5th Grade Science
Curriculum Sample

A Grade Ahead will challenge your students and help them achieve their goals!

In our 16-week science enrichment program, your child will learn and apply science concepts to real-world situations through experiments and develop strong critical thinking and analytical skills.

Each week will have an in-depth lesson and homework exercises. We make it easy to implement at home!

1. **Learn a lesson:** new topics are introduced each week.
2. **Begin the homework with a kitchen experiment each week.** A list of household supplies required is provided.
3. **Complete four days of homework** to ensure complete understanding of the week's topic.
4. **Check your success** with the answers provided.

Want to try an experiment and see what the homework looks like?

We have attached a full day's sample for you to print and try at home! Your kids can have fun and learn at the same time.

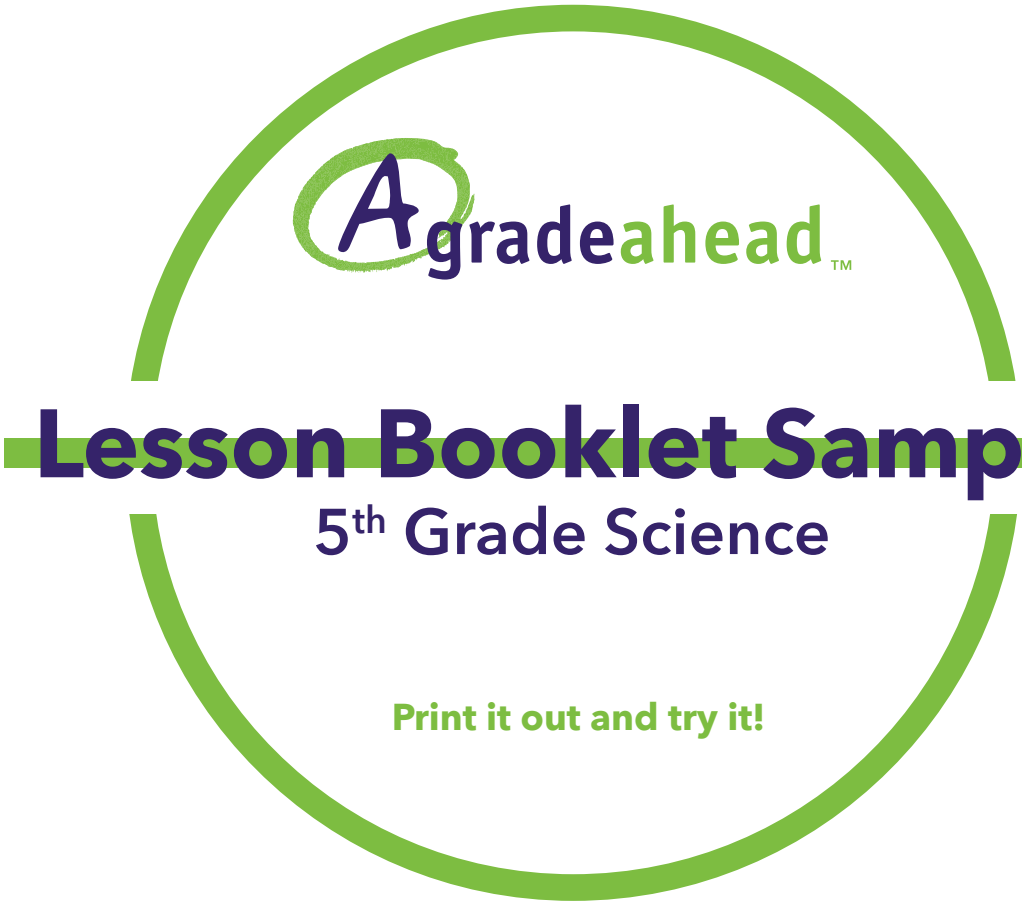
Special pricing for 16 weeks of science: $250 upfront or three monthly payments of $90.

Register Now!

Register online today or get more information at **enrichmentathome.com**!

Questions?

Call **866.628.4628** or email **enrichmentathome@agradeahead.com**.



