

### Space Booklet #3

#### Explaining the Early Universe

The \_\_\_\_\_ consists of a \_\_\_\_\_ and all the other \_\_\_\_\_ that orbit around that star.

A \_\_\_\_\_ is made up of several \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ that are held together by \_\_\_\_\_.

#### Three Types of Galaxies

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

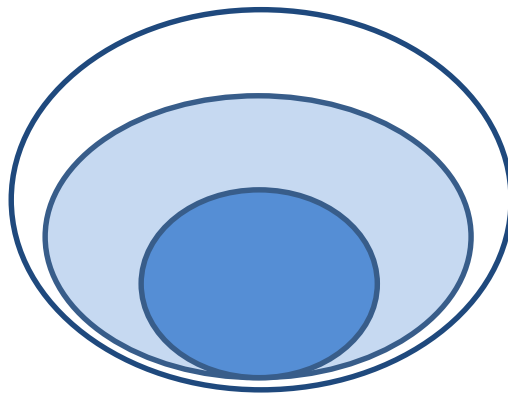


What is the name of the Galaxy we live in ? \_\_\_\_\_

What is its type? \_\_\_\_\_.

The \_\_\_\_\_ consists of all matter and energy.

Solar systems make up \_\_\_\_\_ which in turn make up the \_\_\_\_\_.



#### Measuring Distances in our Universe

Distances within our Universe are measured in \_\_\_\_\_.

1 Light Year = \_\_\_\_\_ (95 trillion Km)

Speed of Light = \_\_\_\_\_ km/s

**Question:** If light travels at approximately 9.5 trillion km/year and Proxima Centauri is 4.28 light years away, what is the distance to Proxima Centauri?

*Theories on the Origin of the Universe*

<b>Big Bang Theory</b>	<b>Oscillating Theory</b>

*Theories on the Origin of the Solar System*

<b>Stellar Collision Theory</b>	<b>Nebular Hypothesis Theory</b>

## Components of the Universe

### 1. Galaxies

Our Milky Way Galaxy is a \_\_\_\_\_. The planet Earth is located on its spiral \_\_\_\_\_.

Some of the oldest and largest galaxies are \_\_\_\_\_.

### 2. Stars (Evolution of Stars)

	Dwarf Stars	Giant Stars
Size		
Burn fuel		
Life span		
Life cycle		

### 3. Black Hole

A sphere of extremely dense material with a \_\_\_\_\_ pull so strong not even \_\_\_\_\_ can pass out of it.

A Black hole is created when a \_\_\_\_\_ star collapses on itself.



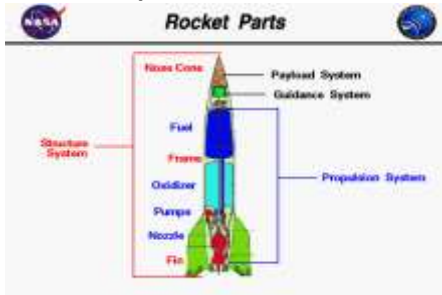
A \_\_\_\_\_ is a region of extremely high \_\_\_\_\_ which develops around a supermassive black hole as matter is attracted into \_\_\_\_\_.

### 4. Solar Sytem

Discussed in Booklet 2 – consists of the sun, planets, and all other celestial bodies orbiting the Sun.

# Technologies Designed To Explore Space

## 1. Rocket Propulsion



- transport \_\_\_\_\_ and \_\_\_\_\_ into space.
- \_\_\_\_\_ such as monkeys and dogs were first sent to make sure that the rockets were safe for humans.
- \_\_\_\_\_ is the force that pushes against the rocket causing it to move.
- As the fuel on a rocket gets used up, parts of the rockets propulsion system break off to make it lighter and require less fuel.

## 2. Space Suits



- act as tiny spaceships that provide \_\_\_\_\_ to breathe, a \_\_\_\_\_ to prevent overheating, \_\_\_\_\_, and a \_\_\_\_\_.

## 3. Satellites

Define \_\_\_\_\_

Natural Satellite - \_\_\_\_\_

Artificial Satellite - \_\_\_\_\_

Artificial Satellites are electronic devices that orbit Earth and relay information.



Examples include;

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### **Satellites Orbits**

Satellites can travel in \_\_\_\_\_ types of orbits. The further away the satellite is from Earth, the \_\_\_\_\_ it will take to orbit.

\_\_\_\_\_: between 300-500km above the Earth. These satellites travel around the Earth \_\_\_\_\_ every \_\_\_\_\_ minutes.

