

LESSON PLAN

SEARCHING BEYOND THE STARS Seven Women in Science Take on Space's Biggest Questions

by Nicole Mortillaro • illustrated by Amanda Key

GENRE: Children's non-fiction

THEMES: aeronautics, astronautics & space science, science & technology, women, biographies, scientists, space, racism, STEM

SUITABLE FOR: Grade 5+, Ages 10+

GUIDED READING LEVEL: Fountas and Pinnell W

LEXILE: 1130L

COMMON CORE STANDARDS: CCSS.ELA-Literacy Strand-Reading literature: RI.6.1,2,3,4,5,6,7,8
W.6.1,1a,1b,1c,1d,1e,2,2a,2b,2c,2d,2e,2f,4,5,6,7,8,9,9b
SL.6.1,1a,1b,1c,1d,2,3,4,5,6
L.6,2,2a,2b,3,3a,3b,4,4a,4b,4c,4d,5,5b,5c,6

SUMMARY:

Are we alone in the cosmos? Could we one day live on a different planet? How is life formed? What other secrets does the universe hold?

Through profiles of seven remarkable women scientists and their achievements in their respective fields, *Searching Beyond the Stars* takes us deep into space, looking at once to the distant past and the distant future to capture the awe and intrigue of some of the biggest questions we can possibly ask. Making connections across astronomy, chemistry, physics, history, and more, Nicole Mortillaro draws on her own experience as a woman in STEM to highlight the incredible odds each scientist faces while chasing new discoveries and the ways in which sexism and racism, among other barriers, still affect women scientists to this day. Sidebars filled with fascinating facts take readers behind the science and encourage them to delve deeper. Vibrant illustrations by Amanda Key showcase the wonder of space and the passion and eternal curiosity that drive each scientist in their work unfurling the mysteries of our universe.

Please remember that the suggested questions and activities within this lesson plan are meant to serve as a starting point. They should be tweaked and/or reformatted to best fit your students, context, and community to ensure equity and inclusion.

Before Reading the Book

These activities build the context, introduce the topic of the book, and establish prior knowledge and interest.

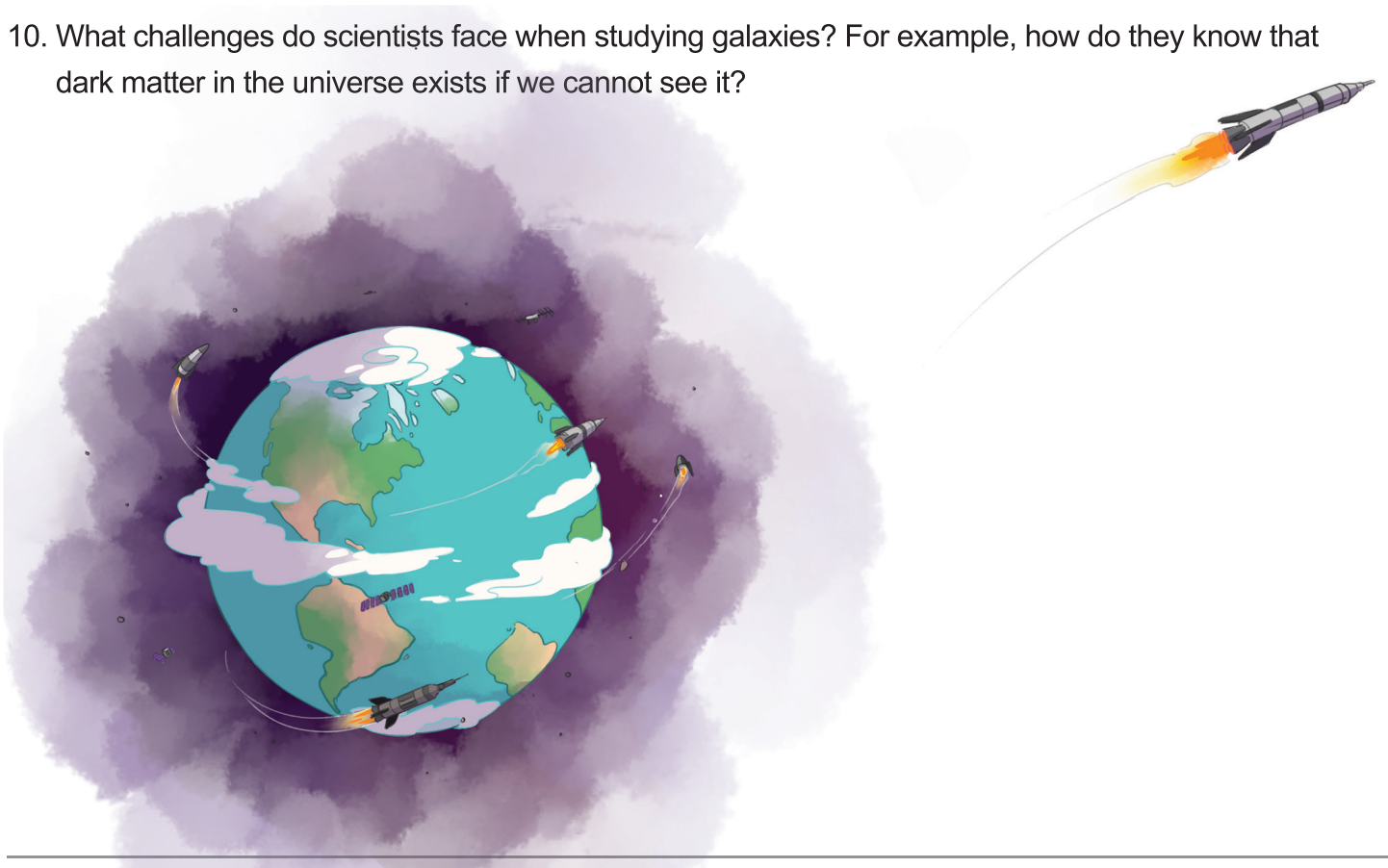
1. Ask students to explain the acronym STEM. Discuss what STEM career streams have been dominated by men and why. Research and share your findings related to different career pathways for women in STEM.
2. Have students research pioneer women scientists from other countries. What were their amazing discoveries and accomplishments?
3. Discuss the following: scientists ask questions about the world around them. They make predictions, design, and plan experiments to test their predictions, and then communicate what they have learned. Explain that every scientific discovery starts with a question. These questions are called scientific questions. A scientific question is one that can be answered by performing an experiment. Ask students to brainstorm questions that some of the women scientists developed during their experiments. Brainstorm a few questions that STEM scientists might ask.

