



FIRST GRADE



1 WEEK LESSON PLANS AND ACTIVITIES

UNIVERSE CYCLE OVERVIEW OF FIRST GRADE

UNIVERSE

WEEK 1.

PRE: Describing the Universe.LAB: Comparing and contrasting bodies that reflect light.POST: Exploring the meaning of stars.

SOLAR SYSTEM

WEEK 2.

PRE: Differentiating between a star and a planet.LAB: Discovering the surface of some planets.POST: Comparing and contrasting the planets of our Solar System.

EARTH

WEEK 3.

PRE: Comparing night and day.LAB: Exploring rotation on the Earth's axis.POST: Analyzing evidence that the Earth rotates.

GEOGRAPHY

WEEK 4.

PRE: Discovering a relief map. LAB: Exploring with a compass. POST: Comparing geographic locations.



UNIVERSE CYCLE - EARTH (1)

PRE LAB

OBJECTIVES:

- 1. Comparing night and day.
- 2. Exploring the movement of the Earth.

VOCABULARY:

axis day Earth night revolve rotate

MATERIALS:

What makes Day and Night by F. Branley (Harper) or an equivalent book on night and day

BACKGROUND:

The Solar System and all its planets are in constant motion. Each of the planets revolves around the Sun. The planets also rotate, or spin, around an internal axis. One manifestation of rotation is the cycle of night and day. Day after day, month after month, year after year, the alternation of night and day continues. Sometimes it is sunny outside, and other times it is dark. In addition to rotation, day and night occur because the Earth is spherical. When a portion of the Earth faces the Sun, it is daytime. When the same are rotates away from the Sun, it is nighttime. The cycle of light and dark is continuous except near the North and South Pole. During the Northern Hemisphere summer, the North Pole always faces the Sun, so daytime is continuous for several weeks. At the same time, the South Pole faces away from the Sun (Southern Hemisphere winter) and is in continuous night.

The origin of night and day is very difficult for children to understand. The idea that the dark side is really a shadow of the planet as it rotates away from the Sun's rays is difficult to imagine. The rotation of the Earth on its axis, is also not easy to understand, because we cannot feel this motion.

Rotation and revolution also cause the seasons. The Earth's axis is tilted 23.5° from vertical. This means that solar energy strikes the Earth unevenly. It is summer in the Northern Hemisphere when the North Pole tilts toward the Sun. This puts the Sun more

Students learn about night and day through reading a book.



overhead, so solar energy strikes the Earth most directly. In half of a revolution the North Pole tilts away from the Sun, making solar energy least direct, so it is winter.

PROCEDURE:

1. Read *What makes Day and Night* to the class. All of the students are of course familiar with day and night, but they may have never wondered why this cycle takes place. This book helps students understand that the rotation of our Earth on its axis causes night and day. Review the pictures and models in the book, so that they can begin understanding night and day. In the Lab, the students will do some of the experiments discussed in the book.

2. To illustrate rotation and revolution, draw the following pictures on the board. Explain that the Earth rotates on its axis, but revolves around the Sun at the same time. Explain that night and day is caused by rotation, and that the seasons are caused by the tilt of the axis and the revolution around the Sun.





Rotation around an axis

Revolution (around another body)

3. Have the students stand up, and rotate or spin. Make sure they understand that this is rotation.

Have students work in pairs. Have one student revolve around the other. Explain that this is revolution.

4. Tell the students that the Earth rotates as it revolves around the Sun. Ask them to figure out what these motions will look like, using one pair of students. Don't let them do these activities for too long or else you will have many dizzy students!

UNIVERSE CYCLE - EARTH (1)

LAB

OBJECTIVES:

- 1. Exploring rotation on the Earth's axis.
- 2. Comparing rotation and revolution.

VOCABULARY:

axis Earth revolve rotate

MATERIALS:

Planetarium (moving solar system) flashlight inflatable world globes

Students simulate day and night.



Full Moon

BACKGROUND:

The Earth is always rotating, spinning eastward. We do not sense this motion, however, because everything else on the Earth's surface is moving as well. There is no independent frame of reference for observing rotation. Viewed from space, however, the Earth is clearly spinning. A point on Earth takes 24 hours to complete one rotation and come back to its starting point. The Earth spins completely once in 24 hours or in 1 day. The axis is the internal line around which the Earth rotates. The axis is tilted 23.5° from



an imaginary vertical line drawn through the Earth.

Light rays from the Sun touch only the side of the Earth that is facing the Sun. While the Earth is spinning on its axis, it is also revolving around the Sun.

