SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Space Mission Part 1 **Grade 6 – Space**

Lesson Plan

Assessment	Scale solar system activity
Cross-curricular	

Big Ideas

- Earth is a part of a large interrelated system

Learning Goals

- Learn about the various bodies of the solar system
- Gain an appreciation for the sizes and distances in the solar system
- Explore how we fit into the solar system and the universe beyond

Specific Expectations:

2.2 use technological problem-solving skills to design, build, and test devices (e.g., a sundial, a model of the earth's rotation around the sun) for investigating the motions of different bodies in the solar system
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
3.2 identify the bodies in space that emit light (e.g., stars) and those that reflect light (e.g., moons and planets)
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 1** of a five-lesson unit in which the students plan and execute an interstellar mission. This first lesson focuses on the solar system and the scales within it.

Materials/Resources:

-Slide Show
-**Paper Slips** with planet size information
-Large scale items: 30 cm beach ball, 1mm pinhead, two 2.5mm big plastic pinheads, 1.5mm small plastic pinhead, 3cm bouncy ball, 2.5 cm Styrofoam ball, two 1 cm Styrofoam balls
-Small scale items: 2cm bouncy ball, three metal pinheads of different colours, four plastic pinheads of different colours (these are for the distance activity)

Introduction

Getting Started

If you are doing the five-lesson unit, start by playing the Science North video that goes along with this lesson. The video will challenge the students to plan a mission to another planet. You only need to play the first section called "The Solar System", for this lesson.

The lesson starts with a slide show on the planets. "Over the years we have sent probes to all the planets in the solar system. We now have beautiful images of all the planets and have learned a lot about all of them. We will start at the centre of the solar system and work our way outward."

- Slide 1: The Sun. A star, the object all planets orbit around. A huge ball of gas that burns at over 6000 degrees on the surface and millions of degrees in the core.
- Slide 2: Mercury. Closest to the Sun. Gets very hot on the daytime side, but also very cold at night as it doesn't have an atmosphere to hold in any heat. The smallest planet. It has many craters.
- Slide 3: Venus. Venus has a thick atmosphere. It is so hot that some metals (e.g. lead) melt at the surface. It is very similar to Earth in size and is our neighbour.
- Slide 4: Earth and Moon. Earth is the only place in the Universe we KNOW supports life. Liquid water, a warm climate, everything is just right! The Earth's moon is one of the largest moons in the solar system and orbits around us once every 28 days.
- Slide 5: Mars. The red planet is smaller than the Earth but also quite similar to it. It is rocky and dry. We know that it once had liquid water. Many rovers have explored Mars and are continuing to do so. It would be the easiest planet to visit for us.
- Slide 6: Jupiter. Largest planet in the solar system. A gas giant without a solid surface. What you see is clouds swirling around. The big red spot is a hurricane like storm that has raged since at least when Galileo first looked at Jupiter through a telescope in 1609. It has over 60 named moons.
- Slide 7: Saturn. Second largest planet in the solar system. Famous for its rings, which are made up of chunks of ice and rock. It has over 60 named moons as well.
- Slide 8: Uranus and Neptune. Gas giants. Smaller than Jupiter and Saturn – about four times the diameter of the Earth.
- Slide 9: Pluto. Now a dwarf planet. We only recently got our first close-up look (with the New Horizons probe), which has revealed stunning images of icy mountains and plains on Pluto. Beyond Pluto there are a number of other objects very similar to it – other dwarf planets.

Action

Activity 1: The sizes of the Sun and Planets

- Introduce the basket of objects that will represent the Sun and planets. They are spheres of various sizes (see materials list)
- Form 10 groups of students.
- Each group is assigned a planet or draws a planet at random (**Paper Slips**)
- Students look at all the objects in the basket and pick what they feel best represents their planet compared to all the other objects.
- Discuss the picks with each group. Did they get it right? If not, point out just how huge some objects are compared to others etc. The Sun for example is a star and is much bigger than any planet. All the gas giants (Jupiter, Saturn, Uranus, Neptune) compared to the

rocky planets (Mercury, Venus, Earth, Mars). Dwarf planets (Pluto) are even smaller (Use Sizes of Sun and Planets handout).

Activity 2: The distances between Planets

The objects we just picked are way too large to put at the proper distances from each other. Pluto would be 1.3 kilometres away from the Sun. Select a landmark a distance away from the school that would demonstrate this concept.

- Hand out new objects to each group.
- Now we can take these objects outside (hallway or school yard) and place them apart at the right distances from each other (Distances Between Planets handout).
- First group stays at the start point and holds the object representing the Sun. All students now take the steps required to get to Mercury. Mercury group stays there, etc.
    - OPTIONAL NOTE: We assume a step size of 30 cm. If you want you could calibrate the step size for your students. Have several students take several steps and measure them each time. Figure out what an average step size for them actually is. Then you can adjust the activity accordingly.

Consolidation/Extension

Back in the classroom discuss the outcome of the activities. Key points:

- Planets have a large range of sizes. The Earth is small compared to Jupiter.
- But even Jupiter is small compared to a star – the Sun.
- The distances out in space are VAST. That is why it is so hard to visit all the planets.
- It took 10 years to send a probe to Pluto. The distances between stars are even bigger. To get from us past Pluto to the very next star would take THOUSANDS of years!

Possible extensions:

- Draw one of the planets. Include distinguishing features and pick the colours that best represent the atmosphere of that planet.
- Talk about other objects in the solar system, such as comets and asteroids.
- Get students to do research on a planet or on the objects they didn't already learn about (comets, asteroids, Kuiper belt objects).