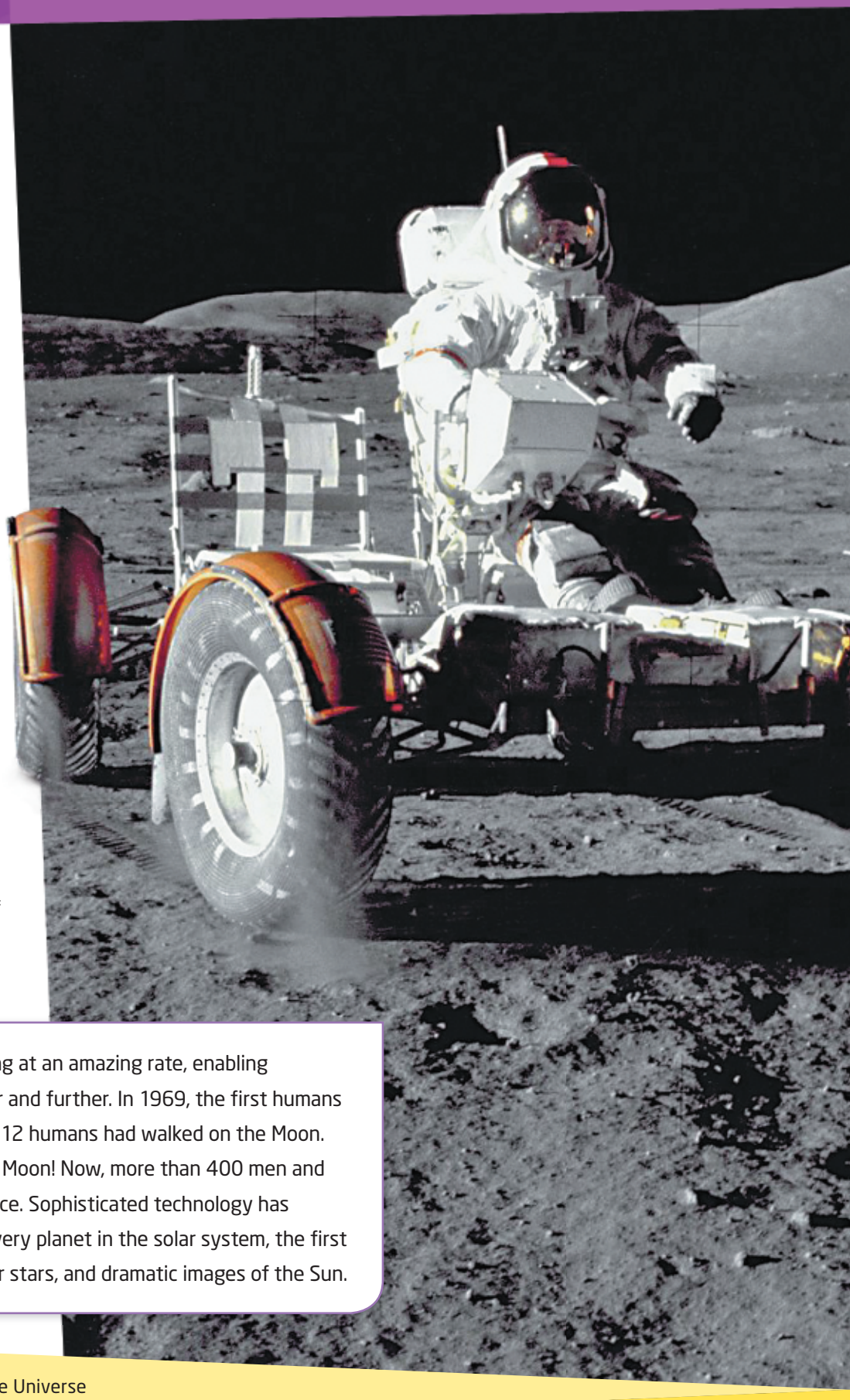
Chapter 8 Exploring Our Stellar Neighbourhood



What You Will Learn

In this chapter, you will learn how to...

- **discuss** a range of technologies used to study objects in the sky
- **assess** some of the costs, hazards, and benefits of space exploration
- **describe** the Sun's composition and energy source, and **explain** how the Sun's energy warms Earth and supports life on the planet
- **compare** star temperatures and colours, and **understand** how stars evolve

Why It Matters

Improvements in technology increase our ability to observe and to travel farther into space.

Skills You Will Use

In this chapter, you will learn how to...