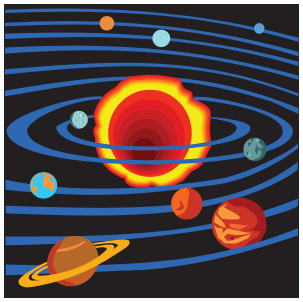
Lesson Booklet Sample

5th Grade Science

Print it out and try it!

Earth Science: Cycles and Patterns in the Solar System

Key Terms
galaxy
universe
year
day
seasons
spring
summer
fall
winter
lunar eclipse
solar eclipse
phases of the Moon
lunar Month

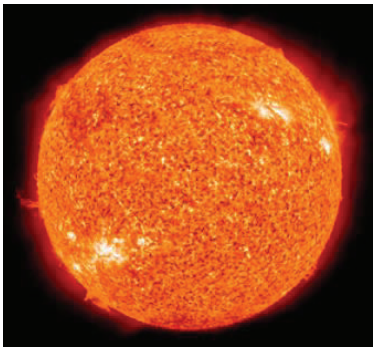


A. Introduction

Last week, we focused on the Solar System and everything included in it. This week, we will examine cycles, patterns, and specific vocabulary to understand physical laws that power the predictable occurrences in our planetary system.

B. The Sun

The Sun, or Sol, is a star that is made of mostly hydrogen and helium gases. Stars make their own light, heat, and energy from the interactions of these gases. Millions of stars form a **galaxy**. The galaxy that the Solar System is part of is called The Milky Way. While the Sun is the largest object in the Solar System, it is not a unique star. It is one of trillions of stars that exist in the **universe**, or all existing space. The Sun, compared to other stars, is a common, middle sized star that is about five billion years old. The Sun is the central and largest body in the solar system and holds everything together with its gravitational pull. The Sun gives us energy, light, and heat needed for life to exist on Earth. The Sun is responsible for all cycles and patterns that occur on and around Earth that we will be covering this week.



C. Cycles and Patterns Involving the Earth and other Planets

As far as we know, Earth is the only planet with life. The factors that allow humans, plants, and animals to live on Earth are: its liquid water, heat from the Sun, and oxygen. The Sun is what regulates life on Earth by providing these qualities through cycles and patterns.

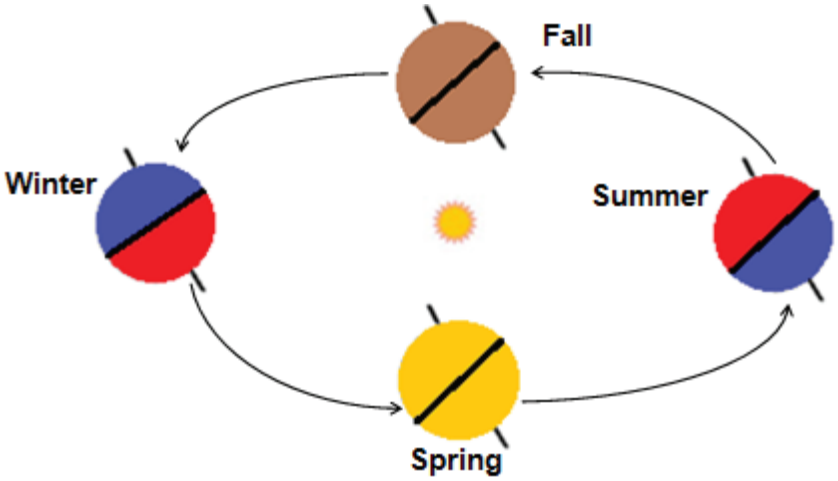
As we learned last week, planets orbit the Sun. The amount of time it takes a planet to orbit the Sun one time is called a **year**. While the planets orbit the Sun, they also spin at the same time. The amount of time it takes a planet to spin in a complete circle on its axis is called a **day**. The table below gives a breakdown of each planet's approximate length of its day and its year.

