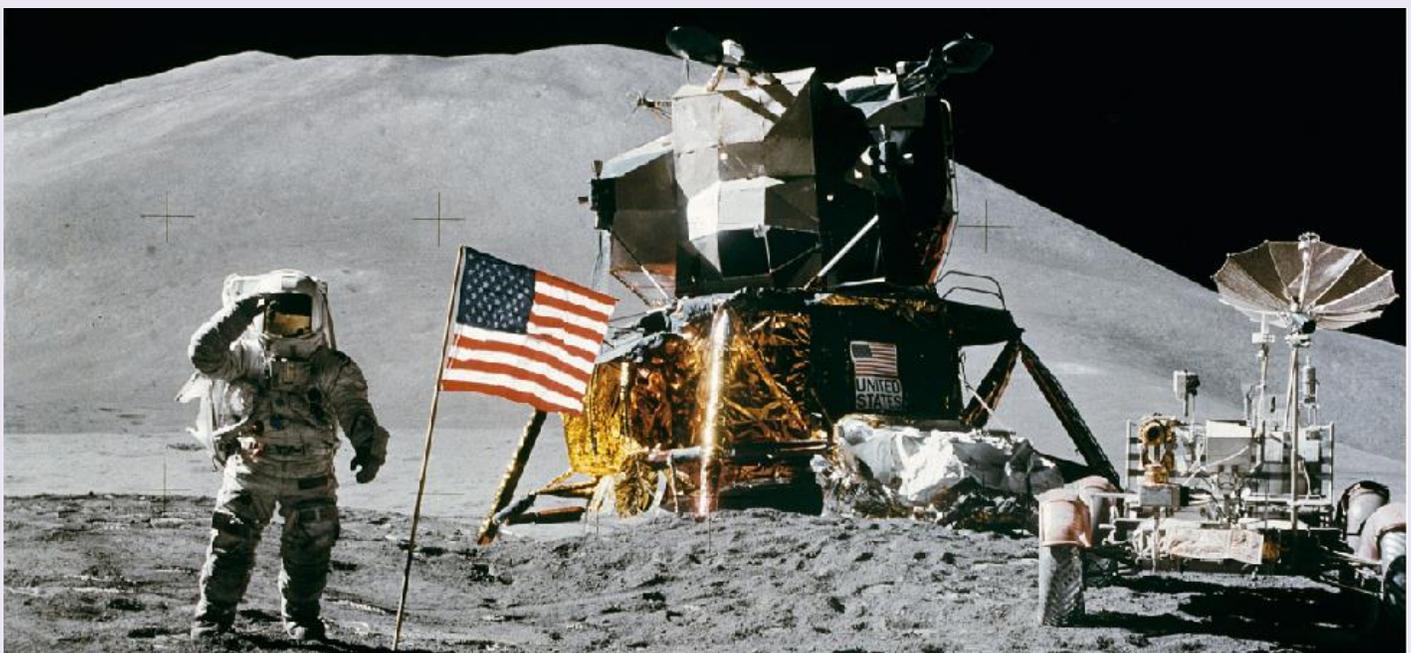


Access for free at <https://openstax.org/books/astronomy/pages/7-1-overview-of-our-planetary-system>

The solar system<sup>1</sup> consists of the Sun and many smaller objects: the planets, their moons and rings, and such “debris” as asteroids, comets, and dust. Decades of observation and spacecraft exploration have revealed that most of these objects formed together with the Sun about 4.5 billion years ago. They represent clumps of material that condensed from an enormous cloud of gas and dust. The central part of this cloud became the Sun, and a small fraction of the material in the outer parts eventually formed the other objects.

During the past 50 years, we have learned more about the solar system than anyone imagined before the space age. In addition to gathering information with powerful new telescopes, we have sent spacecraft directly to many members of the planetary system. (Planetary astronomy is the only branch of our science in which we can, at least vicariously, travel to the objects we want to study.) With evocative names such as *Voyager*, *Pioneer*, *Curiosity*, and *Pathfinder*, our robot explorers have flown past, orbited, or landed on every planet, returning images and data that have dazzled both astronomers and the public. In the process, we have also investigated two dwarf planets, hundreds of fascinating moons, four ring systems, a dozen asteroids, and several comets (smaller members of our solar system that we will discuss later).

Our probes have penetrated the atmosphere of Jupiter and landed on the surfaces of Venus, Mars, our Moon, Saturn’s moon Titan, the asteroids Eros and Itokawa, and the Comet Churyumov-Gerasimenko (usually referred to as 67P). Humans have set foot on the Moon and returned samples of its surface soil for laboratory analysis ([Figure 7.2](#)). We have even discovered other places in our solar system that might be able to support some kind of life.



## Identify all true statements:

- The solar system was formed about  $4.5 \cdot 10^9$  years ago.
- The current theory is that the Sun was formed from a large cloud of gas and dust, and later entered a region full of debris where it picked up the planets and asteroids.
- Only a small portion of the material in the outer portion of the protoplanetary disk was used to create the planets.
- Spacecraft have been sent to study four ring systems.
- Humans have landed a spacecraft on the surface of Saturn.

Question code follows. The text of both parts of the True/False pair is in boldface:

\$n=0

\$isTrue="The solar system was formed about  $4.5 \cdot 10^9$  years ago."

\$isFalse="The solar system was formed about  $4.5 \cdot 10^6$  years ago."

\$questions[\$n]=ifthen(\$TFs[\$n]==1, \$isTrue, \$isFalse)

\$n=1

\$isTrue="The current theory is that the Sun, planets and debris formed from a large cloud of gas and dust."

\$isFalse="The current theory is that the Sun was formed from a large cloud of gas and dust, and later entered a region full of debris where it picked up the planets and asteroids."

\$questions[\$n]=ifthen(\$TFs[\$n]==1, \$isTrue, \$isFalse)

\$n=2

\$isTrue="Only a small portion of the material in the outer portion of the protoplanetary disk was used to create the planets."

\$isFalse="Most of the material in the outer portion of the protoplanetary disk was used to create the planets."

\$questions[\$n]=ifthen(\$TFs[\$n]==1, \$isTrue, \$isFalse)

\$n=3

\$isTrue="Spacecraft have been sent to study four ring systems."

\$isFalse="Spacecraft have been sent to study more than a dozen ring systems."

\$questions[\$n]=ifthen(\$TFs[\$n]==1, \$isTrue, \$isFalse)

\$n=4

\$isTrue="Humans have landed a spacecraft on the surface of Saturn."

\$isFalse="Humans have landed a spacecraft on the surface of a moon of Saturn."

\$questions[\$n]=ifthen(\$TFs[\$n]==1, \$isTrue, \$isFalse)