected during landing. During the drop test, the model spacecraft will be deployed, or dropped, from a height of 2 meters to simulate landing. The hatch must stay closed. The astronauts must stay securely in their seats during the drop test.

Criteria and Constraints

1. **Astronaut Seats.** Each student team **must** design and build secure seats for two astronaut figures (figure height: 3 to 7 centimeters). The astronauts **must** stay in their seats during each drop test without being glued or taped in place.
2. **Hatch.** The spacecraft **must** have one hatch that opens and closes and is sized so the astronauts can enter or exit easily. The hatch **must** remain closed during all drop tests.
3. **Spacecraft Size.** The spacecraft **must** fit within the simulated rocket supplied by the facilitator. The rocket serves as a size constraint; the spacecraft will not be stored in or launched from this item. The total mass **must not** be more than 100 grams.

Multimedia Resource

To heighten student connections and understanding of Orion, watch “Orion: Trial By Fire” on NASA’s YouTube channel.

<https://www.youtube.com/watch?v=KyZqSwwKMHQ>

