

Teacher's Guide

Grade 5: Characteristics of the Sun, Moon, and Earth



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:

D) identify and compare the physical characteristics of the Sun, Earth, and Moon.



Background Information: In this unit, students learn about the characteristic features of the Earth, the Moon, and the Sun. They will compare characteristics, such as mass, size, density, gravity, presence and/or composition of an atmosphere, temperature range, presence of water, the core, and the makeup of their surfaces. They learn about solar winds, sunspots, and solar flares and understand that reactions in the Sun's core produce energy which we experience on Earth as light and heat.



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



Common Misconceptions: Students often have various misconceptions about the Moon. It is common for students to believe that the moon is only visible at night, that it produces its own light, and that the phases of the moon are caused by the Earth's shadow. Moon phases are actually caused by the motion of the moon around Earth, as well as the lighting of the Moon by the sun.

Students may believe the Moon orbits the Sun, when in reality it orbits the Earth and the Earth orbits the Sun.

Due to their view of the Moon and Sun from Earth, students may believe the Moon is bigger than the Sun. This is an illusion caused by the fact that the Moon is so much closer to Earth than is to the Sun which makes it appear larger from our perspective.

Students may believe the Sun is a large star. In reality, the Sun is a medium-sized star. It is the only star in our solar system. It's proximity to Earth makes it appear larger than other stars because other stars are so very far away.



Essential Questions:

1. How do the physical characteristics of the Sun affect life on Earth?

The Sun is a star made of burning gases. It provides light and heat energy to the Earth which makes life on Earth possible. It is much larger than the Earth and has much more mass which gives it a much stronger gravitational pull. The Sun's strong gravitational pull keeps the Earth traveling in orbit around it.

2. Which physical characteristics of the Moon prevent us from living there?

The Moon has no atmosphere and as a result there is no air to breathe. There is no weather without an atmosphere, resulting in extreme temperatures and no precipitation. It is believed the only water on the Moon is ice frozen in deep craters. Without an atmosphere, the Moon's surface and people living there would be unprotected from objects that may impact it.

3. Why is the Sun's gravity greater than the Moon's or the Earth's?

The amount of gravity an object has depends of its mass. The Sun's gravity is much greater than the Moon's or the Earth's because the Sun's mass is so much greater than the Moon's or the Earth's.

4. How are the Earth and Moon alike and how are they different?

The Earth and the Moon both rotate on an axis. They are both terrestrial objects, which means they have a solid, rocky surface. They both receive light and heat energy from the Sun. They are believed to be formed from the same substances. They both orbit other objects.

The Earth has an atmosphere that helps protect the surface of the Earth from objects that can impact it from space. The atmosphere is made of gases that keep the Earth from getting extremely hot or cold and along with the Sun, it is responsible for our weather. The Moon does not have an atmosphere, so it experiences extreme hot and cold temperatures. There is no atmosphere to protect it from impacts and to cause weather so there is no weathering and erosion of its surface. This is why its surface is covered with impact craters.

The Moon is 1/4 the size of the Earth, so it has less mass and 1/6 its gravitational pull.

Water covers almost $\frac{3}{4}$ of Earth's surface. Scientists believe if there is any water on the Moon, it is in the form of ice found only in deep craters.

- 5) How do characteristics of the Sun compare to the characteristics of the Earth and Moon?

The Sun is a star. The Earth is a planet and the Moon is a natural satellite of the Earth. Their characteristics are very different. The Sun is much more massive than the Earth, which is more massive than the Moon, so the Sun's gravitational pull is also much stronger than either of these.

The Sun is made of burning gases, mostly hydrogen and helium, while the Earth and the Moon are terrestrial, or rocky.

The Sun rotates on its axis, as do the Earth and Moon, however it is the center of the solar system and does not revolve or orbit another object. Earth revolves around the Sun and the Moon revolves around the Earth.

The Sun has an atmosphere that consists of charged particles. It experiences cooler areas on its surface called sunspots and it emits energy into space when solar flares occur, but there is no weather on the Sun. It is extremely hot all the time.

All three have a core, but the Sun's core is made of superheated gases while Earth and the Moon have solid cores of iron.



Notes: