

Science Benchmark: 03 : 01

Earth orbits around the sun, and the moon orbits around Earth. Earth is spherical in shape and rotates on its axis to produce the night and day cycle. To people on Earth, this turning of the planet makes it appear as though the sun, moon, planets, and stars are moving across the sky once a day. However, this is only a perception as viewed from Earth.

Standard I:

Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.

STUDENT BACKGROUND INFORMATION

Dance of Earth and Moon

Think of a time when you were camping or boating or just out at night looking at the sky. Suddenly, you see a very bright, round object rise in the sky from behind a mountain. This round object not only lights up the night sky, but it makes things seem brighter around you.



This object is brighter than the stars but not as bright as the sun. What is it? Of course, it is the *moon*.



When viewed from Earth the moon looks like it is glowing. The moon doesn't make its own light. So, what makes it shine in the sky? As the sun's light shines on the moon, the light bounces off the moon's surface to our eyes. Earth does the same thing. If you were on the moon looking at Earth, you would see the sun's light bounce off Earth. In fact, light bounces off all the planets and moons in our solar system. That's how we know they are there.

moon - *a natural, rocky object that goes around a planet*

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Do you think that Earth and the moon have the same *appearance*, as seen from space, or do you think they look different? What does Earth look like from space? You can see the land, the water, and the clouds that surround it in the air. Since Earth has more water than land, it looks blue. You can also see the thin layer of air that is around Earth. What do you think the moon looks like from space? You can see that the moon has hundreds of shallow holes on it made by rocks which fell from space. You can also see mountains made from volcanoes and dark patches made by the lava. Because the moon has no water or air, it looks light gray from space. How do Earth and the moon look the same? If you guessed that they are both *spheres*, you are correct. The moon is much smaller than Earth. Earth appears to be about four times larger than the moon.



Moon and Earth

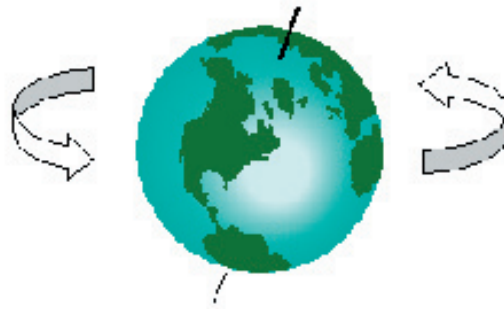
Another object we see in our sky each day is the sun. We could not live without it. Each day we see the sun rise at the beginning of the day and set at the beginning of the night. However, the sun always stays in the same place. Have you ever wondered why the sun seems to be moving in the sky? Have you ever wondered why we have night and day? Look at the picture of Earth on the next page. Since Earth is round, sunlight can only shine on half of Earth at one time. Earth doesn't stay still. Earth rotates or spins around on an *axis*. This *rotation* brings the sun into our view in the morning; we call this a sunrise. As Earth continues to rotate, the sun seems to move across the sky. Finally, the rotation of Earth takes the sun out of our view in the evening; we call this a sunset. In a few hours as Earth continues to rotate the sun will seem to come up again. The time it takes Earth to make a full rotation is 24 hours or one day.

appearance - *the way something looks*

axis - *an imaginary line that goes through the center of a planet*

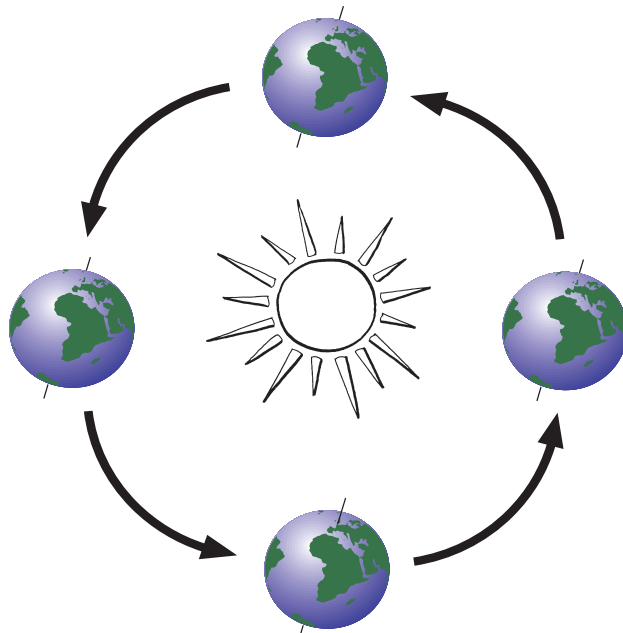
rotation - *the spinning of an object (planet) around its own axis*

sphere - *round like a ball*



Rotation of Earth

The rotation of Earth brings the sun in and out of view. When the sun is out of view and it is dark, what do you see in the sky? Yes! Stars appear in the night sky. Have you ever watched those stars closely at night for a couple of hours? If you have, you probably noticed that they seem to be moving across the sky. Many stars go in and out of view like the sun. What do you think is happening? It is the rotation of Earth that makes them seem to appear to be moving across the sky.



