




INTERMEDIATE SCIENCE 9
UNIT 1: SPACE
WORKSHEET # 9: CANADA AND SPACE EXPLORATION



Listed below are some contributions Canada has made to space explorations:

1. **Canadarm 1** was a mechanical arm used on the Space Shuttle to manoeuvre a payload from the payload bay of the orbiter to its deployment position and then release it.
2. **Canadarm 2** is a mechanical arm that is used on the international space station. It plays a key role in space station assembly and maintenance: moving equipment and supplies around the station, supporting astronauts working in space, and servicing instruments and other payloads attached to the space station.
3. **Dextre (CanadaHand)**, also known as the Special Purpose Dexterous Manipulator (SPDM), is a two armed robot,, which is part of the Mobile Servicing System on the International Space Station (ISS), and extends the function of this system to replace some activities otherwise requiring spacewalks. It was launched March 11, 2008
4. **International Space Station (ISS)** Along with the United States, Russia, Europe and Japan, Canada is a partner in the International Space Station (ISS), The first module of the Station was launched in 1998, the Station has circled the globe 16 times per day at 28 000 km/h at an altitude of about 370 km, covering a distance equivalent to the Moon and back daily. Once complete, the Station will be as long as a Canadian football field, and will have as much living space as a five-bedroom house.
5. **Canadian Astronauts :** Their main job is to develop, support, train and fly on international space missions, and their unique experience helps further scientific research and advanced technology development.

Marc Garneau	Roberta Bondar	Chris Hadfield
		
<p>The first Canadian astronaut in space during the STS-41G mission of the American space shuttle Challenger, 5-13 October 1984</p>	<p>.Canada's first female astronaut and the first neurologist in space. She was launched in January 1992 aboard NASA's space shuttle Discovery</p>	<p>First Canadian Astronaut to walk in space, operate Canadarm, and command the International Space Station</p> <p>Hadfield was the first and only Canadian to board the Russian space station Mir</p> <p>Hadfield has spent a total of 166 days in space, including 14 hours 53 minutes and 38 seconds of time "outside"</p>

Technologies Designed To Explore Space:

- 1. **Rocket Propulsion:** Thrust is the force which moves any aircraft through the air. Thrust is generated by the propulsion system of the aircraft

- 2. **Space Suits:** is a garment worn to keep an astronaut alive in the harsh environment (vacuum and temperature extremes) of outer space.

- 3. **Satellite Orbiting** a satellite is an object which has been placed into orbit by human endeavour

- 4. **Rover** is a space exploration vehicle designed to move across the surface of a planet or other astronomical body

- 5. **Optical telescopes:** is a telescope which is used to gather and focus light mainly from the visible part of the electromagnetic spectrum for directly viewing a magnified image for making a photograph, or collecting data through electronic image sensors.

- 6. **Radio telescopes** are directional radio antennae that often have a parabolic shape. They are used to study naturally occurring radio emission from stars, galaxies, quasars, and other astronomical objects

Laboratory Activity: Designing a Space Station



STUDENT NAME: _____

DATE: _____

GROUP MEMBERS:

TITLE: Designing a Space Station

PURPOSE: To you design a space station in orbit around Earth. The design of the space station must be safe for people to live in, taking into account all the environmental effects of being in space (including solar radiation, solar storms, and temperature control, among others)?

PROCEDURE:

- 1. Working in groups, identify the major environmental factors that a space station needs to protect against. **See table 1 in analysis**, list answers in column 1 (environmental Factors)

- 2. Research to find technology that will help to protect people and equipment from the factors you identified. **See table 1 in analysis**, list answers in column 2 (Technology)

3. Design components of a space station that use the technologies you identified in step 2 to keep people and equipment safe. **See table 2 in analysis**
4. List the resources that will need to be present to allow astronauts to live and work on a space station. **See table 3 in analysis**
5. Build a model, create a diagram, or plan and perform a skit to show how you will obtain and dispose of the resources and to explain how the protective elements of your space station work.

ANALYZE:

Table 1: Major Environmental Factors

Environmental Factors	Technology To Protect

Table 2: Components of a space station that use the technologies you identified in step 2

--	--	--

Table 3: Resources that will allow astronauts to live and work on a space station

1. What are the three most important environmental factors to plan for?

i) _____

ii) _____

iii) _____

2. How did you design the station to keep the astronauts safe?

3. What roles will the astronauts need to perform on your space station?

4. Where will you get your food, air, and water?

5. Where will you get power?

6. What will you do if parts of the space station break down?

7. What will you do if you have to go outside to fix the station?
