SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Space Mission Part 2 **Grade 6 – Space**

Lesson Plan

Assessment	Self assess of spacecraft
Cross-curricular	Arts (drawing)

Big Ideas

- Technology developed for space affects our lives

Learning Goals

- Gain an appreciation for the technological complexity needed to support humans and other life forms over long time periods in space.
- Gain an understanding of what technologies are needed to sustain life in space.
- Design a spacecraft for a long-range mission.

Specific Expectations:

2.3 use scientific inquiry/research skills to investigate scientific and techno- logical advances that allow humans to adapt to life in space
2.4 use appropriate science and technology vocabulary, including axis, tilt, rotation, revolution, planets, moons, comets, and asteroids, in oral and written communication
2.5 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes
3.3 explain how humans meet their basic biological needs in space (e.g., obtaining air, water, and food and managing bodily functions)
3.4 identify the technological tools and devices needed for space exploration (e.g., telescopes, spectroscopes, spacecraft, life-support systems)

Description:

This is **lesson 2** of a five-lesson unit in which the students plan and execute an interstellar mission. In this lesson, students will design a spacecraft to take astronauts on a long mission into space. This lesson will also stimulate their creativity and get them to analyze the challenges and possible solutions for themselves.

Materials/Resources:

-Slide Show
-1 poster paper per student group
-Drawing materials

Online References:
Space ship to Alpha Centauri: http://earthsky.org/space/alpha-centauri-travel-time#conventional
Spaceship designs: https://tauzero.aero/discoveries-log/getting-there/starship-designs/engineered-starships/
Chris Hadfield, Why we need a space program: http://www.tested.com/science/space/459079-astronaut-chris-hadfield-why-we-need-space-program/

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. Watch the second section titled "Designing a Spacecraft."

Today is the second step, in which students are engineers designing the spacecraft that will make the journey into space.

- Now let's think about the challenges of travelling in space. What can you think of that we need to plan for when we design our spacecraft?
- Take as many ideas from students as you want. Briefly discuss and optionally write them up on the board.
- Use the rubric for the spaceship designs as a guide as to what our engineers need to think of and why.
- Designs should be realistic (no antimatter drives in other words)
- Make sure to discuss the importance of redundancy. For example, if the main power source breaks down, is there a backup? What happens if the crop they are growing fails?
- Optionally: View the slide show of some current space concepts. You can also save this for the end in order to let the students' creativity be as free as possible.

Action

Design a Spaceship

- Let students form small groups (2 to 4 students) for brainstorming a spaceship design and drawing it on paper. Students could also do this activity individually.
- Hand out poster paper and drawing materials.
- The spacecraft they are designing should meet certain criteria:
    - Be able to make a long duration flight (several years or even hundreds to thousands of years)
    - Support a crew that can take care of all issues that may arise, and, if necessary, that can reproduce for generations to come.
- Students should take some time to brainstorm ideas and write them down. Maybe on the side of the poster paper or on a separate sheet. They need to start by writing down how they meet the criteria set out:
    - How long do they plan for their spacecraft to travel?
    - How large will the crew be? Write down what the specialties of the crew members are and how many of each (e.g. 2 engineers, 1 doctor, 1 astronomer etc.)
- Then here are some other questions you may ask them to stimulate ideas:
    - What do people need to survive in space?
    - What kind of food will they eat?
    - How will they exercise?
    - How is the spacecraft powered?
    - How many crewmembers will your ship support?
    - How does the spacecraft land?
    - What happens if there is an accident?
    - What happens if someone gets sick?

- Once students have all their ideas, it is now time to design the spacecraft.
    - Draw all the areas needed for human survival.
    - Label the parts of your spaceship.

Consolidation/Extension

Evaluation

- After students wrap up, teacher will go through each point of Checklist and have students assess their design. Honesty required!
- If the students have components that are not on the Checklist, they can write them below the given table. Bonus points!
- Collect drawings and Checklist.

Look at some existing ideas for spaceship designs (Space Mission Part 2 Visuals)

- Note: These are all concepts developed by scientists, but including technology that has not been fully developed yet. So these are not real projects, ready to be built. They are however good examples what real scientists imagine could actually work. Also note that many are unmanned. It is much easier to come up with a concept for an unmanned mission!

Homework or reading for lesson 3 (Reading or Lecture)

- Chris Hadfield: Why we need a space program