\_\_\_\_\_: satellites placed above the equator a distance of about 36000km. These satellites take about \_\_\_\_\_ hours to make one orbit. Because they are rotating at the same rate as Earth, these satellites appear to stay in the same place. \_\_\_\_\_ are usually placed in geosynchronous orbit.

### **4. Probes**

\_\_\_\_\_ sent to other celestial bodies to gather information about its atmosphere and surface features.

They can fly past, orbit or \_\_\_\_\_ on these bodies.

Does not need a \_\_\_\_\_ and do not need to return to Earth.

All of the planets in our solar system have been visited by a Probe. Probes send \_\_\_\_\_ and \_\_\_\_\_ directly back to Earth.

### **5. Rover**



Moveable \_\_\_\_\_ designed to land on a planet. Have highly specialized programming so that they can \_\_\_\_\_ and are designed to withstand extreme \_\_\_\_\_. They are designed to work all day long and conserve battery power at night.

### **6. Telescopes**

#### Optical Telescopes (Two Types)

\_\_\_\_\_  
\_\_\_\_\_

Large Observatories (Labs that contain huge telescopes):

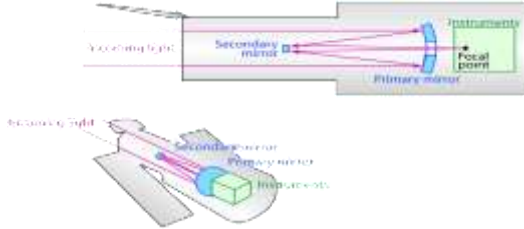


Canada France Hawaii Telescope

Why are these generally built high on mountaintops?

---

Hubble Space Telescope



- In \_\_\_\_\_ orbit. With no air to spoil the view it allows us to see objects far away in space.

Radio Telescopes

- Large receivers that look like giant \_\_\_\_\_
- Collect wavelengths that are \_\_\_\_\_ than visible light.
- Information obtained using a radio telescope would not be able to be obtained using an optical telescope.



Define Interferometry

---



---

Radio telescopes are used to study \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, etc.

**Canadian Contributions to Space Exploration**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Canadian Astronaut	Who are they?
Roberta Bondar	
Marc Garneau	
Chris Hadfield	

Canada's Contributions To Space Exploration Worksheet (Text Page 415-416)

<p><b><u>Canadarm 1</u></b> What does it do?</p>	<p><b><u>Canadarm2</u></b> How is it different from Canadarm 1?</p>	<p><b><u>International Space Station</u></b> Is there an international partnership? What does it orbit and in what time period? What do they do on the space station and in what type of environment do they do it in?</p>
--	---	--

### **Space Exploration & Travel**

Students are to complete this section of the notes using their textbook and/or electronic devices. ( Refer back to your booklet 3 notes and the video clips you have seen in class.)

List 6 Careers Associated with Space Exploration

---

---

---

---

---

---

List 4 Challenges associated with space exploration and travel (Text Page 461)

---

---

---

---

Technology originally invented for use in space has found a new purpose on Earth. List 3 spin-off technologies we use in our day to day lives. (Text Page 461)

---

---

---

List 3 Risks associated with space exploration and travel (Text Page 462-463)

---

---

---

---

What is an Advantage and a Disadvantage of Canadian Partnerships in Space Exploration?

Advantage	Disadvantage



## Designing a Space Station Group Project

### **Step 1: Understanding the environmental factors that affect a space station**

Listed below are the 3 major environmental factors a space station needs to protect itself against. Discuss as a group and use the video clips on “How stuff works” to explain how the space station protects against zero gravity, solar radiation, and objects hitting the station. Make sure to include these ideas in your design.

#### **1. Zero Gravity**

How is the space station able to stay in orbit (on an exact path) around the earth?  
What affect will this have on an astronaut’s body?

#### **2. Solar Radiation**

How does the space station protect itself and the people onboard from the suns heat?

#### **3. Objects hitting the station**

If an object hits the space station (space junk) how are we going to be able to repair any damage to the outside?

### **Step 2: Develop a List: Your Design Must Illustrate the answers to the questions below**

Answer the questions below to develop a list of what must be included in the design of the space station to ensure people are able to live and work there.

1. What roles will the astronauts need to perform on your space station?
2. Where will you get your food, air, and water?
3. Where are you going to sleep/use the bathroom?
4. How are you going to keep your body in shape?
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?

### **Step 3: Design A Space Station**

**Task:** Your group is to prepare a labelled, colored diagram, build a model, or create a rap to music to explain how the protective elements and living environment work on your space station.