Teaching Lightning Bolt Books™

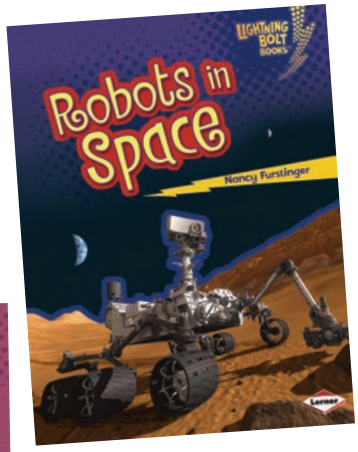
Robots Everywhere!

Interest Level: Grades K–2
Reading Level: Grade 2

LERNER SOURCE™

Titles in this series:

Helper Robots
Robots at Home
Robots in Space
Weather Robots



Standards

Next Generation Science Standards

Engineering Design

- ETS1.A: Defining and delimiting engineering problems (Disciplinary Core Ideas)
- ETS1.B: Developing possible solutions (Disciplinary Core Ideas)
- ETS1.C: Optimizing the design solution (Disciplinary Core Ideas)
- Asking questions and defining problems (Science and Engineering Practices)
- Developing and using models (Science and Engineering Practices)
- Structure and function (Crosscutting Concepts)

Earth and Human Activity

- Influence of science, engineering, and technology (Crosscutting Concepts)

Common Core Reading (Informational Text)

- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Range of Reading and Level of Text Complexity

Common Core Writing

- Text Types and Purposes
- Research to Build and Present Knowledge

Multiple Intelligences Utilized

- Verbal-linguistic, visual-spatial, logical-mathematical, intrapersonal, interpersonal

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Lesson 1 Asking Questions

Purpose
Students will learn the six question words and how to form questions while reading.

Materials
- Robots Everywhere! series
- lined paper
- pencils

Prepare
- Choose a book from the Robots Everywhere! series to use as an example.

Pretest
- Which six words are commonly used to start a question?

Model
- As a class, make a list of the six question words (who, what, where, when, why, and how). Write each word on the board.
- As a class, read the first two pages of the selected Robots Everywhere! book.
- Ask students to form questions based on what you just read.
- As a class, come up with at least one question for each of the question words, and write them on the board. (Examples: *What* are robots made of? *How* do robots move? *When* were robots invented? *Who* makes robots? *Why* do robots exist? *Where* would I find a robot?)
- As a class, read the rest of the book. Write down answers to the questions addressed in the text. Circle any questions that remain unanswered.

Read
- Have students read a second book from the Robots Everywhere! series.

Practice
- Ask students to create a list of questions after reading the first few pages.
- Encourage students to use as many question words as they can.
- Students will read the rest of the book, writing down any answers they find to their questions.
- Students will circle any unanswered questions and look them up online (in class or at home).

Discuss
- How can forming questions make us better readers?
- Where can we find answers to questions that aren't addressed in the book?

Evaluate
- Review each student's list of questions and answers for completeness.
- Check to make sure students have used each question word correctly.

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Lesson 2 Robots Predicting Weather

Purpose
Students will learn how robots make our lives easier and safer by predicting severe weather.

Materials
- *Weather Robots* book
- pencils
- Robot Weather Report, p. 7

Prepare
- Copy Robot Weather Report p. 7 for each student.

Pretest
- Where do severe weather reports come from?

Read
- Read *Weather Robots*.

Model
- As a class, make a list of the different types of severe weather that robots help predict.
- Highlight any types of severe weather that are common in your region.
- Using the examples from the book, make a list of the different elements that robots measure to predict weather, such as temperature, wind, or salinity.

Practice
- Students will complete Robot Weather Report p. 7 by filling in types of weather, the measurements a robot would need to predict each one, and a quick drawing of the weather.

Discuss
- Why is it important for people to be aware of severe weather?
- What should people do if severe weather is predicted in their area?

Evaluate
- Evaluate students' Robot Weather Report p. 7 for completeness and comprehension.

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Lesson 3 Problem-Solving Robots

Purpose
Students will learn how robots can be designed to solve problems.

Materials
- Robots Everywhere! series
- lined paper
- pencils

Prepare
- Choose a book from the Robots Everywhere! series.
- Gather a few additional books or articles on robots and the ways they help scientists and other people.

