# Space Exploration: Unit Overview

**SNC1W, Grade 9 Science (De-streamed), Unit 5.** 13 classes of 75 minutes, plus summative work time, presentations and the unit test (about three and a half weeks).

### The big question

What is out there, how do we know, and what does exploring space mean for life on Earth?

Students explore the components of the solar system and universe, measure distances with astronomical units, light-years and a toilet-paper scale model, code a scale-model calculator in Python, observe the Sun safely with pinhole projectors, and investigate how the Sun drives Earth's weather and renewable energy. They model seasons, Moon phases and eclipses, examine the evidence for the origin of the universe and solar system, and learn from diverse ways of knowing the sky, including Cree star knowledge shared by Wilfred Buck. The unit closes with satellites, spin-offs and the impacts of space exploration, using Artemis II and Canadian astronaut Jeremy Hansen as a case study, and a Canadian Space Mission Proposal. All data sets and scenarios are original or drawn from NASA public data, and every activity uses cheap, common materials.

## Lessons

| # | Lesson | Classes | Question | Expectations | What's inside |
|---|---|---|---|---|---|
| 1 | **Our Place in Space** | 1 | What's out there? | E2.4, A2.4 | Cosmic address; components; terrestrial vs giant planets |
| 2 | **How Far Is Far?** | 1 | How do we measure space? | E2.5, A1.2 | Scientific notation; AU; light-years; toilet-paper solar system |
| 3 | **Code the Cosmos** | 1 | Can code build a model? | E2.5, A1.4 | Python scale-model and light-time calculator |
| 4 | **Our Star** | 1 | Why does the Sun matter? | E2.1, A1.5, A1.2 | Sun's layers and role; pinhole projector; measure the Sun |
| 5 | **Sun Power** | 1 | How does the Sun drive Earth? | E2.2, A1.2, A1.5 | Black and white cups lab; wind, water cycle, auroras; renewables |
| 6 | **Seasons and Days** | 1 | Why do we have seasons? | E2.6, A1.2, A1.5 | Rotation, revolution, tilt; flashlight angle lab |
| 7 | **Moon Phases and Eclipses** | 1 | Why does the Moon change? | E2.6, A1.2 | Lamp-and-ball phases; solar and lunar eclipses |
| 8 | **Where Did It All Come From?** | 1 | How do we know how it began? | E2.3, A1.1 | Balloon universe; Big Bang evidence; CD spectra; solar nebula |

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|---|---|---|---|---|---|
| 9 | **Many Ways of Knowing the Sky** | 1 | Who else has studied the sky? | E2.3, A2.5, A1.1 | Two-Eyed Seeing; Cree, Polynesian, Chinese and Maya astronomy |
| 10 | **Eyes in the Sky** | 1 | How do satellites help Earth? | E1.2, B2.6, A1.2 | RADARSAT; sea ice trend; flood watch |
| 11 | **Space Spin-offs** | 1 | How does space help us here? | E1.3, A1.3, A2.2 | Myths vs spin-offs; neuroArm; design a spin-off |
| 12 | **Is Space Worth It?** | 1 | Do the benefits outweigh the costs? | E1.1, A2.3, A2.4 | Artemis II case study; impact sort; space debris; evaluation |
| 13 | **Mission Workshop** | 1 | How do we plan a mission? | E1.1, E1.3, E2.5, A2.1 | Mission planner; signal time; rubric feedback |

## Assessment

| Type | In this unit |
|---|---|
| Assessment for learning | Object sort, toilet-paper model, trace the cosmos, pinhole measurement, colour lab, angle of light, phase model, balloon universe, sky knowledge research, sea ice and flood watch, spin-off investigation, impact sort, exit tickets |
| Assessment as learning | Self-checks, peer feedback in the Mission Workshop |
| Assessment of learning | Canadian Space Mission Proposal with rubric (suggested weight: 7%) and Unit Test with answer key (suggested weight: 5%) |

## What's included

In the Start Here folder:

- **Summative Task and Rubric:** the Canadian Space Mission Proposal
- **Unit Test and Answer Key:** a 45-minute, 36-mark test with full worked answers

Safety: never look at the Sun directly or through binoculars, telescopes, cameras or phones; view the Sun and solar eclipses only with a pinhole projector. Lamp-and-ball models use cool LED bulbs with cords kept along the floor. Check for latex allergies before the balloon activity. Every hands-on activity has safety notes in its lesson plan. For Lesson 9, work through your board's Indigenous education office if you invite a Knowledge Keeper, and follow its protocols.

## What's in each lesson

- Teacher lesson plan with expectations, timed sequence, differentiation, look-fors and answer guides
- Slides with speaker notes
- Student handouts and organizers
- Editable Word and PowerPoint files, plus PDFs

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