

# Space Systems

By Encyclopædia Britannica, adapted by Newsela staff  
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All objects attract other objects because of a force called gravity. Gravity is a pulling force that works across space. That is, objects do not have to touch each other for the force of gravity to affect them. For example, the sun, which is millions of miles from Earth, pulls on Earth and the other planets and objects in the solar system.

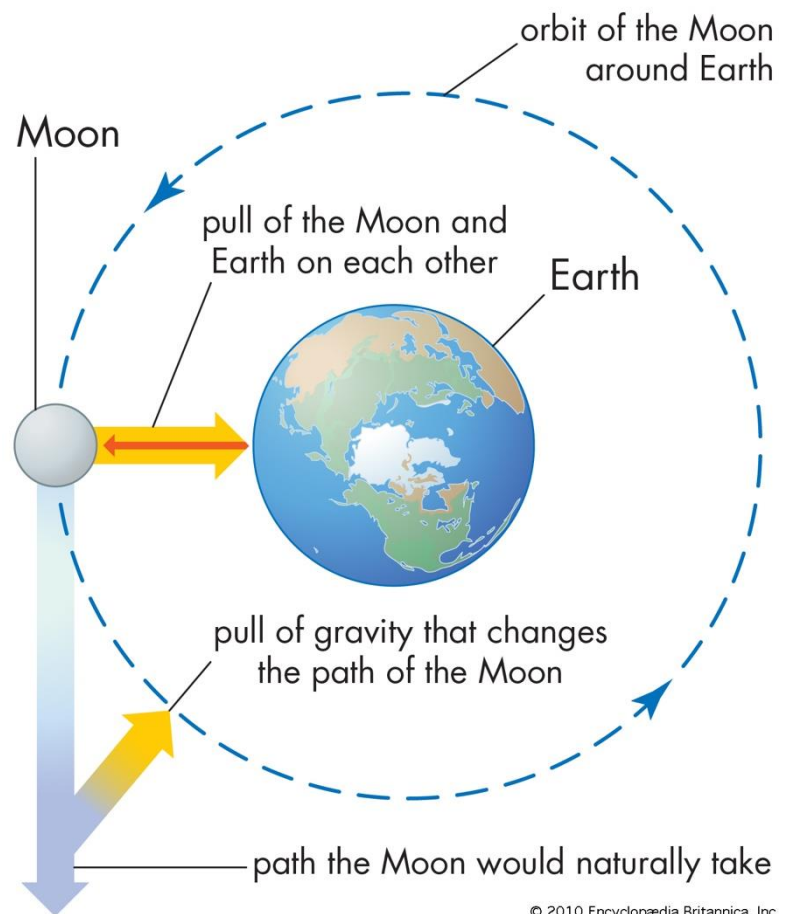
## Gravity On Earth

On Earth gravity pulls objects toward the center of Earth. This is what makes objects fall. It is also what gives an object weight. Weight is a measurement of the force of gravity between an object and the surface it stands on. If a person stands on a scale, gravity pulls the person against the scale. The scale shows the strength of this force, or the person's weight.

## Gravity In Space

In the solar system the planets all orbit, or travel around, the sun in a constant path. They would move in a straight line, but the force of gravity pulls them toward the sun. **Simultaneously**, the speed of the planets in their orbits keeps them from falling into the sun.

Spacecraft and satellites travel around Earth in a similar way. So does Earth's moon. Earth's gravity **maintains** these objects in their orbit, and their speed keeps them from falling back to Earth.



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*Gravity keeps the moon moving in an orbit around Earth.*

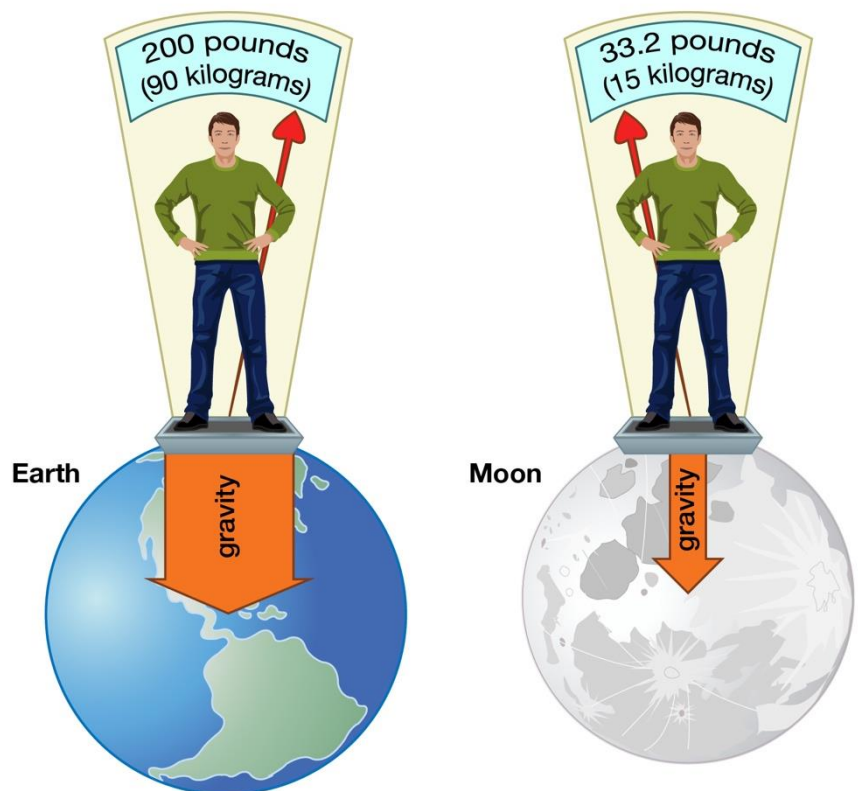
When astronauts are inside a spacecraft in orbit, they experience weightlessness. The astronauts are **suspended** freely because they are traveling around Earth at the same speed as the spacecraft. But even though Earth's gravity does not pull them toward the floor—as it does on Earth—they have not escaped it. Earth's gravity keeps the astronauts in orbit, just as it does the spacecraft.

## Newton's Law Of Gravity

The pull of gravity on Earth is greater than it is on the moon because Earth is much larger and has more mass. So a person weighs less on the moon than they do on Earth.

Isaac Newton, an English scientist, discovered a law, or truth, about gravity in the late 1600s. Newton said that the force of gravity between objects depends on their mass, or the amount of material they contain. The greater the mass of an object, the greater is its force of gravity. For example, the sun, which has a **mammoth** mass, has a greater force of gravity than Earth, which has a much smaller mass. Even a speck of dust has a force of gravity. But its gravity is extremely small.

### Effect of gravity on Earth versus on the Moon



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Images of the Moon and Earth are not to scale

The force of gravity also **varies** based on the distance between two objects. The smaller the distance, the more powerful the force of gravity between them.

Adapted from <https://newsela.com/read/elem-sci-gravity/id/30036/>