

Teacher's Guide Grade 5: Earth Cycles



TEKS 5.8 Earth and Space: The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon systems. The student is expected to:

- C) demonstrate that the Earth rotates on its axis once approximately every 24 hours causing the day/night cycle and the apparent movement of the Sun across the sky.



Background Information: This unit reinforces the concept of recognizing patterns in the natural world. It presents models that help students visualize and understand how the rotation of the Earth on its axis, approximately once every 24 hours, causes the day/night cycle we experience on Earth.

It helps them understand and visual that the Sun only appears to move across the sky due to our position on Earth, and our changing view of the Sun from Earth as the Earth rotates on its axis. Students also learn more about the lunar cycle and phases of the Moon, and recognize that although the Moon appears to change shape during the month, it is an illusion caused by our changing view of the Moon from Earth as the Moon orbits the Earth. This happens in a predictable pattern that takes place approximately every 28 days. In reality, half of the Moon is always illuminated with light from the Sun. At times we just can't see the part that is illuminated, or can only see part of that side of the Moon.

The content in this unit reinforces the knowledge of why we experience changes in seasons. Students are able to observe and visualize how the tilt of Earth's axis causes the angle at which the Sun's rays strike the Earth to change as Earth orbits the Sun over the period of a year.



Prerequisite Knowledge: Prior to this year, students identified events that have repeating patterns, including seasons of the year and day and night. They are able to describe and illustrate objects in the sky such as clouds, the Moon and stars, and the Sun.

Students have observed and recorded changes on the appearance of

objects in the sky such as clouds, the Moon, and stars, and the Sun. They have also constructed models that demonstrate the relationship of the Sun, Earth, and Moon that includes their respective orbits and positions. Students have collected and analyzed data to identify sequences and predict patterns of change in shadows, tides, seasons, and the observable patterns of the Moon over time.



Common Misconceptions: Students may have misconceptions about the Earth's rotation and what causes day and night. It is common for students to believe that the Moon covers the Sun, or that the Sun goes behind the Earth once a day, causing the day/night cycle.

Students observe that the Sun changes position in the sky during the day and may believe the Sun orbits the Earth. The Sun rotates on its axis, but it is the center of the solar system about which other objects revolve. The Sun does not revolve around any other object.

A major misconception held by many students, and adults as well, is that the shadow of the Earth causes the phases of the Moon. This is not true. The only time the shadow of the Earth causes changes in the appearance of the Moon is when the Earth is between the Moon and the Sun during a lunar eclipse.



Essential Questions:

1) What causes the pattern of day and night on the Earth?

The Earth rotates, or spins, on its axis once every 24 hours. As this takes place, daytime occurs on the side of the Earth facing the Sun and nighttime night occurs on the side of the Earth facing away from the Sun.

2) Why does the Sun appear to move across the sky throughout the day?

This is an illusion caused by the rotation of the Earth on its axis. The Sun does not move across the sky. It is the center of the solar system and does not revolve. Our view of the Sun changes throughout the day as the Earth rotates on its axis. From our position on the Earth, the Sun appears to move across the sky during the day, but we are the ones who are actually moving.

3) What causes the pattern of seasonal changes on Earth?

The Earth is tilted at a 23.5 degree angle on its axis. As the Earth

revolves around the Sun, the northern hemisphere is tilted towards the Sun. It receives more direct rays from the Sun which causes people in the northern hemisphere to experience summer. At the same time, the southern hemisphere is tilted away from the Sun and receives less direct rays from the Sun. This causes people in the southern hemisphere to experience winter.

- 4) What causes the lunar cycle, or the pattern of predictable changes in the appearance of the Moon that we observe during the month?

The Moon has no light of its own. The light seen from the Moon is reflected sunlight. The amount of the Moon's reflected light that is visible from Earth gradually changes from one night to the next as the Earth rotates on its axis and the Moon revolves around the Earth. This causes the Moon to appear to change shape as our view of the Moon changes during the month. These changes are known as the phases of the Moon and occur in a predictable pattern known as the lunar cycle. As the Moon revolves around the Earth, the Sun shines on the half of the Moon that faces it, leaving the other half of the Moon in darkness. We cannot always see the full side of the Moon that is illuminated by the Sun. Sometimes we can only see part of it, and sometimes we can't see it at all.

- 5) What causes the pattern of high and low tides on Earth?

High and low tides are usually experienced twice a day. There is usually one high tide and one low tide during the morning and one high tide and one low tide in the evening. This is due to the Moon's gravitational pull on the oceans on the Earth as it revolves around the Earth once every 24 hours.



Notes: