Learning Guide

Mars

We hope you enjoyed learning all about Mars and the Perseverance Rover sent there to explore. Extend your learning with this print-ready Learning Guide!

What's in this Learning Guide?

Get Set to Listen:
Check your knowledge before and after listening to the episode by determining if statements are TRUE or FALSE.

Vocabulary

Discussion Questions
CCSS.ELA-Literacy.SL.3-8.1; CCSS.ELA-Literacy.SL.3-8.3

Writing Prompts and Extension Projects
CCSS.ELA-Literacy.W.3-8.2; CCSS.ELA-Literacy.W.3-8.3

Mars vs. Earth - Venn diagram and project ideas
CCSS.Math.Content.3.MD.B.3 *Represent and interpret data; CCSS.ELA-Literacy.RI.3-5.9*; CCSS Speaking & Listening elementary and middle school standards

Landing on Mars
3-5-ETS1-1 Engineering Design; 3-5-ETS1-2 Engineering Design; 3-5-ETS1-3 Engineering Design

Additional Resources and Book List

The Children's Hour
kids public radio

Get set to listen.

1. Before listening!

Read each statement and write TRUE or FALSE based on what you already know.

2. After listening!

Based on what the experts said in the episode, write TRUE or FALSE.

Before Listening	TRUE or FALSE?	After Listening
	1. Mars has an atmosphere, which has led to erosion on the surface.	
	2. Mars appears red because it has high levels of carbon dioxide in its atmosphere.	
	A Mars day is twice as long as an Earth day.	
	There have been 12 successful Rover missions to Mars.	
	The Perseverance Rover is about the size of your family car.	
	Mars is about ½ the size of Earth, but the land area is about equal to the land area on Earth.	
	Less than 1 percent of Mars has been explored.	

What did you learn?

_____

_____

_____

Get set to listen.

Answer key

1. TRUE
2. FALSE Although Mars's atmosphere does have high levels of carbon dioxide in it, that is not what makes the surface appear red. Martian rocks appear red because they have high levels of iron in them, which has **oxidized**, or rusted, giving them a reddish color. Most volcanic rocks, including the many volcanic rocks on Mars, have a mineral called magnetite in them. Magnetite has lots of iron in it, which stains everything reddish, causing the entire planet to appear red.
3. FALSE. A Mars day is only 40 minutes longer than an Earth day.
4. FALSE:. There have been **six successful rover missions to Mars, five from NASA and one from China**. The NASA rovers are Sojourner, Spirit, Opportunity, Curiosity, and Perseverance. The Chinese rover is Zhurong (part of the Tianwen-1 mission).
5. TRUE
6. TRUE
7. TRUE

Vocabulary

volcanology	The study of volcanoes, how they work, and what they do to the land around them.
core	The center part of a planet, found deep inside, usually made of metal or rock.
mantle	The thick layer of rock found under a planet's crust and above its core.
atmosphere	The layer of gases around a planet.
magnetite	A mineral found in most volcanic rocks that is high in iron. When the iron oxidizes, it stains the surface of Mars red.
oxidize	When a substance changes because it mixes with oxygen. For example, when metal rusts or when the iron in Mars' soil mixes with oxygen and makes the planet look red.
sample	A small part of something that shows what the whole thing is like. Example: A Mars rover might collect a *sample* of rock to study what the planet is made of.
mission	A planned trip to achieve a goal, like exploring Mars.
Rover	A robotic vehicle that moves around on a planet's surface to explore and collect information.
orbit	The path a planet or object takes around the Sun or another body.

Discussion Questions

1. What do you think it would be like to stand on Mars and look around?

2. Why do scientists send rovers instead of people to Mars right now?

3. How does Mars' thin atmosphere affect the possibility of life?

4. If you were designing a Mars rover, what tools or features would you add?

5. What problems would astronauts need to solve before living on Mars?

6. How would you grow food on Mars?

7. Do you think it's more important to explore Mars or explore our oceans first? Why?

8. What kinds of jobs might people have if they lived on Mars?
See "Additional Resources" list in this Learning Guide

9. Imagine you're an astronaut on Mars—what's the first thing you would do?

Group Discussion Strategies

Think Pair Share:
1. Individually, student writes down their answer to a question.
2. Students pair up and tell each other their answers.
3. Teacher calls for volunteers to share with the whole class their answer (and/or their partner's answer). Teacher notes key words/phrases on board.

