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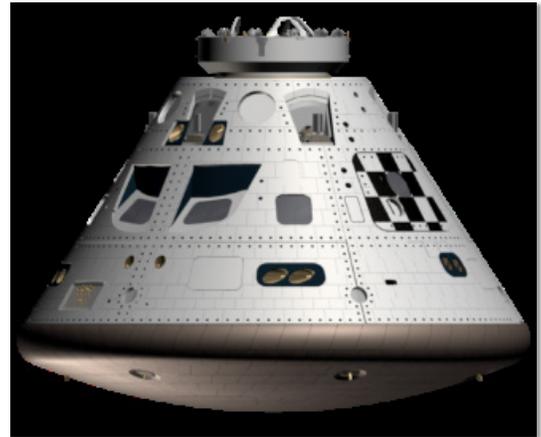
# Engineering Design Challenge: Spacecraft Safety

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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.

## The Challenge

Teams of up to four students will design and build a model of a spacecraft that can safely transport two astronauts on a mission to the Moon, Mars, or other destinations in space. A drop test will determine how well the spacecraft will protect the astronauts during landing. During the drop test, the model spacecraft will be deployed, or dropped, from a height of at least 2 m to simulate landing. The astronauts must stay securely in their seats during the drop test. The spacecraft must also have an internal tank for fuel.



*Figure 6. Illustration of the Orion command module. (NASA)*

## Criteria and Constraints

1. The spacecraft must carry two astronauts safely. Each astronaut is 3 to 7 cm tall. Each student team must design and build secure seats for both astronauts. The astronauts should stay in their seats during each drop test without being glued or taped in place.
2. The spacecraft must have one hatch that opens and closes and is sized so the astronauts can enter or exit easily. The hatch should remain closed during all drop tests.
3. The spacecraft must fit within the simulated rocket. The rocket serves as a size constraint, and the spacecraft will not be stored in or launched from this item.
4. The spacecraft must include an internal holding tank for fuel with a volume of 30 cm<sup>3</sup>.
5. The total mass cannot exceed 100 g.