Springboard into Comprehension 4

Main Idea	**A Place in Space**
	Fossil Fuels
Sequencing	Black Rock
	The Best Holiday Ever
Compare and Contrast	From Me to You
	Your Choice!
Fact and Opinion	Community Views
	The Daily News
Cause and Effect	Natural Disasters
	The Invaders
Bias and Prejudice	Have Your Say!
	Save Our Skate Park

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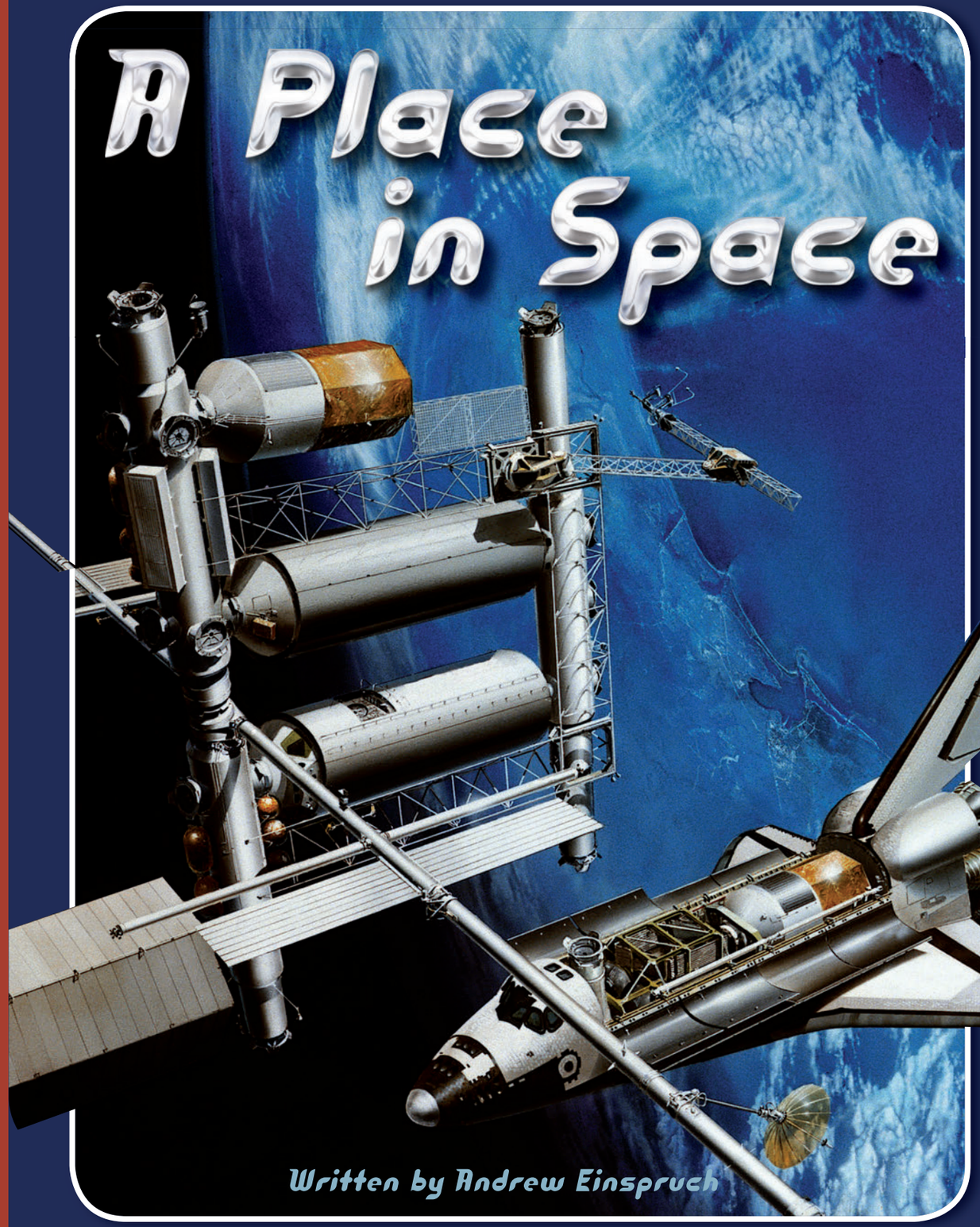
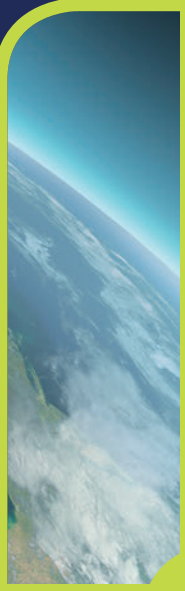
MACMILLAN