Round Robin:
1. Teacher poses one question (written on top of a large page) to students, who are assembled into small groups of 3 or 4.
2. Students take turns brainstorming the answers. The recorder of the group writes down all answers.
3. The leader reads the group's ideas to the entire class. Teacher moderates.

Writing Prompts

Narrative Writing Prompts:

1. You are the first person to set foot on Mars—write about your first day. What do you see, hear, and feel?
Extension: *Design a postcard cover to go with your story and "send" it to someone on Earth.*

2. A message from Mars appears on your computer screen. Who sent it, and what does it say?

3. Write 5 "diary entries" from your first week living on Mars. Include daily challenges and amazing discoveries.

4. Write a story about a pet that comes from Mars.
Extension: *Create a detailed drawing with labels for how it survives on Mars.*

5. You discover a hidden cave on Mars. What's inside?

Informative/Explanatory Writing Prompts:

6. Explain how you would survive on Mars without Earth's air and water.
Extension: *Draw or build a model of the habitat you wrote about, showing how it protects you from Mars' harsh environment.*

7. Write an article for a kids' science magazine about how Rovers help us explore Mars.

8. Imagine you are a scientist who just found signs of life on Mars. Write a press release to share the news.

9. Describe how you would grow food on Mars for a colony of astronauts.
Extension: *Create a food survival manual for new colonists with diagrams and illustrations.*

10. Compare a day on Mars to a day on Earth in a short essay. *Use the "Mars vs. Earth" Venn diagram worksheet found in this Learning Guide to get started.*

Extension Activities

STEM

- Mars Map Challenge: Create a labeled map of your imagined Mars adventure locations (landing site, base camp, discoveries).

Art & Storytelling

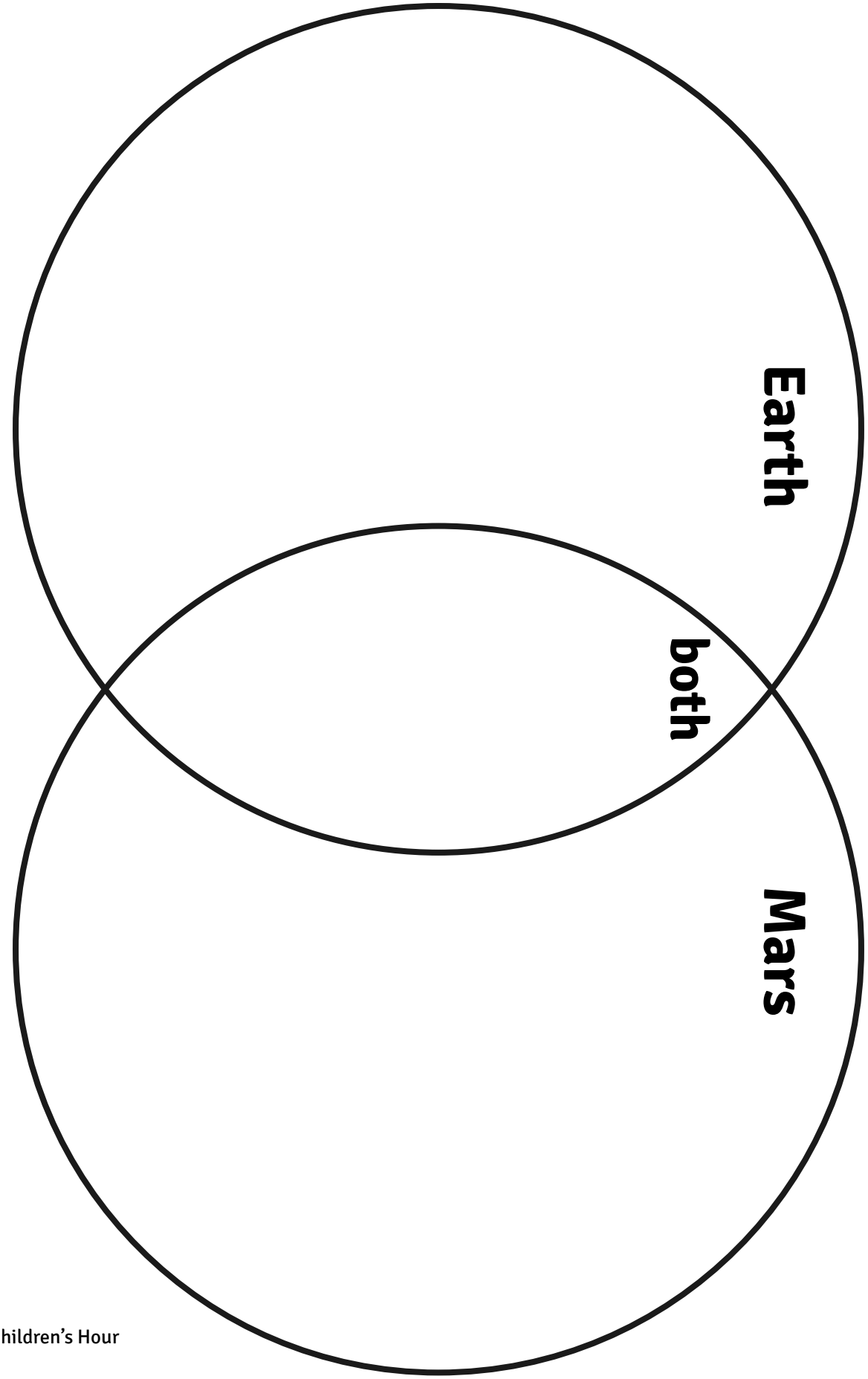
- Illustrate Your Story: Draw key scenes from your writing as a comic strip or picture book.

