SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Lunar Lander Technologies	Grade 6 - Earth and Space Systems

Lesson Plan

Description

Students will explore concepts of mass, weight, gravity, and acceleration through a two-part STEM lunar lander project. They will complete the Canadian Space Agency Lunar Resupply Mission to build a lunar lander retrofitted to hold a Micro:bit. Then they will code a Micro:bit to measure acceleration, both with and without the lunar lander to compare data and the efficiency of their lander. Each group will require two micro: bits as they will be coding the lander Micro:bit to radio data to the "home base".

Learning Outcomes

Students will learn about:

- Canadian contributions to space exploration
- acceleration/deacceleration
- mass, weight and gravity
- design thinking
- computational thinking
- problem-solving skills

Specific Expectations

E2.2 distinguish between the concepts of mass and weight
E2.3 describe the relationship between the force of gravity and the weight of a body
E2.6 identify various technologies used in space exploration, and describe how technological innovations have contributed to our understanding of space

Introduction

Students will learn about Canadian contributions to space and moon exploration, the Artemis II mission, and the Canadensys Lunar rover with a variety of provocations to spark ideas and innovations. Students will learn the physics behind lunar landers (mass, weight, gravity, telemetry) and discuss the various challenges of landing a payload on the moon.

Action

Part A: CSA Lunar Resupply Mission - students will utilize the engineering design process to work collaboratively to build a lunar lander. They will make sure to design their lander to hold a Micro:bit payload. Part B: Lunar Lander Telemetry - students will learn how to utilize computational thinking strategies to code an accelerometer. They will also code a second Micro:bit to radio the signal to in order to emulate mission data acquisition. They will test out their technologies and see if they are able to reduce acceleration for a safe landing. Students will also work collaboratively to debug their code and devices for any errors.

Consolidation/Extension

After the activity, students will reflect upon the two parts of the challenges. They will compare their data from dropping the Micro:bit with and without the lunar lander. Was there a significant decrease in deceleration? Why is it important to be able to measure the acceleration or deceleration of a lunar lander? What other telemetry would be useful for a successful lunar landing?
Extensions will include an accelerometer graph and changing the gravitational force to emulate landing on other celestial bodies.

Accommodations/Modifications

Although it is ideal to have two Micro:bits for every 1-3 students, sometimes the technology is unavailable. Students can try building their system and using the emulator within MakeCode to see if it works. Tinkercad also has a virtual Micro:bit option, although it is quite advanced.

Assessment

Often with projects such as these, anecdotal assessment is always the richest. Seeing students and their "EUREKA!" moments and working through various challenges at their own level is incredible. There will also be a rubric provided to quantify their work.

Additional Resources

Additional resources through the BBC Microbit website and Black Gold School District Micro:bit page are also available to explore.