A Place in Space

Contents

Written by Andrew Einspruch

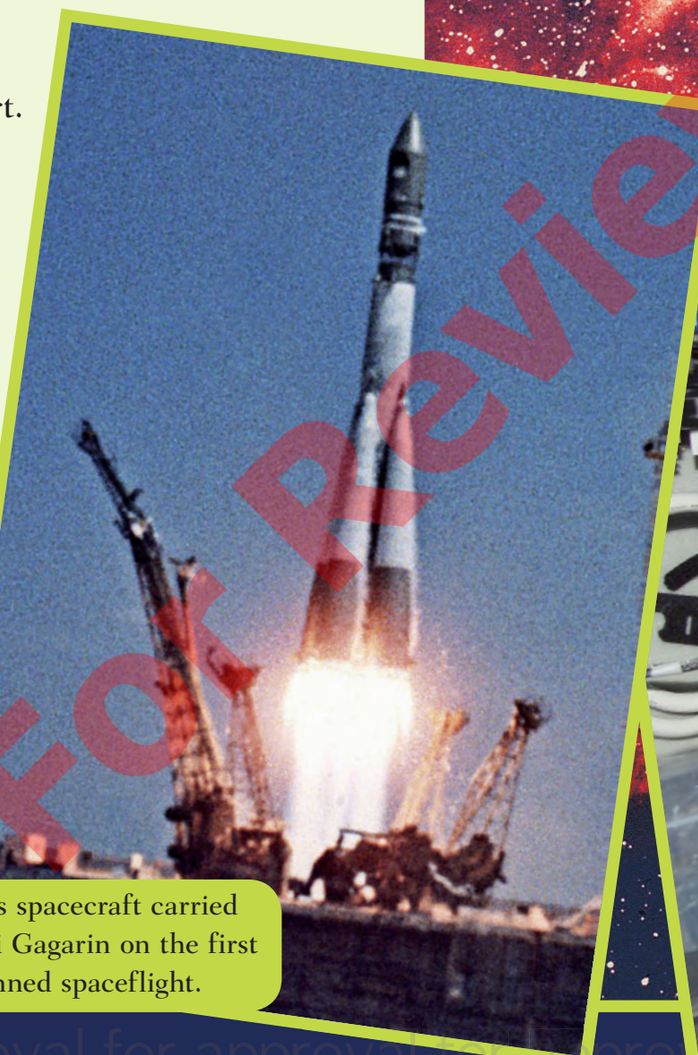
Introduction

Space travel has been a huge success for humankind. It is a great feat to launch people into space and return them safely. In the 1960s, the world watched in awe as spacecraft after spacecraft blasted off from Earth.

However, there has always been one issue – time. The Russian astronaut Yuri Gagarin was the first person in space. In 1961, he flew to the edge of Earth's atmosphere. Gagarin went once around Earth on a fixed path, in orbit. The flight lasted 108 minutes. Even the longest trips into space were quite short. The first mission to the moon lasted just eight days.

Scientists soon planned longer stays in space. Long trips would allow scientists to do in-depth studies. They could study the effects of space travel. They also wanted to study how plants and animals grew in space.

In space, objects behave differently from on Earth. On Earth, objects are pulled towards the centre of the planet. This is because of the force that pulls all objects in the universe towards each other. This force is called **gravity**.



This spacecraft carried Yuri Gagarin on the first manned spaceflight.

Gravity stops people floating away from Earth. This is because the pull of the massive object, Earth, keeps small objects on its surface. When people travel away from Earth, this pull becomes weaker.

In orbit, gravity is still quite strong. It prevents objects from floating away into space. At the same time, objects in orbit are in a state of constant and unrestrained fall, or **free fall**. This pulling and falling keeps objects travelling in a circle around Earth.

On Earth, gravity affects everything people do. However, the further away from Earth people travel, the lower gravity is. This affects astronauts. Scientists wanted to study these effects before sending the astronauts on very long trips, for example to Mars.