Presentation

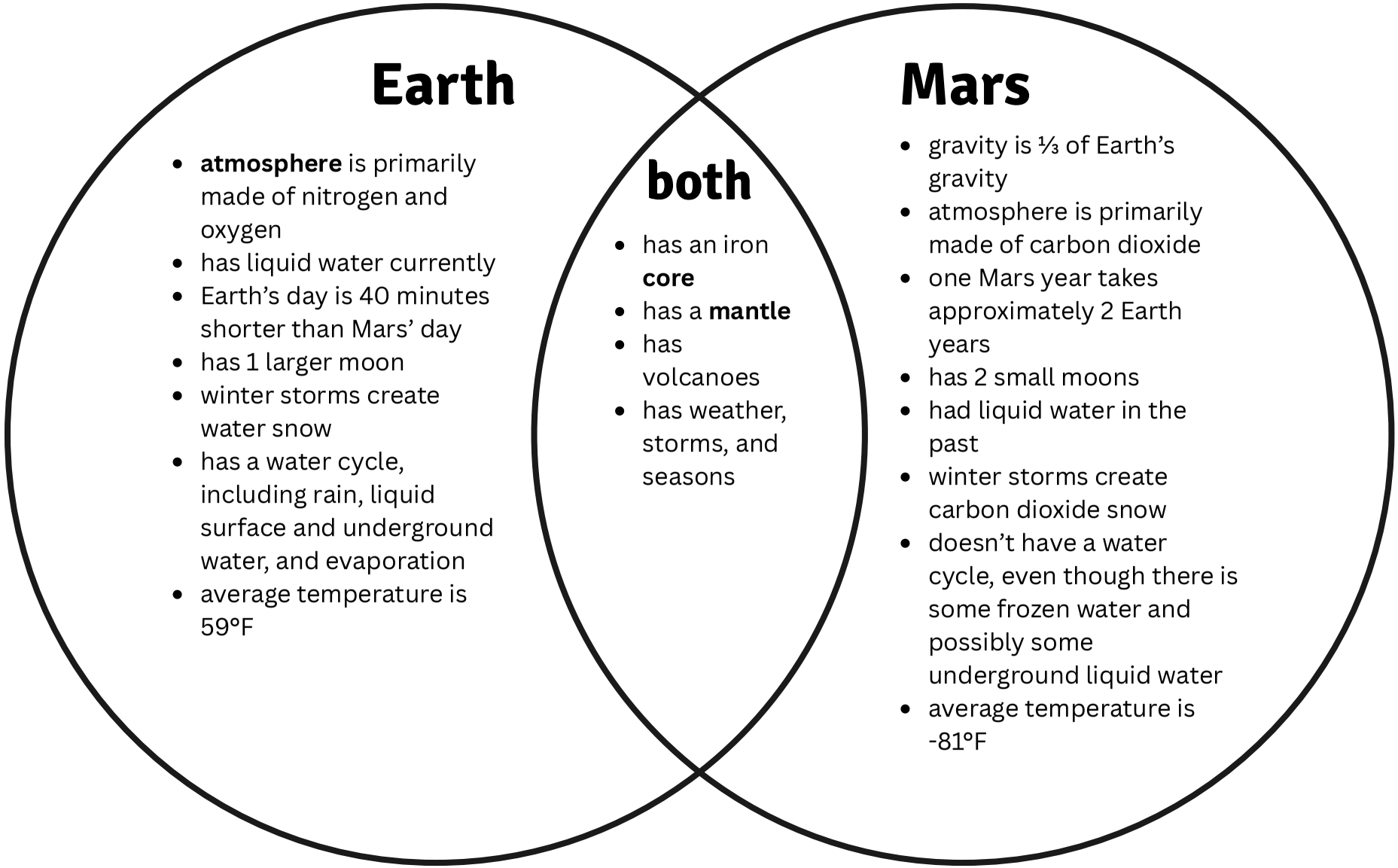
- Author's Chair: Share your Mars story with the class, using props or slides for visuals.