Pretest
- How do robots help us?

Read
- Read the selected book from the Robots Everywhere! series.

Discuss
- As a class, make a list of the different problems that robots help solve in the book.
- How does the design of each robot help it to solve the problem?

Model
- As a class, come up with two additional problems that robots could be designed to solve.
- For each problem, list a feature the robot would need for it to be effective (e.g., a robot designed to put out fires needs to be made of nonflammable material).

Practice
- Divide students into small groups.
- Ask each group to come up with a list of five additional problems that robots could be designed to solve, along with one feature that each of those robots would require to be successful.
- If more structure is needed, specify a category for each group (e.g., household tasks, personal tasks, public safety, transportation/travel, disaster relief, manufacturing, etc.).
- Ask each group to share a list of ideas with the class.

Evaluate
- Evaluate each group's list or problems for completion.
- Assess students' teamwork and discussion.

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Lesson 4
Design a Robot

Purpose
Each student will select a problem from Lesson 3 and design a robot to solve that problem. Students will answer preliminary questions before designing their robots and identify specific features their robots would need.

Materials
- Robots Everywhere! series
- pencils
- Robot Planning Questions p. 8
- coloring utensils
- sketch paper

Prepare
- Copy Robot Planning Questions p. 8 for each student.
- Provide students with sheets of sketch paper.
- Write a list of the problems the class came up with in Lesson 3 on the board.

Pretest
- If you were a scientist designing a new robot, what would your robot do?

Read
- Read books in the Robots Everywhere! series.

Model
- Choose a robot pictured in a Robots Everywhere! book as an example.
- As a class, make a list of three to five of the robot's features. Also, note how these features help the robot do what it was designed to do.
- Explain that students will design robots of their own. Each student will select a problem that the class came up with in Lesson 3 and design a robot that could help solve that problem.

Practice
- Students will complete Robot Planning Questions p. 8 before they begin designing their robots.
- Students will then create a sketch of their robots and label five features that help each robot perform its task, such as cameras, microphones, wheels, or propellers.
- Lastly, each student will write a paragraph about how these features help the robot to function.

Discuss
- How long do you think it would take scientists to create these new robots?

Evaluate
- Assess students' worksheets, sketches, and written responses for completion and comprehension.

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Lesson 5
Robot Redesign

Purpose
Student groups will redesign a robot and present their designs to the class.

Materials
- Robots Everywhere! series
- pencils
- coloring utensils
- poster board

Prepare
- Gather additional books, articles, and images related to robot design. If possible, include examples of robots that serve the same purpose but look different from one another.
- Review the designs produced in Lesson 4. Select several designs that seem most useful and have the most potential to be redesigned.

Pretest
- If something has already been made or designed, why would anyone change it?

Read
- Read books in the Robots Everywhere! series.

Model
- Divide students into small groups.
- Explain to students that each group will be given one of the designs students created in Lesson 4 and asked to redesign that robot. Students can draw ideas from the first draft of the design, but they will also need to propose significant changes.
- Show the class several examples of robots that serve the same purpose but have different designs.
- Ask students where they might look for more information on robot design. Direct students to the Further Reading section on page 31 as an example of additional resources.

Practice
- Students will research robot design and consider the choices made in different designs.
- Students will then discuss their selected design as a group and propose changes. For the new draft, students should aim to improve the robot's functionality, increase its capabilities, or both.
- Each group will sketch a new design on poster board.
- Each group will then write a brief report on the design changes the group chose to make, focusing on why these changes will help the robot function better.
- Groups will present both the original and new designs to the class and explain their changes.

Discuss
- Why is it useful to create more than one design when building a robot?

Evaluate
- Review posters and written reports for completeness and creativity.
- Assess group presentations, teamwork, and effort.

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Name _____

Robot Weather Report

In the first column, write a type of severe weather in each box. In the second column, write down which measurements a robot would need to make a prediction for that kind of weather. In the third column, draw a picture of what the weather will look like.

Day	Type of weather	Measurements needed	Drawing
Sunday			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			

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Name _____

Robot Planning Questions

Think carefully about each of the following questions before you begin designing your robot. Write your answers in the blanks.

1. Why do people need your robot?

2. Who will use your robot?

3. How will your robot help?

4. Where and when will your robot be used?

5. What materials will your robot be made of?

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