Planets of the Solar System's approximate Length of a Day and a Year		
Planet	**Length of a Day** *(According to Earth Days/Hours)*	**Length of a Year** *(According to Earth Days)*
Mercury	59 days	88 days
Venus	243 days	225 days
Earth	1 day (24 hours)	365 days
Mars	1 day (24 hours)	687 days
Jupiter	10 hours	4,332 days
Saturn	10 hours	10,832 days
Uranus	17 hours	30,799 days
Neptune	16 hours	60,190 days

Most of the cycles and patterns of motion between the Earth and sun are predictable. Earth spins on an axis that is tilted. As mentioned before, it takes the Earth 24 hours to complete one rotation on its axis – this is when we experience day and night. We experience day when the side of the earth that we live on is facing the sun and experience night when the side of the earth that we live on is not facing the

sun. This tilt, along with Earth's revolution around the sun, affects the amount of direct sunlight that the Earth receives in a single day and throughout the year.

The amount of direct sunlight that the Earth receives throughout a year determines the Earth's **seasons**: spring, summer, fall, and winter. Examine the figure below to understand this concept.



The black line represents the equator. Above the equator is the Northern Hemisphere. Below the equator is the Southern Hemisphere. Because of the Earth's tilt, these two hemispheres experience opposite seasons. The seasons listed in this picture represent the seasonal pattern for the Northern Hemisphere.

Summer occurs when the Northern Hemisphere is tilted toward the Sun. Winter occurs when the Northern Hemisphere is tilted away from the Sun . While the Northern Hemisphere experiences winter, the Southern Hemisphere experiences summer, and vice versa. Spring and fall occur when the Earth is between winter and summer seasons and each hemisphere is neither tilted toward nor away from the Sun – they are tilted to the side. Because of this, these seasons are similar. Seasons of the Earth let us know what temperature patterns we should experience. Examine the table below to see these patterns.

How Seasons Effect Temperature			
Winter	**Spring**	**Summer**	**Fall**
Cold	Cool/Warm	Hot	Warm/Cool

As you can see from the table above, spring and fall seasons have similar temperatures because the Earth's tilt in relation to the Sun is the same. Consequently, summer seasons are generally the hottest because the Earth is exposed to the most amount of sunlight. During winter, it is the coldest because the Earth is exposed to the least amount of sunlight.

D. Cycles and Patterns Involving the Moon

The cycles and patterns involving the Moon are solar and lunar eclipses and the phases of the moon. These are cycles that are affected by the Sun and the orbit of the earth and the Moon.

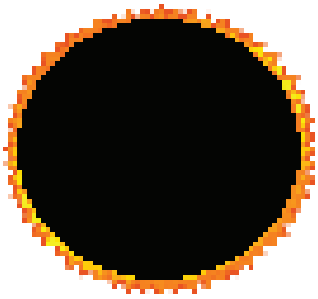
Eclipses: Eclipses occur when either the Moon blocks the light from the sun, or when the Earth blocks the light from the sun. An eclipse will occur when the Sun is blocked out or the Moon is blocked out for a short period of time.

A **lunar eclipse** is when the Earth casts a shadow that completely blocks light from illuminating the Moon. It occurs when the Earth is <u>perfectly</u> aligned between the Sun and Moon. Examine the figure below to see how a lunar eclipse happens. These happen every 6 months.

As we know, the Earth and Moon are always moving due to their orbits. Lunar eclipses do not happen every day. They happen when the Moon and Earth's orbits are perfectly aligned, as illustrated in the picture to the left. This happens about twice a year during the full moon phase.

A **solar eclipse** is when the Moon blocks light from the Sun. It occurs when the Moon is perfectly aligned between the Sun and Earth. Examine the figure below to see how a solar eclipse happens. These happen every 6 months.

As we know, the Earth and Moon are always moving due to their orbits. Solar eclipses do not happen every day. They happen when the Moon and Earth's orbits are perfectly aligned, as illustrated in the picture above. This happens about twice a year.



The picture above illustrates what a solar eclipse looks like from Earth. The Moon is blocking most sunlight from reaching the Earth.

