



EXPEDITIONARY  
LEARNING

# Grade 4: Module 3A: Unit 2: Overview



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## Unit 2: Scientific Research: Researching Simple Machines: How Do They Help Do Work?

In Unit 2 students read the extended science text *Simple Machines: Forces in Action* by Buffy Silverman (870L) to learn about simple machines while also examining the structure and text features of scientific writing. Several sections of this science text are structured as close-reading experiences, and students continue to learn to use context clues to determine the meaning of new words. They write routinely in order to explain how various simple machines work. Students also experience the scientific method in several simple experiments. They develop hypotheses, document steps in experiments, and synthesize their learning about how simple machines work in scientific conclusions. In the mid-unit assessment, students are asked to read an on-demand text about a simple machine, the screw, and answer text-dependent and multiple-choice questions. The end of unit assessment also has the students read a scientific text about a simple machine,

the wedge, and answer text-dependent and multiple-choice questions. In addition, the students read an experiment, answer text-dependent questions, and conduct the experiment. They are asked to explain in writing their observations and conclude about wedges and their impact on work from the experiment.

*NOTE: The lessons in this unit are designed to meet ELA Reading Informational Text standards, specifically for reading scientific text. The unit is designed to complement, not replace, science instruction. In this unit, students do conduct several simple experiments, but in order to fully address key components of the state curriculum for K–4 science, students will need more experiences with simple machines. Students need additional science instruction and opportunities to be curious, explore the natural world, and have direct experience with common objects, materials, and living things in their environments.*

### Guiding Questions and Big Ideas

- **How do simple machines affect our lives?**
- **How can I use what I learn from research to form an opinion?**



Mid-Unit 2 Assessment	<p><b>Answering Questions about Screws</b></p> <p>This assessment centers on standards NYSP12 ELA CCLS RI.4.2, RI.4.3, W.4.8, and W.4.9. In this assessment, students read a new text about the screw and answer a series of multiple-choice and short-answer questions that assess their ability to identify main points of the scientific text using explicit details from the text.</p>
End of Unit 2 Assessment	<p><b>Part I: Reading and Answering Question about Wedges; and Part II: Reading and Answering Questions about Experiments</b></p> <p>This two-part assessment centers on standards NYSP12 ELA CCLS RI.4.3, RI.4.4, W.4.2, W.4.8, and W.4.9. During Part I, students will read about a new simple machine, wedges, from pages 12 and 13 in <i>Simple Machines: Forces in Action</i>. They will take notes using a graphic organizer and then answer text-dependent multiple-choice and short-answer questions. In Part II, students will read an experiment, answer text-dependent questions, then conduct the experiment and write explaining what they observed and conclude about how wedges impact work from the experiment.</p>



### Content Connections

This module is designed to address English Language Arts standards. However, the module intentionally incorporates Science content that many teachers may be teaching during other parts of the day. These intentional connections are described below.

#### **NYS Science Core Curriculum**

- Science Learning Standard 4: The Physical Setting
  - Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.
- Key Idea 5
  - Energy and matter interact through forces that result in changes in motion.

### Central Texts

1. Buffy Silverman, *Simple Machines: Forces in Action*, Do It Yourself series (New York: Heinemann, 2009), ISBN: 978-1-4329-2317-4.
2. Pamela Marx, *Take a Quick Bow!* (Culver City, CA: Good Year Books, 1997), ISBN: 978-1-59647-083-5. (NOTE: Only one copy required for teacher, then reproduced for students. The book explicitly states, “Only portions of this book intended for classroom use may be reproduced without permission in writing from the publisher.”)



**This unit is approximately 3 weeks or 13 sessions of instruction.**

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 1</b>	Setting Purpose for a Deeper Study of Simple Machines	<ul style="list-style-type: none"> <li>I can explain what a text says using specific details from the text. (RI.4.1)</li> <li>I can effectively engage in discussions with diverse partners about fourth-grade topics and texts. (SL.4.1)</li> <li>I can recall information that is important to a topic. (W.4.8)</li> </ul>	<ul style="list-style-type: none"> <li>I can self-assess my progress toward the learning targets.</li> <li>I can identify what I already know about simple machines and what I want to learn.</li> <li>I can ask questions about simple machines.</li> <li>I can follow our class norms when I participate in a conversation.</li> </ul>	<ul style="list-style-type: none"> <li>Tracking My Progress, End of Unit 1 recording form</li> <li>Simple Machines KWL anchor chart - Page 10 of Simple Machines Science journal</li> </ul>	<ul style="list-style-type: none"> <li>Simple Machines KWL</li> <li>Concentric Circles protocol</li> </ul>
<b>Lesson 2*</b>	Reading a Scientific Experiment: The Inclined Plane	<ul style="list-style-type: none"> <li>I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>I can describe the organizational structure in an informational text (chronology). (RI.4.5)</li> <li>I can write informative/explanatory texts that convey ideas and information clearly. (W.4.2)</li> <li>I can use a variety of strategies to determine the meaning of words and phrases. (L.4.4)</li> </ul>	<ul style="list-style-type: none"> <li>I can explain what happens before, during, and after a scientific experiment.</li> <li>I can explain how the directions in a scientific experiment are a form of informational text that involves a procedure.</li> <li>I can document what I observe during a scientific experiment.</li> <li>I can construct a conclusion statement that describes what I learned about inclined planes.</li> </ul>	<ul style="list-style-type: none"> <li>Simple Machines Science journal: Science Experiment note-catcher (page 11)</li> </ul>	<ul style="list-style-type: none"> <li>Simple Machines KWL</li> <li>Vocabulary Strategies</li> <li>Scientific Method</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 3</b>	Reading Scientific Text: Learning More about the Inclined Plane	<ul style="list-style-type: none"> <li>• I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li> <li>• I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li> <li>• I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>• I can choose evidence from informational texts to support analysis, reflection, and research. (W.4.9)</li> </ul>	<ul style="list-style-type: none"> <li>• I can find the meaning of scientific and academic words as I read a text about the inclined plane.</li> <li>• I can determine important information about inclined planes and how they help people do work.</li> <li>• I can document what I learn about inclined planes in my own words.</li> </ul>	<ul style="list-style-type: none"> <li>• Students' Gist statements (homework from Lesson 2)</li> <li>• Simple Machines Science journal:               <ul style="list-style-type: none"> <li>* Vocabulary note-catcher</li> <li>* Diagram Constructed response captions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Vocabulary Strategies</li> <li>• Scientific Method</li> <li>• Inclined Plane</li> </ul>
<b>Lesson 4*</b>	Reading a Scientific Experiment: The Lever	<ul style="list-style-type: none"> <li>• I can explain the main points in scientific text, using specific details in the text. (RI.4.3)</li> <li>• I can describe the organizational structure in an informational text (chronology). (RI.4.5)</li> <li>• I can write informative/explanatory texts that convey ideas and information clearly. (W.4.2)</li> <li>• I can use a variety of strategies to determine the meaning of words and phrases. (L.4.4)</li> </ul>	<ul style="list-style-type: none"> <li>• I can explain what happens before, during, and after a scientific experiment.</li> <li>• I can explain how the directions in a scientific experiment help me understand what a lever is and how it works.</li> <li>• I can document what I observe during a scientific experiment.</li> <li>• I can construct a conclusion statement that describes what I learned about levers.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple Machines Science journal: Science Experiment note-catcher (page 13)</li> </ul>	<ul style="list-style-type: none"> <li>• Inclined Planes</li> <li>• Vocabulary Strategies</li> <li>• Scientific Method</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 5</b>	Reading Scientific Text: Reading Closely about the Lever	<ul style="list-style-type: none"><li>• I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li><li>• I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li><li>• I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li><li>• I can choose evidence from informational texts to support analysis, reflection, and research. (W.4.9)</li></ul>	<ul style="list-style-type: none"><li>• I can find the meaning of scientific and academic words as I read a text about levers.</li><li>• I can determine important information about levers and how they help people do work.</li><li>• I can document what I learn about levers in my own words.</li></ul>	<ul style="list-style-type: none"><li>• Simple Machines Science journal (page 14)</li><li>• Vocabulary note-catcher</li><li>• Diagram</li><li>• Constructed response questions</li><li>• Captions</li></ul>	<ul style="list-style-type: none"><li>• Levers</li></ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 6</b>	Science Talk: Synthesizing What We Know about the Inclined Plane and Lever	<ul style="list-style-type: none"> <li>I can effectively engage in discussions with diverse partners about fourth-grade topics and texts. (SL.4.1)               <ul style="list-style-type: none"> <li>I can prepare myself to participate in discussions.</li> <li>I can draw on information to explore ideas in the discussion.</li> <li>I can follow our class norms when I participate in a conversation.</li> <li>I can ask questions that are on the topic being discussed.</li> <li>I can connect my questions and responses to what others say.</li> </ul> </li> <li>I can identify the reason a speaker provides to support a particular point. (SL.4.3)</li> <li>I can identify evidence a speaker provides to support particular points. (SL.4.3)</li> </ul>	<ul style="list-style-type: none"> <li>I can effectively participate in a Science Talk about simple machines.               <ul style="list-style-type: none"> <li>I can prepare for the Science Talk by using evidence from simple machines texts.</li> <li>I can ask questions so I am clear about what is being discussed.