- **interpret** the composition of the Sun and other stars by examining their spectra
- **plan** and **conduct** a simulation that illustrates the relationship between a star's distance from Earth and its brightness
- **compare** and **contrast** properties of stars by using a graph to determine star properties based on their spectral type

Space technology is progressing at an amazing rate, enabling astronomers to explore further and further. In 1969, the first humans walked on the Moon. By 1972, 12 humans had walked on the Moon. Some have even driven on the Moon! Now, more than 400 men and women have travelled into space. Sophisticated technology has provided close-up images of every planet in the solar system, the first images of planets around other stars, and dramatic images of the Sun.

Activity 8-1

Preparing for a Trip to the Moon

Many scientists believe that the next major step in human exploration of space will be a base on the Moon. If you travelled to the Moon, what would you need? In this activity, you will plan a trip to the Moon and plan your needs for a base on the Moon.

There are many factors to consider when planning a trip to the Moon.

Materials

- large sheets of paper
- markers

Procedure

1. Working in a small group, analyze what you would need for the three-day trip to the Moon, as well as what you would need once you reach the Moon. The following questions will guide you in deciding your needs.
   - **a.** How many crew members and passengers will there be?
   - **b.** Will there be any specialists (such as doctors or engineers)?
   - **c.** What will your spaceship need (for example, spacesuits, fuel, oxygen supply, food, medical supplies, entertainment)?
   - **d.** What will your needs be when you reach the Moon (think about shelter, oxygen, food supplies, water)?
   - **e.** How will you get home?
2. Sketch the results of your discussion on the paper provided.

Questions

1. As a class, discuss the technological problems that would have to be solved before establishing a base on the Moon.
2. Do you think there should be a limit on the total number of passengers on your trip? Explain your answer.
3. Do you think families should be allowed to take your trip? Explain your answer.

Study Toolkit

These strategies will help you use this textbook to develop your understanding of science concepts and skills.
To find out more about these and other strategies, refer to the Study Toolkit Overview, which begins on page 561.

Organizing Your Learning

Making Study Notes

Study notes are brief statements that explain the most important ideas and details of a text in your own words. Use whatever format helps you remember the information: point form, sentences, or graphic organizers. The T-chart below shows the most important idea and supporting details of the first paragraph on page 330.

Main Idea	Supporting Details
Space travel is both expensive and risky.	• It takes years to design and test the equipment and software. • A fire in the *Apollo 1* spacecraft led to the death of all three astronauts inside.

Use the Strategy

Read the first paragraph under the heading "Satellites" on page 325. After reading, draw a T-chart like the one shown above. In your chart, write the main idea of the paragraph. Then list the supporting details. Finally, write a sentence in your own words to summarize the paragraph.

Word Study

Compound Words

A compound word is made of two smaller words joined together. Recognizing the smaller words and knowing their meanings can help you figure out the meaning of the compound word. For example, *blackout* is made up of *black*, meaning without any light, and *out*, meaning outside. So, *blackout* literally means "without any light outside." Note that some compound words have meanings that are different from the combination of their smaller parts. Consider the context of the compound word, too.

Use the Strategy

Think about the compound word *wavelength*. Identify the two smaller words that make up this compound. Use their meanings to figure out the meaning of the compound word. Be sure that your meaning makes sense in a scientific context.

Reading Graphic Text

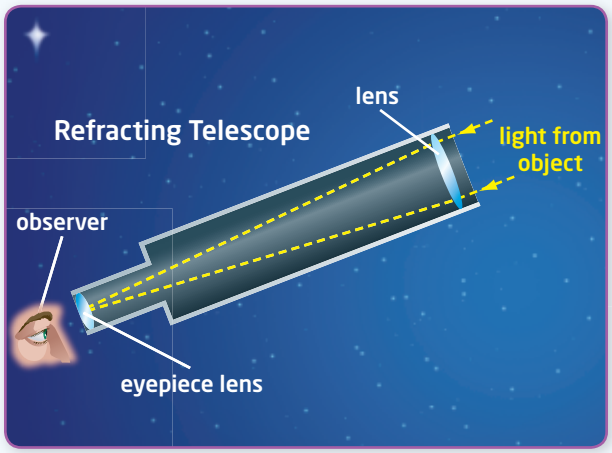
Interpreting Diagrams

A diagram is a simplified drawing that uses symbols to represent objects, directions, and relationships. Reading the labels of a diagram can help you understand these symbols.

To interpret a diagram, first read the title or caption to understand the main idea of the diagram. Then consider how each part illustrates the main idea. For example, the caption of the figure on the right tells you about the function and structure of a refracting telescope. The labels and the picture show how each part of the telescope collects light and focusses it for the observer.

Use the Strategy

Examine **Figure 8.20** on page 336. Read the caption to identify the main idea of the diagram. Explain how each labelled part on the diagram contributes to your understanding of the main idea.



Telescopes let you see light from distant objects, such as stars, more clearly. A refracting telescope uses a lens to collect light. A smaller lens in the eyepiece magnifies the image.