SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Space Mission Part 5 **Grade 6 – Space**

Lesson Plan

Assessment	AFL, Observations, questions
Cross-curricular	

Big Ideas

- Earth is a part of a large interrelated system.

Learning Goals

- The motions of the Earth, Sun, and Moon relative to each other
- Phases of the moon.
- Learn about some of the tremendous objects we have in our universe.
- Learn the names for these objects and what they are.
- Better understanding of how WE fit into the BIG picture.

Specific Expectations:

2.3 use scientific inquiry/research skills to investigate scientific and technological advances that allow humans to adapt to life in space
3.1 identify components of the solar system, including the sun, the earth, and other planets, natural satellites, comets, asteroids, and meteoroids, and describe their physical characteristics in qualitative terms
3.5 describe the effects of the relative positions and motions of the earth, moon, and sun (e.g., use models or simulations to show solar and lunar eclipses, phases of the moon, tides)

Description:

This is **lesson 5** of a five-lesson unit in which the students plan and execute an interstellar mission. This lesson is really meant to inspire and give the students awe about the amazingly cool world out there. Students will model the Solar System and learn about the phases of the Moon.

Materials/Resources:

-A bright flashlight or table lamp.
-A ball to represent the Moon.
-Objects from Lesson 1 to represent Solar System planets.

Safety Concerns:

Do not shine the light in people's eyes.

Introduction

We will use some of the materials again that we used in lesson 1 to illustrate the scale of things.

- Our interstellar mission is concluding. We have launched our spacecraft, and we have imagined what life on another planet may look like and how we might live there.
- Your astronauts are on the journey to this distant world – so today let's take a journey ourselves to learn more about the Universe starting here with the solar system and then moving out into space!

Action

Modeling the Solar System (Ideally you have a fairly large open space to do this activity)

We will take a journey out into space to see some of the really cool objects that are out there. Before we do that though we need to understand how things work close to home. How do objects in the solar system move? Let's model it with some volunteers!

- Earth – place a volunteer in the centre. What orbits around the Earth?
    - Hints: Goes around the Earth once a month. Doesn't make its own light. Has phases.
- Moon – place a volunteer next to the Earth to be the Moon. Now slowly walk around the Earth. The moon orbits the Earth. Does it always look the same? NO. It has phases. Let's see if we can show that.
- Give a ball to the Moon volunteer. This ball now represents the moon.
- A light. Get a volunteer to shine a bright light onto the ball from a distance, but close enough that you can see that it is lit up. This will work best in a darkened room.
- Ask the Earth volunteer: From where you are looking at it, does the whole ball seem lit up? Depending on where the Moon volunteer stands this answer will change. (See image: Phases of the Moon)
- Now make the moon volunteer move to different spots of its orbit around the Earth. The Earth volunteer should notice that what he/she sees changes. The moon is sometimes lit on one side, sometimes on the other. Sometimes not lit up at all, and sometimes fully lit up. These are the phases of the moon. This is what we see from Earth.
    - The easiest phases for students to understand are the full moon and new moon. To show the full moon make sure the volunteer shining the lamp points the light just past the Earth at the Moon or it will not appear lit up (that would be a lunar eclipse – but we don't need to get into that today!).
    - When standing in the first and third quarter positions ask the Earth volunteer if it is the right or left side of the ball that looks lit up. It will switch from one to the other phase.
- Now let's move on to see how the Earth and Moon move around the Sun.
    - Place the Sun at the centre. Earth and moon towards the edge.
    - Instruct the moon to keep orbiting around the Earth, even if the Earth moves.
    - Now ask the Earth to slowly "orbit" around the Sun.

We could add the other planets and moons. Let's look beyond this, our home in the Universe, now and explore what else is out there.

You can show the final section of the Science North Space video here. Start with the section titled, "Exploring the Universe." It is short.

Slide show

- **Slide 1** – The solar system. Our neighbourhood. Let's shrink it to a pinhead. On that scale the next star is about 100 metres away. Likely somewhere in the parking lot of the school!
- **Slide 2** – A star. … Now shrink the distance between stars down to this pinhead. The Sun is on one side of it. Our closest neighbours on the other side.
- **Slide 3** – This is what the distribution of stars near the Sun looks like. What is this part of? The Milky Way, a galaxy.
- **Slide 4** – If we shrink this image down to the size of a pinhead again, then the room would fill up with a picture like this.
    - The Pinwheel Galaxy is similar to the Milky Way. A grand spiral, with over 100 billion stars in it. All the stars that you can see in the night sky by naked eye are in our Milky Way. Galaxies are amazing objects with really cool objects in them. Let's look at a few.
- **Slide 5** – Globular cluster. Some of the stars in galaxies form huge clusters. Globular clusters may contain hundreds of thousands of stars. They orbit around galaxies.
- **Slide 6 & 7** – Nebulae.
    - Gas comes together to form stars and is illuminated by these young stars. The Orion nebula is an example of such a star-forming nebula. You can see it with a small telescope or binoculars if you look in the constellation of Orion.
    - When stars run out of fuel to burn (hydrogen) they often blow up and shed their outer layers, becoming beautiful planetary nebulae.
- **Slide 8** – Black hole. We all know about black holes. Objects with such strong gravity that not even light can escape. Matter often circles around black holes and emits light as it falls in.
- **Slide 9** – Other galaxies. As we zoom even further out we see groups of galaxies that form clusters and super clusters. We estimate that there are billions of galaxies in the Universe.