

Earth, Weather and Waste Curriculum Map

The lessons and experiments fall under twelve topics that relate to three aspects of earth and space science: Exploring Soils in the Environment, Rocks and Minerals, and Stars and Planets.

The activities have two intentions:

1. to teach concepts related to earth and space science and
2. to provide students the opportunity to apply necessary skills needed for mastery of science and technology curriculum objectives.

In each section you will find teacher notes designed to provide you guidance with the learning intention, the success criteria, materials needed, a lesson outline, as well as provide some insight on what results to expect when the experiments are conducted. Suggestions for differentiation are also included so that all students can be successful in the learning environment.

Introduction, Assessments and Learning Expectations

- At A Glance – List of Skills
- Introduction
- Student Assessment Form
- Teacher Assessment Form

Lesson One: Types of Soils

Students will learn about the four components of soil and they will explore the different types of soil using their senses.

Lesson Two: Soils In Your Environment

Students will learn about the components that are in their neighborhood soils by exploring sieving and sedimentation techniques.

Lesson Three: Growing in the Garden

Students will learn about how different types of soil affect the growth of plants.

Lesson Four: Living in the Soil

Students will learn about how living things are interdependent with the soil they live in.

Lesson Five: At Work in the Soil

Students will learn about the benefit of earthworms in making nutrient rich soil, and how composting provides nutrients to soil.

Lesson Six: Erosion

Students will learn about the effects of water on soil.

Lesson Seven: Rock Types

Students will learn about different rock types and discover the types that are where they live.

Lesson Eight: Exploring Minerals

Students will learn about minerals and their properties.

Lesson Nine: Fun with Rocks

Students will learn about the presence of carbonates, and how rocks become eroded.

Lesson Ten: Our Solar System

Students will learn about the unique features of each planet in our solar system.

Lesson Eleven: The View From Earth

Students will learn about the positions of the sun, Earth, and its moon in our solar system.

Lesson Twelve: Constellations

Students will learn about the constellations in our night sky.

THE VIEW FROM EARTH

LEARNING INTENTION:

Students will learn about the positions of the sun, Earth, and its moon in our solar system.

SUCCESS CRITERIA:

- recognize the positions of the sun, Earth, and its moon in our solar system
- describe how the Earth rotates on its axis and how it orbits the sun
- explain why the Earth experiences different seasons as it orbits the sun
- describe how the moon rotates and orbits the Earth, moving as one unit orbiting the sun
- demonstrate the rotation and orbit of the Earth and its moon around the sun

MATERIALS NEEDED:

- a copy of “Day and Night” Worksheet 1 for each student
- a copy of “Revolving Around the Sun” Worksheet 2 for each student
- a copy of “A Look at the Moon” Worksheet 3 for each student
- a copy of “Rotate and Orbit!” Worksheet 4 and 5 for each student
- a large ball, a small ball, a hat, 2 index cards (for each group of 3 students)
- a globe
- masking tape, markers, pencils

PROCEDURE:

***This lesson can be done as one long lesson, or be divided into two shorter lessons.**

1. Using Worksheets 1, 2, and 3, do a shared reading activity with the students. This will allow for reading practice and learning how to break down word parts in order to read the larger words in the text. Along with the content, discussion of certain vocabulary words would be of benefit for students to fully understand the passage.

Some interesting vocabulary words to focus on are:

- | | | |
|--------------|--------------|------------|
| • axis | • rotate | • exposure |
| • orbit | • tilted | • journey |
| • revolution | • hemisphere | • equator |

(As the moon orbits the Earth, the phases change. A phase of the moon is how much of the moon appears to us on Earth to be lit up by the sun. As the moon begins to orbit the Earth, we can only see a portion of the lit up side. As it continues to orbit the Earth, we see more of the lit up side until finally the moon is on the opposite side of the Earth from the sun and we get a full moon that is 100% lit up. As the moon continues orbiting, we see less of the lit up side. When we can't see any of the lit up side, this is called a new moon. In the new moon phase, the moon is between Earth and the sun.)

