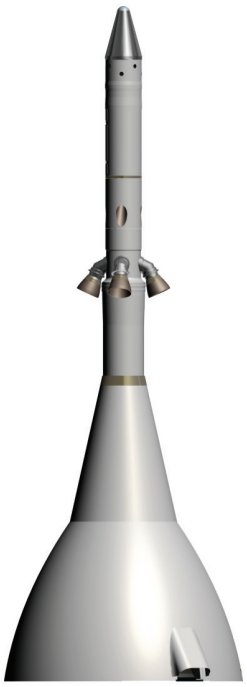
National Aeronautics and Space Administration

NASA facts

Constellation

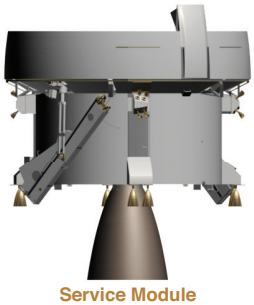
Orion Crew Exploration Vehicle

Orion—America's spacecraft for a new generation of explorers. Blazing a bold new journey of space exploration and discovery, NASA's Orion crew exploration vehicle will replace the space shuttle after it is retired in 2010. Orion is the flagship of NASA's programs for space exploration beyond low Earth orbit and a key element of NASA's Constellation Program to explore the moon, Mars and beyond.

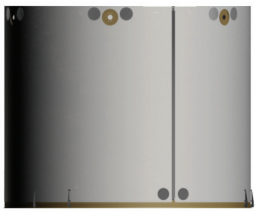


Launch Abort System

Crew Module



Service Module



Spacecraft Adapter

Orion Crew Exploration Vehicle Summary

Number of crew.....4 (lunar/International Space Station (ISS))
Crewed mission duration..... 21.1 days (active lunar)
Total change in velocity..... 5233 ft/s
Gross liftoff weight.....66,033 lbs (lunar)/60,003 lbs (ISS)
Effective mass to orbit.....48,231 lbs (lunar)/42,201 lbs (ISS)

Launch Abort System—Emergency Escape During Launch

Mass Properties Summary
Dry mass/propellant.....9,849 lbs/5,722 lbs
Gross liftoff weight.....15,571 lbs

Crew Module—Crew and Cargo Transport

Pressurized volume (total)..... 690.6 ft^3
Habitable volume (net)..... 316 ft^3
Reaction control system (RCS) engine thrust.....160 lbf/engine
Lunar return payload..... 220 lbs

Mass Properties Summary
Dry mass/propellant.....19,350 lbs/300 lbs
Oxygen/nitrogen/water..... 77 lbs
Landing weight..... 18,939 lbs
Gross liftoff weight.....19,650 lbs (lunar)/21,400 lbs (ISS)

Service Module—Propulsion, Electrical Power, Fluids Storage

Oxygen/nitrogen/water..... 694 lbs (lunar)/456 lbs (ISS)
Propellant weight.....17,433 lbs (lunar)/8,079 lbs (ISS)
Gross liftoff weight..... 27,198 lbs (lunar)/19,418 lbs (ISS)

Spacecraft Adapter—Structural Transition to Launch Vehicles

Gross liftoff weight.....3,614 lbs

The Orion Crew Exploration Vehicle

NASA is building a new space exploration vehicle that will one day take humans to the moon to live and work after the shuttle is retired in 2010. The new spacecraft is called the Orion crew exploration vehicle. Orion is just one part of the Constellation Program's fleet of vehicles that is being built to send human explorers to the moon and beyond.

Building on the best of Apollo and shuttle technology, NASA is creating a 21st-century exploration system that will be safe, affordable, reliable, versatile and reusable. Orion's size will allow it to transport up to four crew members to the International Space Station and the moon. It will be able to rendezvous with the Altair lunar lander and an Earth departure stage in low Earth orbit to carry the crew members to the moon. In the future, Orion could rendezvous in low Earth orbit with vehicles that will take explorers to other destinations in our solar system such as Mars.

Ares I Launch With Orion

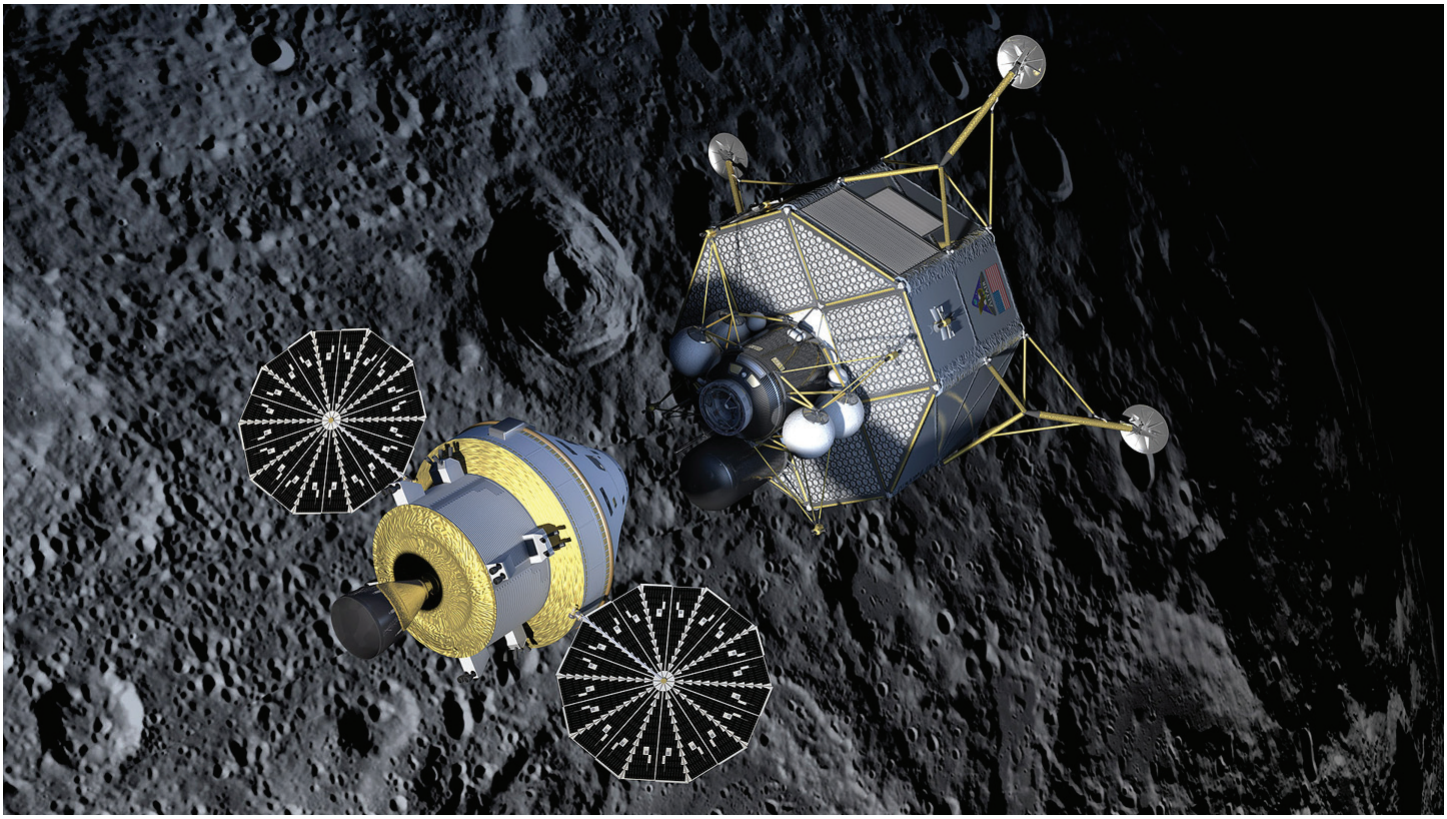
The Orion crew exploration vehicle will be launched into Earth's orbit by the Ares I crew launch vehicle. The Ares I first stage is a five-segment, reusable solid rocket and an upper stage powered by a J–2X engine. To maximize crew safety, Orion has incorporated a launch abort system to carry the crew safely away from possible life-threatening scenarios.

Ares V Launch With Altair

For missions to the moon, Orion will dock with Altair and an Earth departure stage in low Earth orbit. The Earth departure stage will propel Orion and Altair to the moon. Once they have reached the moon's orbit, astronauts will use Altair to travel to the moon's surface. Orion will stay in lunar orbit up to 210 days, awaiting return of the crew. After a stay on the lunar surface, the crew will return to the orbiting Orion using Altair as its ascent vehicle. Once the crew has reunited with Orion and Altair has been released, the service module main engine will provide the power for Orion to break out of lunar orbit and return to Earth.

Orion Returns to Earth

The service module supports the crew module until the two modules separate just before reentering Earth's atmosphere. The Orion crew module will reenter Earth's atmosphere and, with the use of parachutes, safely return the astronauts back to Earth.



With the crew inside, the Altair lunar lander undocks from the Orion crew exploration vehicle and begins its descent to the lunar surface.

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