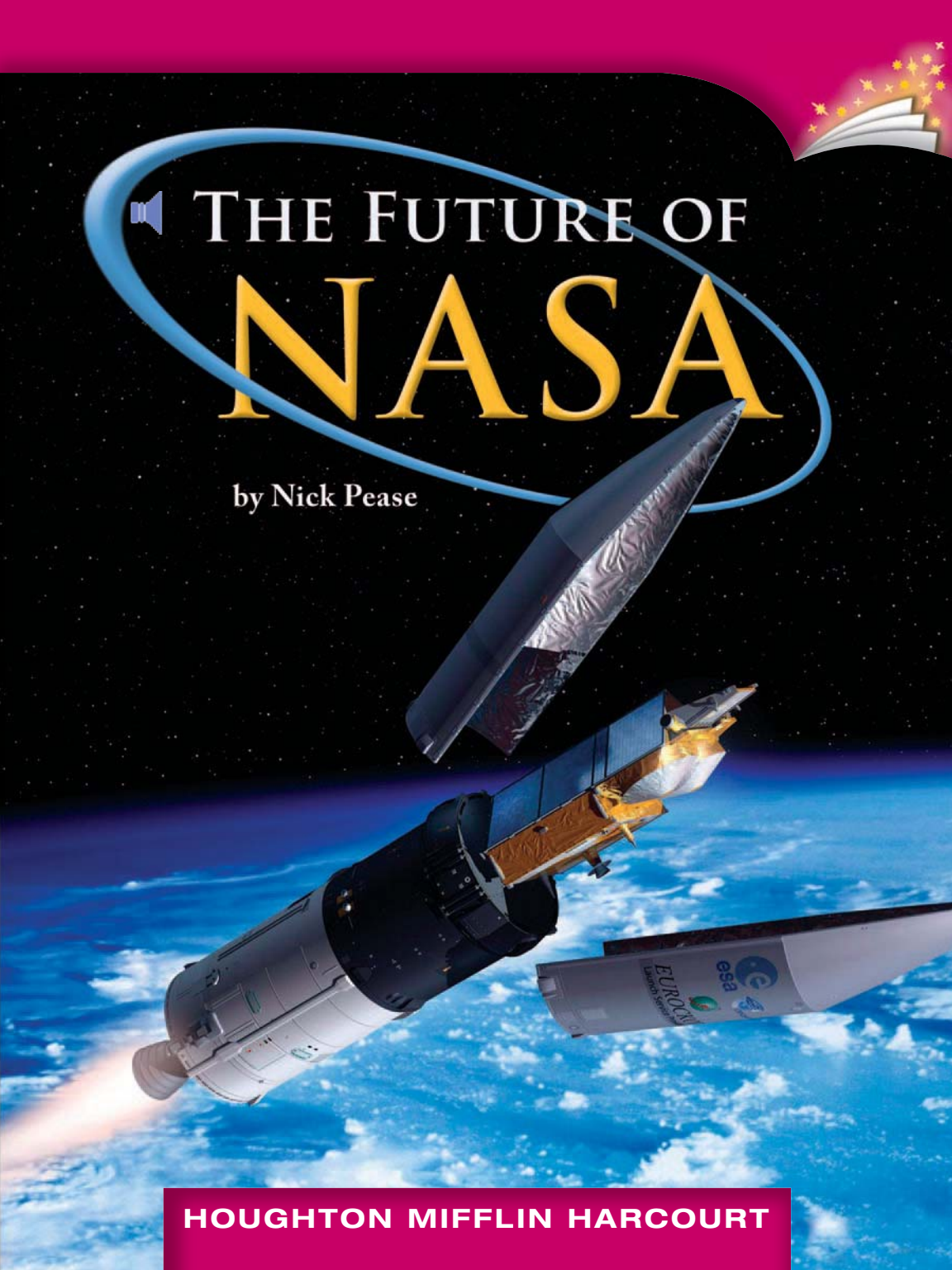
The Future of NASA

by Nick Pease



HOUGHTON MIFFLIN HARCOURT

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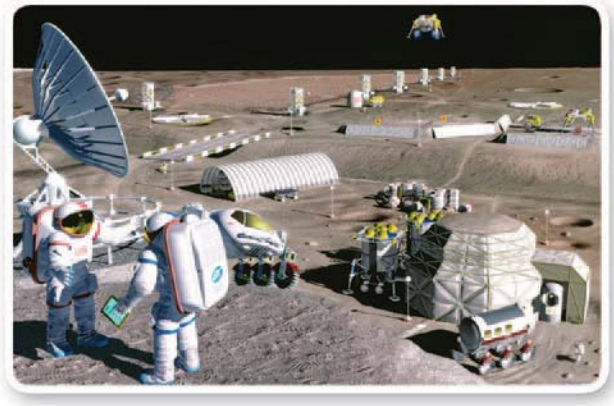

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ILLUSTRATION CREDITS: **5** John Hovell / Kirchoff / Wohlberg

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Printed in the U.S.A.