Mars vs. Earth

Name_____



Mars vs. Earth - Teacher's Guide



Use this Venn diagram to compare and contrast what you learned about Mars from *The Children's Hour's* "Mars" episode and from your own research.

Extension Projects:

Planet Comparison Chart: Compare Mars and Earth's size, temperature, day length, atmosphere, and other features in a colorful visual chart.

Comparison Essay: Compare a day on Mars to a day on Earth in a short essay.

Mars Colony Debate: Work in teams to decide if humans should live on Mars. One team argues "yes" and the other "no," then present to the class.

Landing on Mars

Listen to the segment (23:52-24:16):

What challenges are there to safely landing the Perseverance Rover on Mars?

Challenges: _____

_____

_____

_____

_____

_____

_____

_____

Imagine you are on the team of engineers tasked with designing a method for safely landing the Perseverance Rover on Mars. Do NASA's Space Lander Design Challenge. Afterwards, discuss possible solutions to the special design challenges faced by Perseverance.

Then, listen to segment (24:17-24:57) to hear the description of how engineers designed the landing system.

Compare your design to the design the team of engineers came up with.

_____

_____

_____

_____

_____

_____

_____

Additional Resources

Mars 2020: Perseverance Rover
NASA's official website for all things Perseverance Rover, including drive path animation, the stories Mars rock samples could tell, and news updates.

Mission to Mars Unit Plan and Resources
This guide from NASA's Jet Propulsion Laboratory at Cal Tech includes everything you'd need for a unit spanning 15-20 class periods for grades k-12. Take bits and pieces, or do the whole thing!

24 STEM Lessons You Can Quickly Deploy in the Classroom
Explore NASA's Jet Propulsion Lab's STEM lessons and activities by grade, with links to NASA missions and student projects for class or independent work.

Space Lander Design Challenge
Students build and test a paper, straw, and marshmallow shock absorber to protect "astronauts" during landing.

Mars Careers

The Future of Work: What Will Jobs Look Like on Mars?
A short, speculative article that will get your imagination going.

Exploring Planetary Science Careers: A Guide for Students
A practical first look at some career possibilities and actionable steps.

Videos

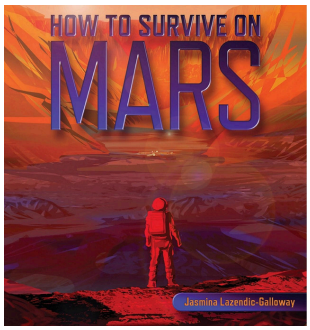
Mission Overview: NASA's Perseverance Mars Rover

How does the Perseverance Mars Rover work?
How it was built, launch, the journey to Mars, and the scientific instruments that allow it to study the surface.

Perseverance Rover's Descent and Touchdown on Mars
Official NASA video

Perseverance Rover Zooms in on Ancient Mars River
After 1,000 days on Mars, NASA's Perseverance rover studied rocks in Jezero Crater that may hold signs of ancient life.

Book List

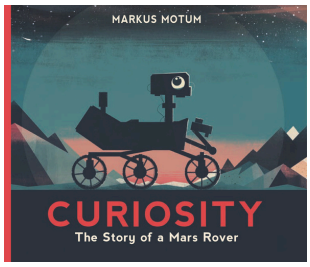


How to Survive on Mars
by Jasmina Lazendic-Galloway

Explore the challenges and wonders of living on Mars in this photo-packed book with activities and quizzes for upper elementary readers. Learn about its volcanoes, ice caps, and ancient lakes, and discover what it takes to survive on the Red Planet.