Earth's revolution around the Sun.

As Earth rotates, causing night and day, it also takes a long journey around the sun. This yearly journey is called a *revolution*. This revolution takes 365 days, or one year. Earth follows an *orbit* on this journey around the sun.

We can understand these ideas of rotation and revolution better by using a globe of Earth as a *model*. Put a lamp with its shade off in the middle of a room. Turn on the lamp light. Hold the globe in the air about ten feet away from the lamp. Spin it. This represents Earth rotating on its axis.

What do you notice about the light on the

globe? As the globe spins, the light shines on different parts of the globe while other parts are dark. This model shows how we get night and day from the rotation of Earth. Remember, Earth rotates on its axis once every 24 hours to produce the night and day cycle.

model - a small-sized copy of something

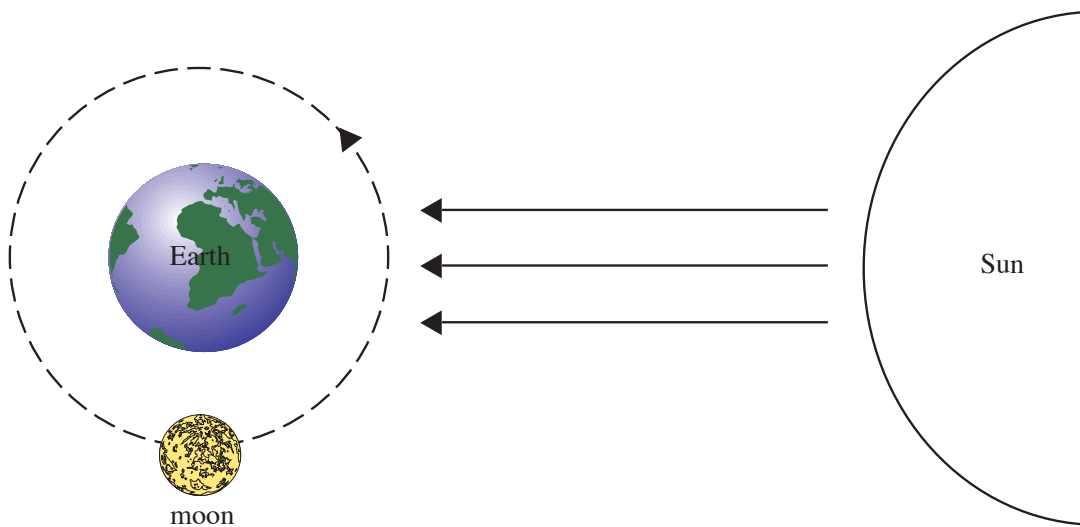
orbit - the path an object in space follows as it revolves around another object

revolution - an object in space makes one complete circle around another object in space

Our model can also show Earth's revolution around the sun. With the globe in hand, walk around the lamp in a circle, and stop where you started. This represents Earth's revolution around the sun. It takes Earth about 365 days to go around the sun. If you were to continue to walk around the lamp in the exact path, this would represent Earth's orbit.

Using the same model, hold a star behind the globe about twenty feet away from the globe. Now, spin the globe. If we were on the globe, when would we be able to see the star? What does the star seem to be doing as Earth rotates? As the globe spins, the star seems to move across the night sky.

Let's find out more about the moon. Possibly you have noticed that sometimes the moon is up during daylight hours. Sometimes it is up during nighttime hours. This is because the moon doesn't stay in the same place in space like the sun does. The moon moves around Earth in an orbit just as Earth moves around the sun. When the moon has made one complete circle around Earth, it too, has made one full revolution. This revolution takes about twenty-eight days for the moon to orbit Earth.



As Earth rotates on its axis, the moon goes in and out of our view each day just like the sun and stars do. Therefore, the moon seems to rise, move across the sky, and set. Because the moon orbits Earth, it makes its own schedule when it appears and disappears from our view each day. Each day we see the moon, it has orbited around Earth a little more. This makes the moon come up a little later each day.

Make a model of the moon orbiting Earth. With the lamp in the middle of the room, have a student hold the globe, and have another student revolve slowly around the globe with a small ball in hand representing the moon. Can you see how the moon seems to move across the sky after coming into view? As the student with the ball is revolving around the globe, can you see how sometimes the moon can be seen during the day and sometimes at night? When the ball returns to the same place it began, this represents a full revolution of the moon around Earth. Using a model can help us understand science.

Science Language Students Need to Know and Use

- 1. appearance:** the way something looks
- 2. axis:** an imaginary line that goes through the center of a planet
- 3. model:** a small-sized copy of something
- 4. moon:** a natural, rocky object that goes around a planet
- 5. orbit:** the path an object in space follows as it revolves around another object
- 6. revolution:** one orbit of an object in space around another object in space
- 7. rotation:** the spinning of an object (planet) around its own axis
- 8. sphere:** round like a ball