2. *This activity can be done in groups, or as a whole group demonstration. Students will **need teacher guidance** to demonstrate the Earth's orbit around the sun correctly.

Give them Worksheets 4 and 5 and the materials to create a model of the positioning of the sun, the Earth, and its moon in the solar system. Read through the materials needed and what to do sections to ensure their understanding of the task before they begin. At this point, use the globe to show students how the Earth is divided into two hemispheres, Northern Hemisphere



and Southern Hemisphere. Pointing out where the students live on the globe would be of interest to them also.

Once students have positioned themselves, the teacher will help the “Earth” to orbit the sun correctly. This means that as the “Earth” is approaching the half way around mark, the teacher ensures that the “Earth” begins to face away from the sun, so that the Northern Hemisphere now becomes further from the sun while the Southern Hemisphere becomes closer to the sun.

DIFFERENTIATION:

Slower learners may benefit by having another opportunity to re-read the information on Worksheets 1, 2, and 3 in a small group with teacher support.

For enrichment, faster learners could access the internet to research some interesting facts about the sun, the Earth, or the moon. This could be later shared with the large group to promote discussion on the topic.

Day and Night

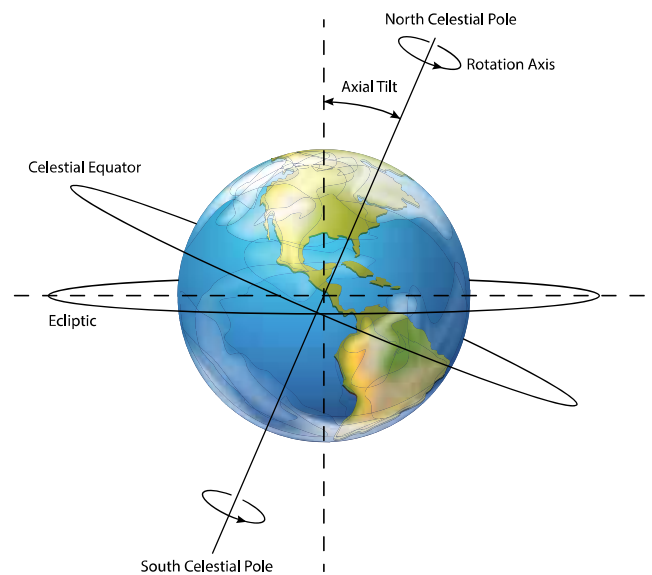
You have learned that the planet Earth is third in line from the sun. In measured distance, it is about 150 million kilometres from the sun. Even from that great distance, the sun is Earth's powerful heat energy source.

So what is the Earth doing while it is soaking up the sun's heat energy? It is rotating! The Earth has an axis that runs from the North Pole to the South Pole.

As the Earth spins on its axis, from east to west, we experience day time and night time. The Earth takes 24 hours to complete a rotation.

Its rotation gives each part of the Earth a turn to be warmed by the sun. Life forms on Earth need the heat and light from the sun. If the Earth did not rotate, one half of the Earth would always be too hot to support life, and the other half would be in a deep freeze!

Axial Tilt of the Earth



How long does it take for the sun's heat to reach Earth? Let's do the math!