</li> <li>I can ask questions on the topic being discussed.</li> <li>I can follow our class norms when I participate in a conversation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Simple Machines Science journals (pages 9 and 15)</li> <li>Science Talk Criteria checklist</li> </ul>	<ul style="list-style-type: none"> <li>Science Talk Norms</li> <li>Participating in a Science Talk</li> <li>Quiz-Quiz-Trade protocol</li> <li>Science Talk protocol</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 7</b>	Making Connections to Vocabulary and Mid-Unit Assessment: Interactive Word Wall and Reading and Answering Question about Screws	<ul style="list-style-type: none"> <li>I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li> <li>I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li> <li>I can choose evidence from informational texts to support analysis, reflection, and research. (W.4.9)</li> </ul>	<ul style="list-style-type: none"> <li>I can make connections between the meanings of vocabulary words related to simple machines.</li> <li>I can document what I learn about a simple machine in my own words.</li> <li>I can find the meaning of scientific and academic words related to a simple machine.</li> <li>I can determine important information about a simple machine and how it helps people do work.</li> </ul>	<ul style="list-style-type: none"> <li>Mid-Unit 2 Assessment: Reading and Answering Question about Screws</li> <li>Tracking My Progress, Mid-Unit 2 recording form</li> </ul>	<ul style="list-style-type: none"> <li>Interactive Word Wall directions</li> <li>Interactive Word Wall protocol</li> </ul>
<b>Lesson 8</b>	Reading Scientific Text: Reading Closely about the Pulley	<ul style="list-style-type: none"> <li>I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li> <li>I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li> <li>I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>I can choose evidence from informational texts to support analysis, reflection, and research. (W.4.9)</li> </ul>	<ul style="list-style-type: none"> <li>I can find the meaning of scientific and academic words related to the pulley.</li> <li>I can determine important information about pulleys and how they help people do work.</li> </ul>	<ul style="list-style-type: none"> <li>Simple Machines Science journal (page 16)</li> <li>Vocabulary note-catcher</li> <li>Diagram</li> <li>Constructed response questions</li> </ul>	<ul style="list-style-type: none"> <li>Simple Machines KWL</li> <li>Vocabulary Strategies</li> <li>Pulleys</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 9</b>	Reading Scientific Text: Reading Closely about the Wheel and Axle	<ul style="list-style-type: none"> <li>• I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li> <li>• I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li> <li>• I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>• I can write for a variety of reasons. (W.4.10)</li> <li>• I can choose evidence from informational texts to support analysis, reflection, and research. (W.4.9)</li> </ul>	<ul style="list-style-type: none"> <li>• I can find the meaning of scientific and academic words related to the wheel and axle.</li> <li>• I can determine important information about wheels and axles and how they help people do work.</li> <li>• I can document what I learn about wheels and axles in my own words.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple Machines Science journal (page 17)</li> <li>• Vocabulary note-catcher</li> <li>• Diagram</li> <li>• Constructed response questions</li> </ul>	<ul style="list-style-type: none"> <li>• Simple Machines KWL</li> <li>• Vocabulary Strategies</li> <li>• Wheels and Axles</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 10*</b>	Reading a Scientific Experiment: The Pulley and Wheel and Axle	<ul style="list-style-type: none"> <li>• I can explain the main points in scientific text, using specific details in the text. (RI.4.3)</li> <li>• I can describe the organizational structure in an informational text (chronology). (RI.4.5)</li> <li>• I can write informative/explanatory texts that convey ideas and information clearly. (W.4.2)</li> <li>• I can effectively engage in discussions with diverse partners about fourth-grade topics and texts. (SL.4.1)</li> </ul>	<ul style="list-style-type: none"> <li>• I can explain what happens before, during, and after a scientific experiment.</li> <li>• I can explain how the directions in a scientific experiment help me understand what a pulley and wheel and axle are and how they work.</li> <li>• I can document what I observe during a scientific experiment.</li> <li>• I can construct a conclusion statement that describes what I learned about pulleys or wheels and axles.</li> <li>• I can follow our class norms when I participate in a conversation.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple Machines Science journal: Science Experiment note-catcher (pages 18 or 19)</li> <li>• Four Corners Teacher observations</li> </ul>	<ul style="list-style-type: none"> <li>• Scientific Method</li> <li>• Conducting an Experiment</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 11</b>	Science Talk: Synthesizing What We Know about Simple Machines	<ul style="list-style-type: none"> <li>• I can effectively engage in discussions with diverse partners about fourth-grade topics and texts. (SL.4.1)</li> <li>• I can effectively engage in discussions with diverse partners about fourth-grade topics and texts. (SL.4.1)               <ul style="list-style-type: none"> <li>a. I can prepare myself to participate in discussions.</li> <li>a. I can draw on information to explore ideas in the discussion.</li> <li>b. I can follow our class norms when I participate in a conversation.</li> <li>c. I can ask questions that are on the topic being discussed.</li> <li>c. I can connect my questions and responses to what others say.</li> </ul> </li> <li>• I can identify the reason a speaker provides to support a particular point. (SL.4.3)</li> <li>• I can identify evidence a speaker provides to support particular points. (SL.4.3)</li> </ul>	<ul style="list-style-type: none"> <li>• Learning targets: I can effectively participate in a Science Talk about simple machines.               <ul style="list-style-type: none"> <li>a. I can prepare for the Science Talk by using evidence from simple machines texts.</li> <li>b. I can ask questions so that I am clear about what is being discussed.</li> <li>c. I can ask questions on the topic being discussed.</li> <li>d. I can follow our class norms when I participate in a conversation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Simple Machines Science journals (page 20)</li> <li>• Science Talk Criteria checklist</li> </ul>	<ul style="list-style-type: none"> <li>• Science Talk Norms</li> <li>• Quiz-Quiz-Trade protocol</li> <li>• Science Talk protocol</li> </ul>



Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
<b>Lesson 12</b>	Connecting Key Vocabulary and End of Unit Assessment Part I: Reading and Answering Questions about Wedges	<ul style="list-style-type: none"> <li>I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li> <li>I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li> <li>I can choose evidence from informational texts to support analysis, reflection, and research. (W.4.9)</li> </ul>	<ul style="list-style-type: none"> <li>I can make connections between the meaning of vocabulary words related to simple machines.</li> <li>I can document what I learn about a simple machine in my own words.</li> <li>I can find the meaning of scientific and academic words related to a simple machine.</li> <li>I can answer questions about simple machines and how they work using details from a scientific text.</li> </ul>	<ul style="list-style-type: none"> <li>End of Unit 2 Assessment, Part I: Reading and Answering Questions about Wedges</li> <li>Tracking My Progress, End of Unit 2, Part I recording form</li> </ul>	<ul style="list-style-type: none"> <li>Interactive Word Wall Directions</li> <li>Interactive Word Wall protocol</li> </ul>
<b>Lesson 13</b>	Connecting Key Vocabulary and End of Unit Assessment Part II: Reading and Answering Questions about Experiments	<ul style="list-style-type: none"> <li>I can explain the main points in a scientific text, using specific details in the text. (RI.4.3)</li> <li>I can describe the organizational structure in an informational text (chronology). (RI.4.5)</li> <li>I can determine the meaning of academic words or phrases in an informational text. (RI.4.4)</li> <li>I can determine the meaning of content words or phrases in an informational text. (RI.4.4)</li> <li>I can write informative/explanatory texts that convey ideas and information clearly. (W.4.2)</li> </ul>	<ul style="list-style-type: none"> <li>I can explain what happens before, during, and after a scientific experiment.</li> <li>I can document what I observe during a scientific experiment.</li> <li>I can construct a conclusion statement that describes what I learned about wedges.</li> </ul>	<ul style="list-style-type: none"> <li>End of Unit 2 Assessment, Part II: Reading and Answering Questions about Experiments</li> <li>Tracking My Progress, End of Unit 2, Part II recording form</li> </ul>	<ul style="list-style-type: none"> <li>Scientific Method</li> <li>Conducting an Experiment</li> <li>Concentric Circles protocol</li> </ul>

\* In these lessons, students conduct similar experiments that may need to be spread over two days. Time in the calendar reflects these additional days.



Optional: Experts, Fieldwork, and Service

**Experts:**

- Interview people in the community who use simple machines in their daily work.

**Fieldwork:**

- bike shop, physical therapy department of a local hospital

**Service:**

- N/A

Optional: Extensions

- Interview people in your community with disabilities to see how simple machines help improve their ability to move and travel.

Preparation and Materials

- This unit includes several scientific experiments. Review Lessons 2, 4, 8, and 9 in advance for necessary materials. Materials for each lesson can be found in the following pages of the text *Simple Machines: Forces in Action* by Buffy Silverman:
- For Lesson 2: Materials listed for inclined plane experiment on page 8.
- For Lesson 4: Materials listed for lever experiment on page 26.
- For Lesson 10: Materials listed for pulley experiments on page 32 and wheel experiment on page 38. (Note: See Lessons 8 or 10 for suggestions for alternate materials and logistics.)