



EXPLORING THE UNIVERSE

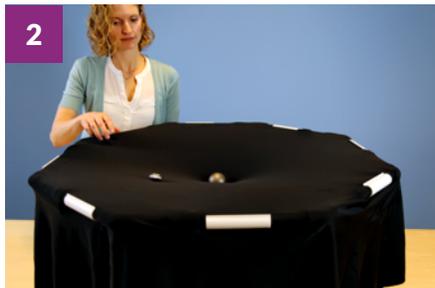
Orbiting Objects

Try this!



Place the largest ball in the center of the black fabric. Gently roll one of the smaller balls around the center ball. What do you notice?

Tip: To make a ball “orbit,” start near the rim and roll it along the edge of the well (not straight down to the center).



Keep experimenting with different balls. Can you get two balls to revolve at the same time? What does this remind you of?



Now, place the small, heavy ball in the center. What happens when you roll the largest ball?

The force of gravity influences everything in space.

Every object in space exerts a gravitational pull on every other object.

We're familiar with gravity as the force that pulls objects toward the center of Earth, but gravity isn't just present here on Earth. Across the entire universe, any object with mass exerts a gravitational pull. Gravity is what makes pieces of matter clump together into planets, moons, and stars. Gravity keeps planets and other objects in orbit around their stars. And gravity is what makes stars cluster together in huge, swirling galaxies.



Gravity keeps the Moon in orbit around Earth, and Earth in orbit around the Sun.

This activity lets you play with gravity and observe the way objects can revolve around other objects. The gravity well is just a model, and in this model the objects don't stay in motion very long. That's because friction between the balls and the fabric removes some of the energy of the orbiting balls and causes them to drop down into the well. There is very little friction in space, so objects in space aren't affected in the same way.

The force of gravity keeps objects in orbit around other objects. Most objects in the universe are in orbit. This includes the Moon and satellites going around Earth, planets orbiting a star, and the solar system orbiting the center of the Milky Way galaxy. Without gravity, objects wouldn't stay in orbit—they would fly off into space!



NASA scientists bounce light off reflectors on the Moon to measure its orbit.

NASA scientists can study the orbit of the Moon around Earth thanks to a special delivery made by astronauts. In the 1960s and 1970s, Apollo astronauts visiting the Moon left reflectors on the Moon's surface. Scientists on Earth send beams of light toward these reflectors and measure the time it takes for the light to be reflected back. This information allows researchers to measure the Moon's orbit very accurately.