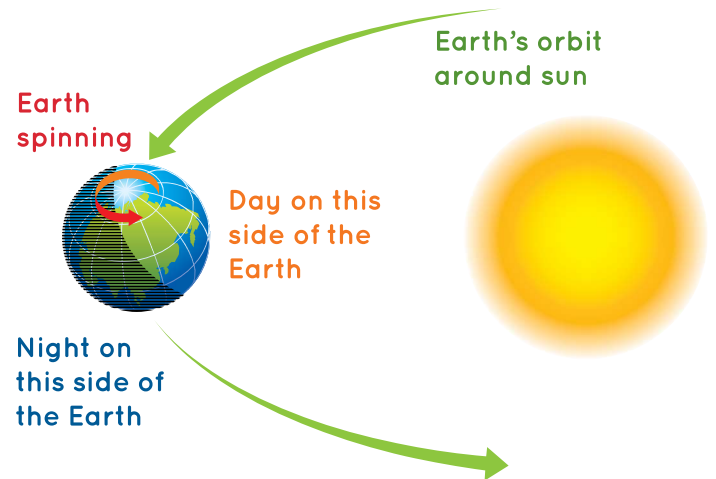
We are 150 million km away from the sun. Light travels 300 000 km per second. Dividing these numbers, it will equal to 500 seconds, or 8 minutes and 20 seconds.



Revolving Around the Sun

At the same time that the Earth is rotating on its axis, it is taking a journey around the sun. This journey is called a revolution.

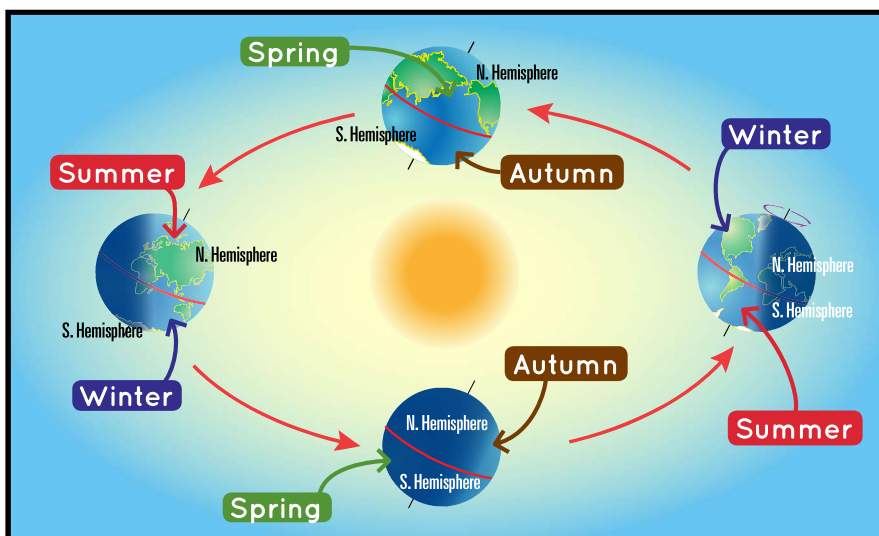
The Earth's journey around the sun is about 940 million kilometres long and it takes one year (365 days) to complete.



Did You Know?

The Earth is divided into two hemispheres. They are the Northern Hemisphere and the Southern Hemisphere. As the Earth orbits the sun during a year, its tilt causes the Northern and Southern hemispheres to change from more or less exposure to the sun.

As a hemisphere is tilted away from the sun, the length of a day gets shorter and it gets colder. As it is tilted toward the sun, day lengths get longer and it gets warmer. The