ISBN: 978-0-547-90859-5

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Introduction

Ever wonder what the future will bring? NASA thinks about it all the time.

NASA is short for the National Aeronautics and Space Administration. (Aeronautics means "the science or art of flight.") This group looks to the future. It takes on goals that seem out of reach, like sending someone to the moon. Then it makes them happen.

What lies ahead for things that fly — in air or in space?

A NASA spacecraft flies away from Earth.

CHAPTER 1

Eyes in the Skies

One of NASA's big ideas is a global map. They call it the Landsat Program. It uses satellites to map Earth. Believe it or not, these maps note every square foot of land and sea on our planet. The map gets updated every week. Now that's keeping up with the times!

You hear a lot about satellites in orbit. But what *is* a satellite, anyway? And what does *orbit* mean?

Satellites in Orbit

A satellite is any object that revolves around a planet. It flies along a pathway, or orbit. The orbit is either circular or stretched by gravity into an oval. Gravity gives everything on Earth weight. It is the force that keeps us from floating into the air. In the 1960s, space capsules orbited, or circled, Earth. They carried animals and humans. Today, other satellites give us radio, television, and telephone service.

This satellite is orbiting Earth.

Why Don't Satellites Fall?

Can you do the "around the world" trick with a yo-yo? The yo-yo doesn't fall — even when overhead. What makes that happen is centrifugal (sen TRIF uh guhl) force. The folks at NASA don't spend a lot of time playing with yo-yos. But they do know a lot about centrifugal force. It pushes outward on the yo-yo as it spins. That same force helps keep satellites up.

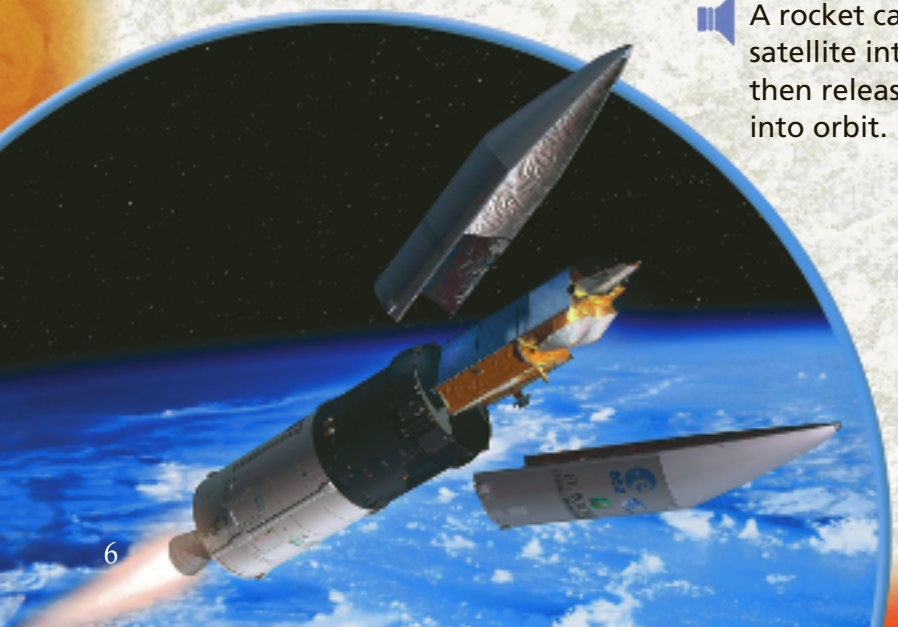
Centrifugal force helps keep yo-yos and satellites from falling.

Rocket Science

A satellite is carried inside a rocket. The rocket shoots up into the air at high speed. At the right moment, the rocket's tip opens, and the satellite pops out.

Satellites don't just buzz around at random. The pull of Earth's gravity and the push of centrifugal force keep it in orbit. The trick is to fly at just the right speed. Too fast, and the satellite flies off into space. Too slow, and it starts to fall.