While Reading the Book

These activities check on comprehension, stimulate interest, involve readers in reflection as they read, and encourage consideration of other readers' reactions.

1. Use a vocabulary concept map to make visual connections between the key terms and their meanings. Have students share their vocabulary maps with a classmate or small group.
2. No two planets are alike. Sara Seager is working on a telescope to search for exoplanets. Have students design a telescope like the James Webb Space Telescope that searches for exoplanets.
3. Ask students to think of three scientific discoveries that make their day-to-day lives better. Then, ask them the following questions:
 - What types of scientists could make these innovations possible?
 - What sorts of experiments would they need to do?

4. Compare Ashley Walker and Tanya Harrison's careers and experiences working in space and space exploration. How were their experiences similar? How were they different?
5. Facilitate a short discussion about sexism and racism in STEM. Ask students if they think the industry has changed over the years.
6. Discuss the following: Why is it important for students to see role models representative of their identities? What kind of impact does representation of race and gender have on women entering the sciences? Why is representation particularly important for women of color in science?
7. Many of these women scientists broke through barriers to pursue their dreams, goals, and interests. Ask students what obstacles they might have encountered while pursuing their dreams.
8. The scarcity of women in STEM fields is a long-standing and persistent problem. Compare the role of women in science in the 18th and 19th centuries to the 21st century. Are there any similarities or differences? What changes should be made to increase women to pursue careers in STEM?
9. Have students pretend they are astronomers who have just discovered a new planet. How big is their planet? What is the name of this new planet? How far is the new planet from Earth?
10. What challenges do scientists face when studying galaxies? For example, how do they know that dark matter in the universe exists if we cannot see it?



After Reading the Book

These activities inspire continued reflection and response to the text, bring conclusion to the experience of reading this text, and stimulate further extensions.

1. Talk with students about past expeditions to space. What factors do scientists have to consider when determining when to launch a spacecraft into space?
2. Have students read one of the related reading articles in the book. Ask them to partner with someone who read a different article to share what they learned with each other. Have students create a Venn diagram to illustrate the relationships between the two articles.
3. Create a concept map comparing and contrasting cosmonaut and astronaut. Include examples of each type.

Extension Activities

These activities are only a start. They are designed to support the goal of helping students explore the story and their own creativity.

1. Are we alone? Jill Tarter spent 30 years searching for intelligent extraterrestrial life. Have a discussion with students and ask them, “Do you think intelligent alien life will be found in this decade?”
2. Challenge students to put historical events in chronological order to create an interactive timeline game.
3. Encourage students to discuss which space invention has had the biggest impact on our modern life. What inventions might be created in the next ten years?
4. Have students create a picture book biography of the women scientists.