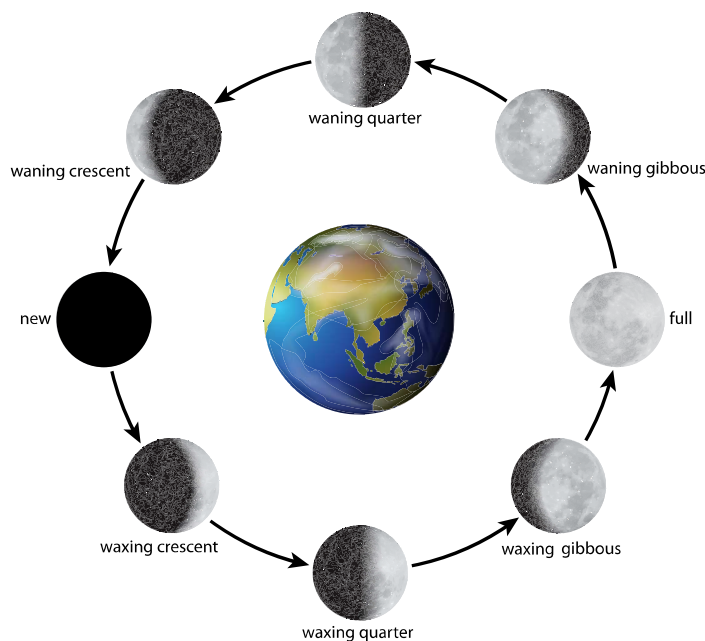
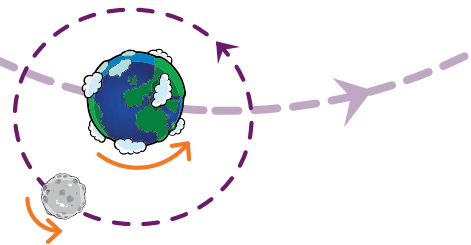
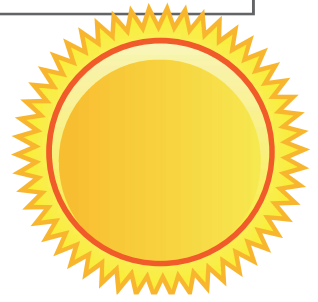
further you are from the equator in either hemisphere, the more obvious the effect. This is why we have the different seasons in the year, Spring, Summer, Winter and Fall.

A Look at the Moon

Are you wondering what the moon is doing while the Earth is revolving around the sun? It is orbiting the sun with the Earth as one unit. While it is on this journey, the moon is also revolving around the Earth, and rotating.

Have you ever wondered why the moon looks different in the sky some nights? The moon does not shine light, by itself. What we see when we look at the moon from Earth is the sun's light bouncing off the moon.

Sometimes we only see part of the moon, sometimes we see the full moon, and other times we can't see the moon at all.



It takes about 28 days for the moon to orbit the Earth and to rotate.

The moon goes through many phases as it rotates and orbits the Earth, but from Earth we always see the same side of the moon.



Rotate and Orbit!

It is time to review the facts. You have learned that:

- Earth rotates on its axis while it orbits the sun
- because of Earth's tilt, one hemisphere is closer to the sun for half the year, while the other is farther away
- the moon rotates as it orbits the Earth
- the moon orbits the sun as one unit with the Earth

Now it is time to put these ideas into practice!

You'll need:

- a large, and a small ball
- a card with an **N** on it
- a card with an **S** on it
- a hat
- masking tape
- 2 other group members

What to do:

1. Tape the letter **N** to the hat. (**N** means Northern Hemisphere). One partner will wear the hat.
2. Tape the **S** to the lower back of this person. (**S** means Southern Hemisphere). This person is the Earth.
3. Another group member will hold the large ball (the sun).
4. The Earth will stand about 2 metres away from the sun, facing it, tilted forward a little.
5. As **your teacher** is turning the Earth around the sun, observe which hemisphere becomes closest to the sun. Record your observations on Worksheet 5.
6. The third group member will hold the small ball (the moon). The moon will rotate slowly while it orbits the Earth. Keep up with the Earth's orbit!
7. Make a conclusion about the rotation and orbit on Worksheet 5.

Let's Observe

Choose words from the **Word Box** to complete your observations.

Northern higher lower

When the Earth **started** to turn, the _____ Hemisphere was closer to the sun, and the sun stayed _____ in the sky for a longer time.

When the Earth was **half way around**, the _____ Hemisphere was farther from the sun, and the sun stayed _____ in the sky for a longer time.

Let's Conclude

Choose words from the **Word Box** to complete your conclusions.

summer winter shorter longer

When the sun is higher in the sky the days are _____ , just like in the _____ .

When the sun is lower in the sky the days are, _____ , just like in the _____ .