Phases of the Moon: If you look up in the night sky, you will, during most nights, see the Moon shining bright in the sky. The Moon becomes illuminated because it reflects light from the Sun; it has no light of its own. Because the Moon is a spherical shape, it cannot be entirely illuminated at once; at most, half of the Moon can be illuminated while the other half is not. The part of the Moon that is facing the Sun is illuminated while the other side is dark (see picture below). If we imagine this, we would always expect to see a full circle of the Moon illuminated every night. However, because the Moon and the Earth are orbiting at the same time, the Earth casts shadows on the Moon causing it to appear to change shape or the Moon is between the Sun and Earth and there is no light to illuminate the half of the Moon that we can see from Earth (New Moon phase). The different shapes that we see of the Moon repeat over the course of a 29.5 days and are called phases of the Moon.

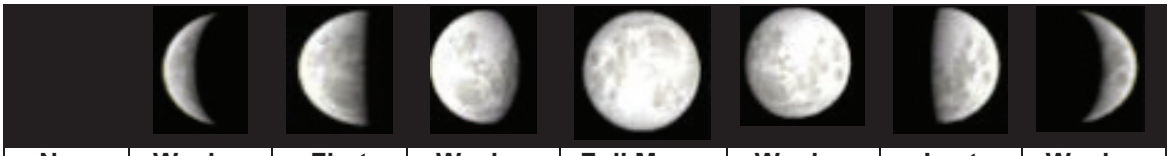
The revolution of the Moon around the Earth makes the Moon look as if it is changing shape in the sky. From various parts of the Earth, you will see the Moon shaped differently. The moon will seem to grow from a thin crescent to a full circle (full moon) and then shrink back to the crescent before vanishing for a few days. Each phase of the moon occurs within 29.5 days as the Moon completes its orbit around Earth. This is known as a **lunar month**.

The phases are named by how much of the Moon we can see and whether the amount visible is increasing or decreasing each day. There are 8 phases of the Moon: **New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Last Quarter,** and **Waning Crescent**.

The order of the phases of the Moon depends on which hemisphere you are viewing the Moon from. Examine the table below to see this.

New Moon	Waxing Crescent	First Quarter	Waxing Gibbous	Full Moon	Waning Gibbous	Last Quarter	Waning Crescent

The Phases of the Moon as seen from the Northern Hemisphere



New Moon	Waxing Crescent	First Quarter	Waxing Gibbous	Full Moon	Waning Gibbous	Last Quarter	Waning Crescent

The Phases of the Moon as seen from the Southern Hemisphere

Experimentation: The Dark Side of the Moon

For this experiment, students will use supplies to investigate properties of the Moon such as: its rotation, phases of the Moon, and eclipses.

Date: _____ **Start Time: _____ End Time:_____**

Pre-Lab Score:_____/10

PRE-LAB QUESTIONS

(Mandatory for all Students)

1-10. Answer the following questions prior to starting either experiment.

1. Describe what happens when a celestial body rotates.

_____

2. Describe a complete revolution of a celestial body.

_____

3. Define a lunar month. _____

_____

4. Describe the New Moon phase. _____

_____

5. What is a lunar eclipse? _____

_____

6. What is the difference between the New Moon phase and a solar eclipse?

_____

7-8. When it is night time in America, it is _____ in China and _____ in Brazil.

9-10. When it is winter in America, it is _____ in China and _____ in Brazil.

Experiment 1 Score:_____/7

EXPERIMENT 1: KITCHEN SCIENCE
(Mandatory for all Students)

Experiment: In this week's experiment students will investigate Earth's daily rotation and learn how scientists can make predictions about cycles in space by making their own sundials. *Parents: It is best to begin this experiment early in the morning, when the students will have a full 12 hours of sunlight to utilize. If not possible, at least 6 hours of light is desirable.*

Supplies Needed per Student:

1 paper plate
1 plastic straw/wooden chopstick
12 in. duct tape
1 sharp pencil (*not mechanical*)
1 clock or watch
1 ruler

1-7. Experimentation: Follow the given procedure. Reference the pictures to the right when making the sundial.

- Very carefully, draw a spot in the center of the paper plate. It is important that the spot be on the exact center of the plate, so take your time. Multiple attempts may be necessary.
- Using the sharp pencil poke a hole in the center of the paper plate. Make sure that the hole is large enough for the straw to pass through.
- Look at the clock. What hour is approaching? For example, if the clock says 7:45 AM, the approaching hour is 8 AM.