The Moon revolves eastward around the Earth, taking 29.5 days to complete one orbit. The phases of the Moon are complex when fully explained; at this point the students need to be able to distinguish between a full Moon and a new Moon. A full Moon is when we see the complete Moon

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from the surface of the Earth. This takes place when the Moon is in the outer part of its orbit, and sunlight and reflected sunlight (from the Earth) shine on it. During a new Moon, we cannot see any of the Moon in the night sky. This occurs when the Moon is between the Earth and the Sun.

PROCEDURE:

1. Have the students look at the planetarium. Revolve the system. Make sure that they observe that the Earth is spinning and turning at the same time. You may want to tell the students that the Sun is also moving in space, but this model does not show it. In reality, Venus and the Moon also move, but this model does not illustrate this. This may differ, depending on the type of planetarium system your school has available.

2. Explain why the Earth has night and day. Divide the students into groups of two. Give each group a flashlight. Instruct them to think about creating day and night. Have one student be the Sun by holding the flashlight. The other student is the Earth. You may want this student to hold an inflatable world globe to be more realistic.

3. Darken the classroom, and have a pair of students "create night and day". You may need to give them detailed instructions. Have the Earth students go into "day position" by facing the Sun student, then in to "night position" by facing away from the Sun. The correct positions are illustrated below.

Check each position. Have the students change positions and repeat the exercise.



4. Explain the difference between a new Moon and a full Moon to the students. Group the students into threes. Have one student be the Sun, one the Moon, and one the Earth. Again, have the Sun hold the flashlight. This time the Sun will shine on the Moon.

The Earth student and the Moon student first arrange themselves in the new Moon position, as shown in the diagram. Make sure they see that the "sunlight" shines on the side of the Moon away from the Earth. Next, have the Moon student revolve half way around the Earth person. The key objective is for the students to recognize there is a lot of motion occurring all the time in the Solar System.



UNIVERSE CYCLE - EARTH (1)

POST LAB

OBJECTIVES:

Students use chalk on the playground to observe moving shadows.

- 1. Discussing what creates seasons.
- 2. Analyzing evidence that the Earth rotates.

VOCABULARY:

axis east north season south tilt west

MATERIALS:

pictures of Earth from space chalk inflatable globe

BACKGROUND:

A season is one of the four periods of the year including spring, summer, autumn, and winter. Seasons are defined in two ways. Climatic seasons reflect changes in temperature, weather, and the length of daylight. The length of climatic seasons varies, for example at high northern latitudes winter is relatively long and summer is relatively



Summer in the Southern Hemisphere, winter in the Northern Hemisphere

short.

Astronomical seasons are defined by the position of the Sun with respect to the Earth. Because the Earth's rotational axis is tilted 23.5⁰, the overhead position of the Sun changes throughout the year. The Sun appears to migrate more overhead in summer, and less so in winter. For the Northern hemisphere, the astronomical



summer begins on the summer solstice, which is the day the Sun reaches its most northern, most overhead position. As the Sun moves back south, it comes directly over the equator. This marks the autumnal equinox, or the start of astronomical autumn. When the Sun reaches its southernmost point below the equator, it is the winter solstice, or the start of the winter season. Finally, as the Sun moves back north, it again crosses the equator. This is the vernal equinox, and the start of spring.

The climatic seasons correspond to the astronomical seasons because the Northern hemisphere is warmed when it is close to the summer solstice, because the Sun is more directly overhead. Likewise, the Northern Hemisphere grows cool as the Sun moves south, and the seasons transition through fall and into winter.

PROCEDURE:

1. Show the students pictures or slides of the Earth as seen from space. Point out the clouds, oceans, and land.

2. Show the inflatable globe to the class. The globe shows the oceans and land masses. Have them find the general area where they live.

Point out that the globe is tilted, and explain that this is because the Earth is tilted on its axis relative to the Sun. Explain how this causes the seasons. Some students may notice that when the northern hemisphere tilts away from the Sun, the southern hemisphere tilts toward the Sun. Explain that our summer season is the winter season in the southern hemisphere.

3. In the following activity, the students will demonstrate that the Earth is rotating by watching changes in shadows cast by the Sun. Go outside to the playground, and have the students find the shadow cast by a pole. If many shadows are available, divide the class into groups. Have the students outline the shadow, or a portion of it, with chalk. Record the time. Come back in one or two hours. Have the students mark where the shadow is now located. Explain that the shadow has moved because the Earth has turned (rotated) while the Sun has stayed in the same place.

Ask the students if they think shadows help us tell time. They may make the connection between the passage



of time and the movement of the shadow, and answer yes, which is correct. Explain again that because the Earth is rotating, the shadows change position (this is how sundials work).

4. Ask the students where the Sun comes up every morning. They should have the sense that it always rises in the east. Ask them about sunset. Again, they may know that the Sun sinks in the same general area all the time. Explain that in reality, it is not the Sun

that moves, but the Earth. As the Earth rotates toward the Sun, we experience sunrise, and as it rotates away, we experience sunset.