

Space travel

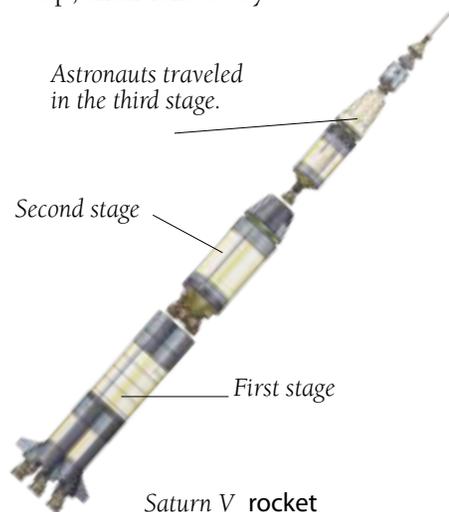
Human space travel began in 1961, when the Russian Yuri Gagarin orbited Earth. US astronauts landed on the Moon eight years later. Today, more than 400 astronauts have traveled into space in rockets or on the space shuttle. In the foreseeable future, astronauts may set up bases on the Moon and may even travel to Mars.

Rockets

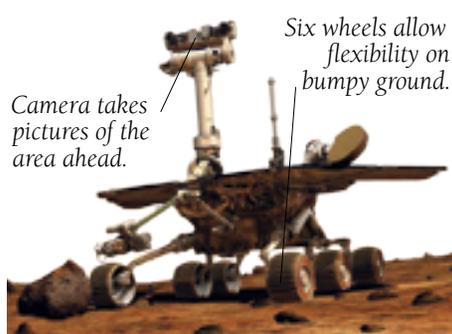
A space rocket lifts off from the ground and propels itself into orbit by means of a controlled explosion. Fuel is burned in a combustion chamber to produce a mass of hot gases. The gases expand and explode out of the nozzles at the bottom of the rocket, thrusting it upward.

Key facts

- As the rocket moves away from the pull of Earth's gravity, it can travel much faster.
- Because there is no oxygen in space, a rocket must carry a supply of oxygen to burn its fuel.
- Each section, or stage, of a space rocket fires until its fuel is used up, then falls away.



Landing craft



Mars rover

A manned or unmanned vehicle can land on a planet, moon, or asteroid, collect samples, take photographs, and conduct experiments. The landing craft has to be designed to function in difficult surface conditions, such as extreme temperatures or very low gravity. A rover vehicle has wheels so that it can survey a wider area.

Key facts

- Mars is the only planet that has been visited by robot vehicles. The rovers found frozen water in the Martian rocks.
- The Moon is the only body that humans have landed on.
- On three of the six missions to the Moon, astronauts used a vehicle called a lunar rover to travel around on the Moon's surface.

Space shuttle

The space shuttle was the first reusable spacecraft. It is made up of a winged orbiter that carries the crew and the cargo, twin booster rockets, and a fuel tank. It takes off like a rocket, but lands like an aircraft. The first space shuttle, *Columbia*, launched in 1981. Space shuttles regularly visited space for 30 years, until NASA's space shuttle fleet retired in 2011.



Space shuttle on takeoff

Key facts

- The space shuttle was used to launch space probes and satellites, and to carry out repairs and construction work in space.
- There are three space shuttle orbiters (now retired), named *Discovery*, *Atlantis*, and *Endeavour*.
- The external fuel tank is the only part that cannot be reused.



Space shuttle landing