Carefully poke a hole in the center of the plate.

1. What is the current time? _____

2. What is the approaching hour? _____

- Turn the paper plate upside down. Write your answer from the previous question on the edge of the plate.
- Using the ruler, draw a dark line from the number to the center of the plate.
- Place the straw in the hole.
- At the exact time you wrote on the paper plate, go to a sunny location (preferably outside).
- Turn the plate so that the straw's shadow lines up with the line you drew.
- Using the duct tape, fasten the plate to the ground so that it cannot change positions.

Draw a dark line between the straw and the time.

Line up the straw's shadow with the line you drew.

- If you cannot fasten the plate in place, mark the exact location and angle of the plate so that you can put it back in the exact same position.

3. What do you think will happen to the shadow of the straw in exactly one hour?

_____

_____

4. In exactly one hour what will be the time? _____

- Paying careful attention to the clock, leave the sundial alone until it has reached the time you have written above.
- *Do not move the sundial.*
- After an hour has passed, return to your sundial. Examine the shadow of the straw.

5. Has anything about your sundial changed? What is different?

_____

_____

- The shadow of the straw should no longer be in line with the time you wrote earlier.
- Using your pencil, mark the new location of the shadow, and label it with the time you wrote in question 4.
- Repeat the above steps every hour, until you have at least 6 hour readings marked on your sundial.

6. **Challenge:** Why is the shadow moving? Is the straw changing position? ***[Hint: What planetary cycle did we discuss that is measured in hours?]***

_____

_____

_____

7. **Conclusion Question:** What did you learn from doing Experiment 1?

_____

_____

_____

_____

Week: 3 – Day 1

PRE-LAB

1) It spins about its axis like a top spinning on a table.
2) A complete revolution is when a celestial body orbits all the way around the Sun or a planet.
3) A lunar month lasts 29.5 days. It is the amount of time it takes the Moon to orbit Earth.
4) The New Moon phase is the phase of the Moon when we cannot see the Moon. This is because the side of the Moon facing the Earth is not illuminated by the Sun.
5) A lunar eclipse is when the Earth casts a shadow that completely blocks sunlight from illuminating the Moon.
6) A solar eclipse is when the Moon blocks light from the Sun and only occurs when the moon is perfectly aligned between the Sun and Earth, once every 6 months. The new moon phase is when the moon is approximately aligned between the Sun and the Earth and occurs every month. A solar eclipse can only happen during the New Moon phase.

7-8) day time, night time 9-10) winter, summer

EXPERIMENT 1

For 1-4, Answers will vary. Examples are given.

1) 7:45 AM
2) 8:00 AM
3) In exactly one hour I think that the straw's shadow will not change position but will become shorter.
4) 9:00 AM
5) The shadow of the straw has moved so that it is not on the line anymore. The shadow is also a little bit shorter than it was before.
6) The straw is not moving. The shadow is moving because the sun's position in the sky is changing.
7) The Earth's rotation around its axis is what makes the sun move through the sky during the day. Since we know how fast the Earth is rotating, we can make things like clocks and sundials to predict time and related ideas such as weather and moon phases.

Now, more than ever, kids need supplemental education!

A Grade Ahead's science program makes it easy to provide academic enrichment for your students that is educational and fun!

Why A Grade Ahead?

For one thing, it's not boring and repetitive like some other programs. For another thing, our parents love us, with more than 90% referring us to their friends and families, year after year.

Here is what some other parents are saying:

"A Grade Ahead has a robust curriculum and has been really helpful in building a strong foundation for my kids. I recommend it to everyone especially for elementary level."

Nimsha, Ilinois

"Helps improve performance of kids and boost confidence level."

K.U., Virginia

Is your student ready to join the 25,000 other students who have benefitted from our pragmatic, effective approach?

Register today to see what A Grade Ahead can do for your family.

Questions?

Call **866.628.4628**, chat at **enrichmentathome.com** or email **enrichmentathome@agradeahead.com**.