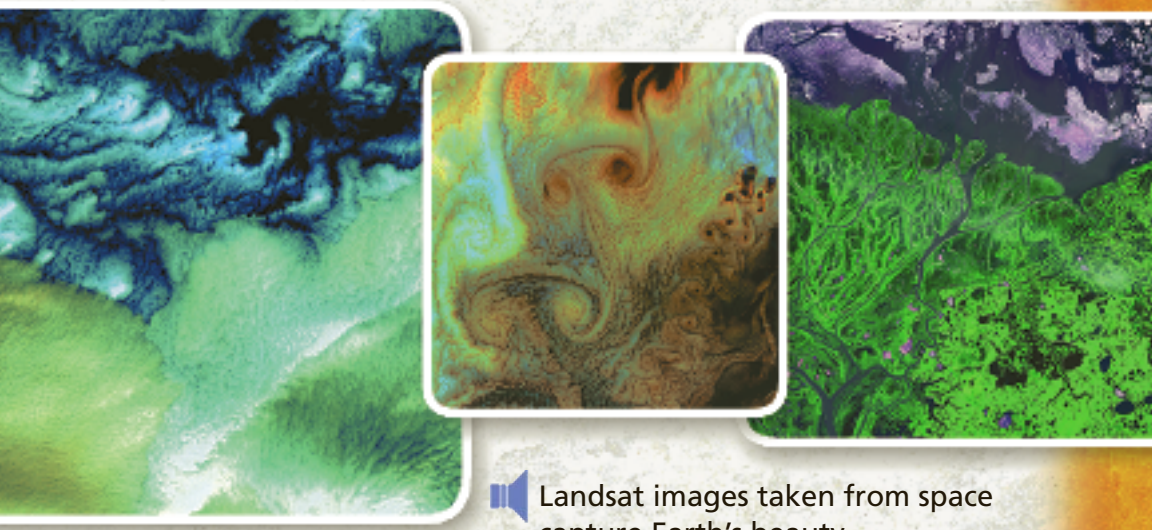
People say hard problems are like rocket science. It's no wonder! There's no room for error. NASA has to get satellites into the exact position. Experts check and recheck their math. It has to be right on target. We can't have satellites falling from the sky!



A rocket carries a satellite into space, then releases it into orbit.

Landsat at Work

NASA's Landsat satellites take incredibly sharp photos of things on Earth. They measure heat. They make maps of all sizes, from whole oceans to a city block. NASA shares its photos with scientists. People and countries around the world benefit from them.



Landsat images taken from space capture Earth's beauty.

Landsat photos are used to track bison herds in our national parks. They can also be used to study global warming, natural disasters, and pollution. They may be used to spot cracks in the ground that warn of impending earthquakes. Landsat photos could save lives.

NASA has lots of projects in mind for Landsat. The options seem endless!

CHAPTER 2

Seeing Past Tomorrow

We can't see clearly into space from the ground. The air mass around Earth gets in the way. In fact, this is why stars seem to twinkle. Moving air blocks them from full view. NASA has an "eye" in space. It's the Hubble Space Telescope. Hubble is high in space. It can see objects in space almost perfectly.

What Does Hubble Show Us?

Scientists always have lots of questions. Hubble gives them answers. For example, black holes exist in space. They have super strong gravity. What this means is that nothing in a black hole ever gets out — not even light. But what does a black hole look like? NASA's Hubble gave us pictures of these holes.

As big as a city bus, Hubble floats in orbit.

Hubble showed us other new sights, too. Galaxies are groups of stars. Hubble has found whole new galaxies. It has even found something called dark energy. Dark energy is a force that may cause space itself to expand. It adds proof to the Big Bang theory. This theory says that the universe began with a single gigantic explosion.

Hubble constantly pushes the limits of knowledge. Every week, it gathers enough data to fill 18 DVDs. It shares this information over the Internet, taking us *all* into the future.

Hubble by the Numbers

Length	53.4 feet
Diameter	14 feet
Weight	24,500 pounds
Speed	17,500 miles per hour
Orbit	353 miles
Time per Orbit	97 minutes
Energy Source	Sun (solar); batteries while in Earth's shadow
Power Usage	2,800 watts

CHAPTER 3

Living in Space

NASA is planning a return to the moon. President George W. Bush put forth the plan. By 2018, he said, astronauts will build outposts for long-term living and exploring. China and Russia have similar space programs, so we may team up with them. From the moon, astronauts may even blast off to Mars!

Long visits to the moon will take planning and teamwork.