Astronaut Frank Dewinne next to a plant used to study the effects of space travel on plants

Structures in Space

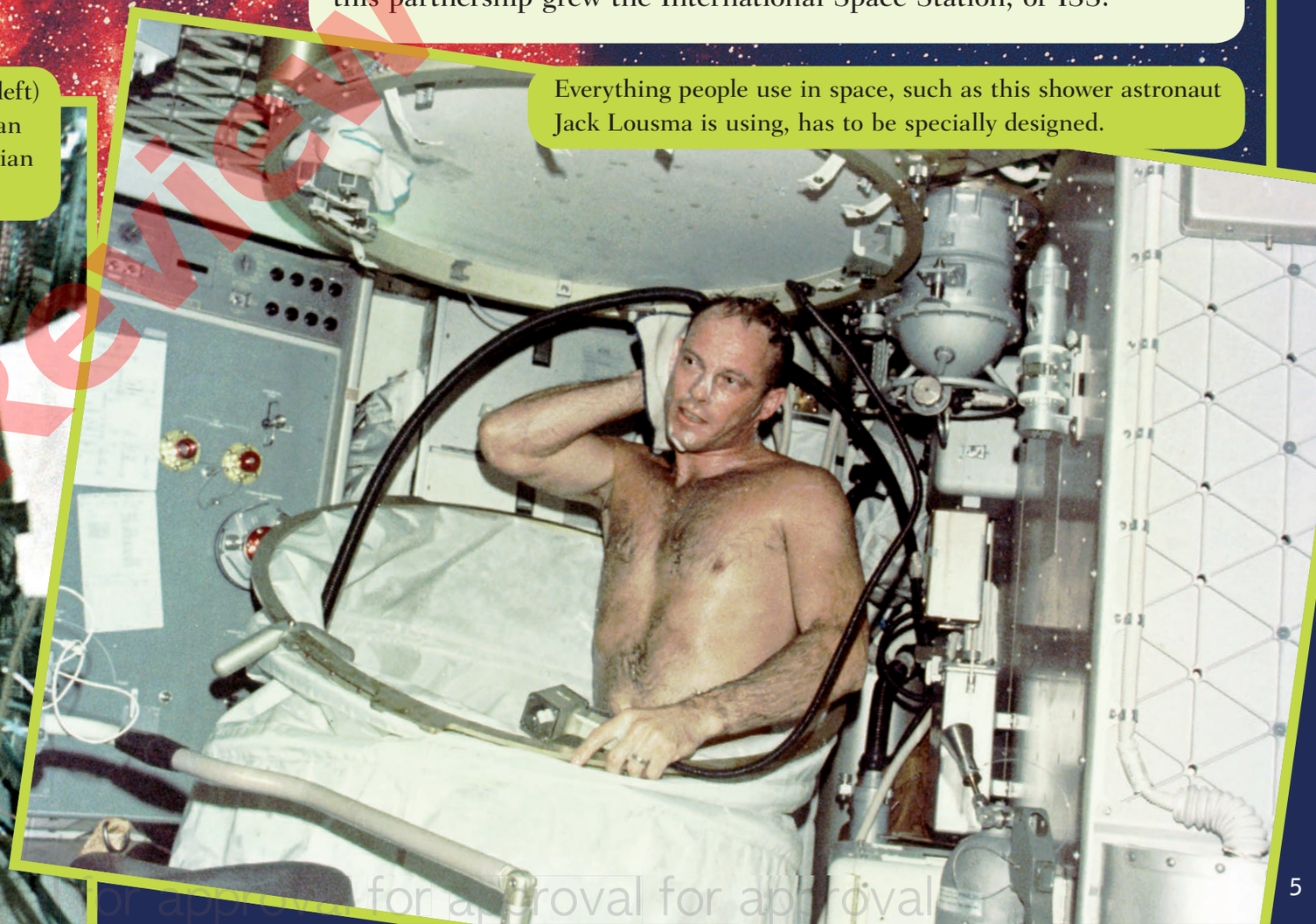
To study space travel, scientists built structures where people could live and do research in space. These structures are called space stations. They are big enough for people to live for weeks or months. They are built to remain in orbit. Shuttles carry astronauts to and from space stations.

At first, countries built space stations on their own. The United States (US) and the Soviet Union, now Russia, started building stations in the 1970s.

Astronauts Thomas Reiter (left) and Yuri Gidzenko prepare an experiment aboard the Russian space station *Mir*.

However, space stations are very complex. They are very costly to build and run, too. It is hard for a country to build and maintain a space station on its own. Getting other countries involved helps spread the risks and costs.

In the 1980s, the US began talks with other countries about building a space station. In 1993, the talks finally produced results. The US National Aeronautics and Space Administration (NASA), and other space agencies, agreed to build a space station. The other agencies were from Japan, Canada, Russia, and ten European countries. From this partnership grew the International Space Station, or ISS.