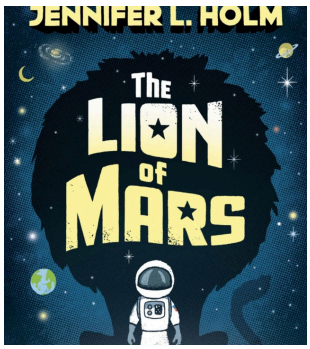
Discover Mars
by Beth Georgia

Bright photos and current facts introduce readers to Mars—its climate, geography, past explorations, and what scientists hope to discover in the future.



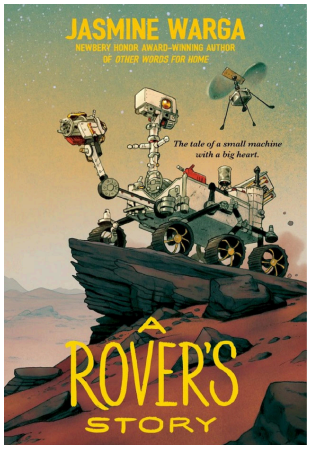
Curiosity: The Story of a Mars Rover
by Markus Motem

This colorful book tells the story of NASA's Curiosity rover—how she was built, named, and sent over 350 million miles to explore Mars and search for signs of life.



The Lion of Mars
by Jennifer L. Holm

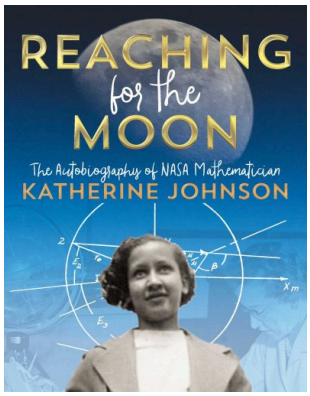
In this middle-grade novel, eleven-year-old Bell and his friends in a Mars colony face a mysterious virus that sickens all the adults, uncovering secrets, saving their families, and possibly uniting the planet.



A Rover's Story
by Jasmine Wargo

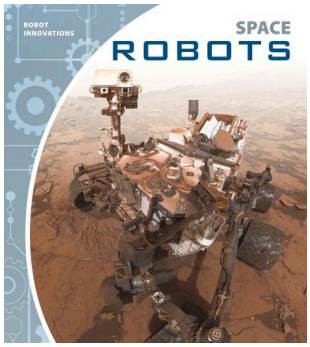
In this heartfelt middle-grade novel, meet Resilience, a Mars rover built for exploration—not emotions—who learns to feel as he journeys across Mars with his drone friend, Fly. Facing dust storms, cliffs, and countless challenges, Res must summon all his courage and determination to survive, while millions on Earth watch his mission unfold.

Book List



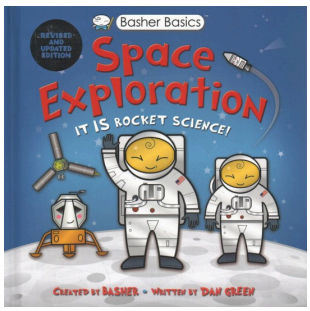
Reaching for the Moon: The Autobiography of NASA Mathematician Katherine Johnson
by Katherine Johnson

The autobiography of NASA mathematician Katherine Johnson, who overcame racism and sexism to help send Apollo 11 to the moon, now sharing her story in her own words.



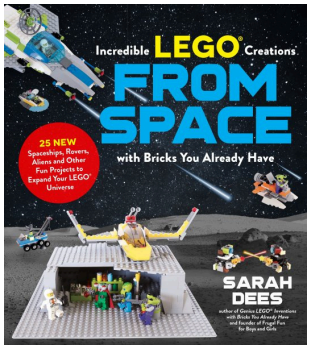
Space Robots
by Angie Smibert

From Earth orbit to deep space, robots are expanding the frontiers of exploration. This 2019 book showcases their missions, design challenges, and future advances, with clear text, vivid images, and useful features.



Space Exploration
by Dan Green

In this 2019 book, cartoon-style characters guide young readers through space exploration and the spacecraft used to achieve it.



Incredible LEGO Creations From Space With Bricks You Already Have
by Sarah Dees

Build epic spaceships, aliens, and vehicles with LEGO® bricks you already own! This book by bestselling author Sarah Dees features 25 space-themed projects with step-by-step instructions, fun stories, and endless ways to customize your creations..

Hey-Ho, to Mars We'll Go!
by Susan Lendroth, illustrated by Bob Kolar

Set to "The Farmer in the Dell," this playful Mars mission follows five bobble-headed astronauts learning the science of space travel, from launch to landing, in a fun, gravity-defying format.