Return to the Moon

Would lunar living be fun? You might not wish to live on the moon. It is a perilous place. Cosmic rays bombard it. Tiny space rocks rain down. Except at the poles of the moon, nights and days are two weeks long.

NASA must also do some housecleaning to make a moon base. The moon is covered with gritty dust, which gets into everything. It jams the joints of space suits. It ruins metal gears. It swirls into living quarters, choking crew members. No amount of dusting clears it. It would be hard to live that way for long.

Life on Mars

Building a Mars base would be even harder. NASA scientists face all sorts of problems. The air mass around Mars is too thin for humans to survive. In fact, without a space suit, your body would explode! Mars is 34 million miles away from Earth. That's 136 times farther than the moon. A round trip to Mars would take a year.

Mars is cold. Some parts of the planet warm up in the summer. Most often it's 55 degrees — that is, 55 degrees below zero! A warm base would be hard to build. Spaceships would have to bring loads and loads of supplies. That would take a lot of money and time.

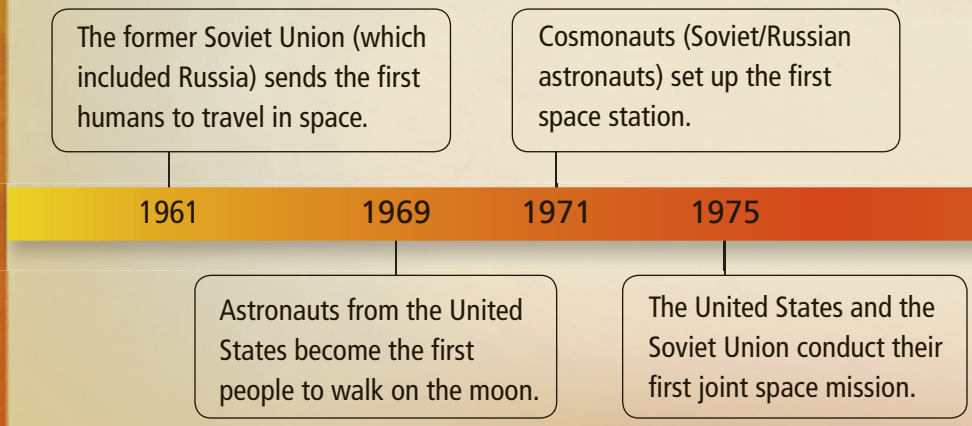
This drawing shows what a Mars base might look like.

Planning for the Future

NASA has joined other countries on a very costly project. It's called the International Space Station, or ISS for short. The ISS is the largest science project in human history. It took the work of scientists from the United States and many other countries to build it. Work on the ISS continues today.

NASA has a lot of new space projects in mind, too. So do space agencies in other countries. When projects are bigger, the cost goes as high as the moon! That's why the United States and other countries may join together again.

History of Space Travel



We could divide the costs. We could explore space together and reach higher goals.

NASA's motto says that it is a "rough road to the stars." We may not know what our future in space may be. But we do know that NASA is ready for anything!

The United States and the Soviet Union teamed up on the Apollo-Soyuz Test Project (shown here) and other space missions.

1981 — The United States launches the first reusable space shuttle to carry a crew.

1995 — Cosmonaut sets record for longest single spaceflight by a man (438 days).

2003 — China sends its first astronaut into space.

2004 — A private company launches its first astronaut into space.

2007 — U.S. astronaut Sunita Williams sets record for longest single spaceflight by a woman (195 days).

Index

Responding

TARGET SKILL **Text and Graphic Features** How did this book's text and graphic features help you learn more about NASA? Copy and complete the chart shown below.

Text or Graphic Feature	Page Number	Purpose
Diagram	5	It helped explain centrifugal force. This force helps keep NASA's satellites in orbit up in space.
?	?	?

Write About It

Text to Self NASA sets challenging goals, such as walking on the moon. Write a letter to a friend describing how you set and reached a goal.

TARGET VOCABULARY

ascent	**option**
hovering	**perilous**
impending	**presumably**
likelihood	**random**
lunar	**unpredictability**

TARGET SKILL **Text and Graphic Features** Examine how the arrangement of text and visuals makes ideas clearer.

TARGET STRATEGY **Analyze/Evaluate** Think carefully about the text and form an opinion about it.

GENRE **Literary Nonfiction** gives factual information by telling a true story.

Level: U

DRA: 50

Genre:
Literary Nonfiction

Strategy:
Analyze/Evaluate

Skill:
Text and Graphic Features

Word Count: 1,109

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Online Leveled Books

ISBN: 978-0-547-90859-5
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