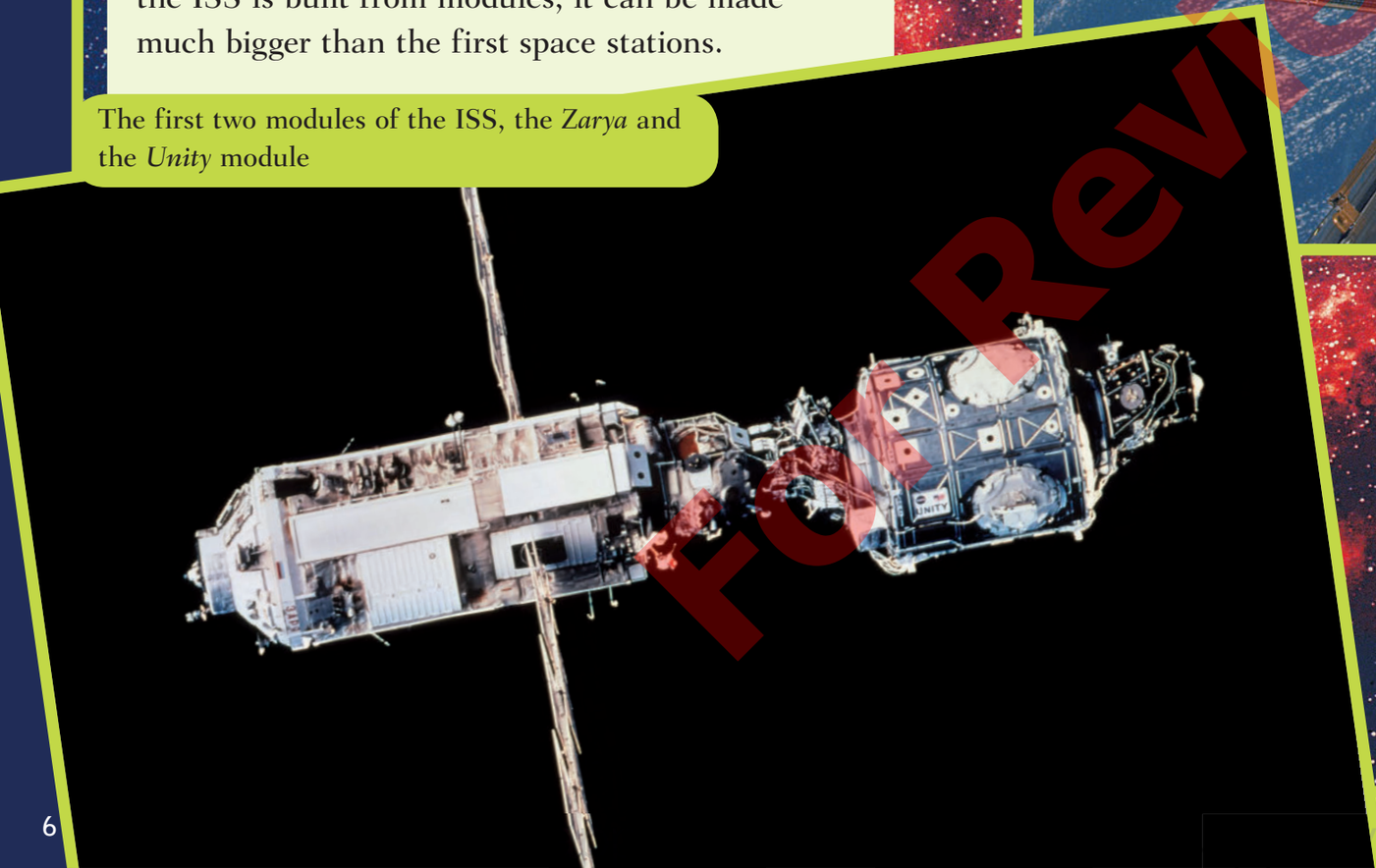


Everything people use in space, such as this shower astronaut Jack Lousma is using, has to be specially designed.

Building the ISS

Five years later, it was time to start building the ISS. The ISS is made up of self-contained pieces that fit together to make a whole, or **modules**. The space agencies lifted each module into space separately. Then, astronauts put them together in space.

The first space stations were built in one piece on the ground. Then, spacecraft carried them into space. This meant the space stations could not be any larger than the spacecraft could lift. Therefore, the first space stations were quite small. Because the ISS is built from modules, it can be made much bigger than the first space stations.



The first two modules of the ISS, the *Zarya* and the *Unity* module

To work on the exterior of the ISS, astronauts must go outside for a spacewalk, or extravehicular activity (EVA). Astronaut James Newman is working on the *Unity* module.

The first ISS module was named *Zarya*, Russian for *sunrise*. It was launched on November 20, 1998. Two weeks later, a space shuttle carried the module *Unity* into space. The shuttle crew put the two parts together. The third module, *Zvezda*, which is Russian for *star*, was added 19 months later. With the three modules in place, the ISS was complete.

In November 2000, the first crew to live on the station arrived. The crew consisted of three astronauts. They stayed there for 136 days. The ISS was now in use.