EXPEDITIONARY LEARNING

Grade 4: Module 3A: Unit 2: Lesson 4
Reading a Scientific Experiment: The Lever

Long-Term Targets Addressed (Based on NYSP12 ELA CCLS)	
I can explain the main points in scientific text, using specific details in the text. (RI.4.3) I can describe the organizational structure in an informational text (chronology). (RI.4.5) I can write informative/explanatory texts that convey ideas and information clearly. (W.4.2) I can use a variety of strategies to determine the meaning of words and phrases. (L.4.4)	
Supporting Learning Targets	**Ongoing Assessment**
• I can explain what happens before, during, and after a scientific experiment. • I can explain how the directions in a scientific experiment help me understand what a lever is and how it works. • I can document what I observe during a scientific experiment. • I can construct a conclusion statement that describes what I learned about levers.	• Simple Machines Science Journal: Science Experiment note-catcher (page 13)

Agenda	Teaching Notes
1. **Opening** A. Checking Homework and Reviewing Learning Targets (5 minutes) 2. **Work Time** A. Explaining Procedures: Reading a Science Experiment (15 minutes) B. Guided Practice: Focusing on Key Vocabulary before Conducting an Experiment (10 minutes) C. Rereading Scientific Text while Conducting a Science Experiment (15 minutes) D. Writing a Conclusion (10 minutes) 3. **Closing and Assessment** A. Read-aloud of Pages 24–25 of *Simple Machines*: Learning More about the Lever (5 minutes) 4. **Homework** A. Write a gist statement for pages 24 and 25 in your *Simple Machines* text. You will be sharing this with the class tomorrow to post on the Levers anchor chart, which will also be introduced tomorrow.	• The structure of this lesson is similar to Lesson 2. The students read procedures and conduct a simple experiment about levers as an initial inquiry experience into what levers are and how they work. • This is an ELA lesson, not a science lesson. The purpose is to practice reading and applying understanding of scientific text. This lesson is intended to align with science standards, but not to fully address them. Students will need more extensive experiences and instruction with simple machines, such as experiments and discovery, during other parts of the school day. • As with Lesson 2, for the first read, do NOT distribute the full text to students. Rather, use a document projector to show the text. This is important, since the goal is for students to use inquiry to come to a conclusion of how a lever works rather than simply reading about it. After conducting the experiment, students will then write about their findings and reread to verify them. • Review the Scientific Method anchor chart (created in Lesson 2). • During Work Time B, some scientific vocabulary is defined for students since there is little context for these terms on pages 26–27. Students need a basic understanding of these terms to know how to conduct the experiment. • Then, in Lesson 5, students will read *Simple Machines: Forces in Action* (pages 24–25) in depth. They'll spend more time on detailed definitions and understanding how these terms relate to the concept of simple machines. • It was suggested in the Teaching Notes in Lesson 2 that science partners change for the study of each simple machine. Make sure students know who their new science partner is for Lessons 4 and 5. • Post: Learning targets.

Lesson Vocabulary	Materials
experiment, procedure, force, effort (review); lever, fulcrum, lever arm, balance, mid-point, arm, adjust, consider	• Sticky notes (three to five per triad) • Inclined Planes anchor chart (from Lesson 3) • *Simple Machines: Forces in Action* pages 26–27 (book; one per student) • Document camera • Equity sticks • Vocabulary Strategies anchor chart (reviewed in Unit 1, Lesson 1) • Simple Machines Science journal (page 13: Lever Experiment Notes) • Scientific Method anchor chart (from Lesson 2)

Opening	Meeting Students' Needs
A. Checking Homework and Reviewing Learning Targets (5 minutes) • Remind students of their homework: "Look for inclined planes around you (at school or at home). Record examples to share in our next lesson. Either take pictures of the inclined planes, make a sketch of what you saw, or use words to describe what you saw." • Invite students to get into triads to share and then record examples of inclined planes they found—one per **sticky note**. Ask a representative from each triad to post their sticky notes on the bottom section of the **Inclined Planes anchor chart** (from Lesson 3). • Ask the class what they noticed about inclined planes around them. Invite students to turn and talk to their triad groups. Listen for comments such as: "They're everywhere, on sidewalks and doorways of buildings. I never knew the ramps were simple machines," or "Now that I know what an inclined plane is, I see them all over the place," or "Lots of people use inclined planes and probably don't even know it." • Invite the students to read the learning targets. Tell them these targets should be familiar to them from Lesson 2. Ask them to turn and tell a partner what they think they'll learn based on the learning targets. Listen for things such as: "I think we're going to do another science experiment, but this time it's going to be with levers," or "We're going to do another experiment and write about what we see happening and what we learn about levers." • Ask students if any words or phrases are confusing. Clarify as needed.	

Work Time	Meeting Students' Needs
A. Explaining Procedures: Reading a Science Experiment (15 minutes) *Note: Be sure to cover up the "How Does It Work?" text box on the top of page 27; see Teaching Notes. Do not distribute the texts to students at this point.* • Project the "Make a Dime Balance" spread from ***Simple Machines: Forces in Action*** **pages 26–27** with a **document camera**. Ask students to whisper into their hands the name of this kind of informational text. Tell students that on the count of three, they will "release" their answer to the rest of the class by whispering their "caught answer" as they turn their hands out. Count: "One, two, three!" You should hear: "It's an experiment." • Remind students this text is similar to the text they read in Lesson 2. Ask them to think, then turn and talk, about how this informational text is organized versus other informational texts they've read prior to this unit. Using **equity sticks**, cold call two or three students to share out. Listen for: "It's not written in paragraphs. It's written like a list that's numbered," or "It has different steps to follow, like directions in a game." • Tell students that they will conduct another science experiment today. Remind them that before they actually do the experiment, they need to read the directions to understand the procedure. Review that the procedure of an experiment consists of the steps a scientist takes to conduct the experiment. Explain that the term *steps* means a sequence of actions. • Ask the students to sit with their pre-assigned science partner for today's experiment. Distribute *Simple Machines: Forces in Action* to each student. Be sure that the "How Does It Work?" box on page 27 is covered up. • Ask them the following text-dependent questions: * "Do you know what the materials are for this experiment?" * "What do you notice about this list versus the list from the inclined plane experiment you conducted in Lesson 2?" • Listen for: "There are a lot fewer materials to use during this experiment." Tell students you'll read the steps aloud. Remind them to try to visualize what is being described so they can better explain what happens in each step. Tell students this text has new vocabulary. Remind students about all the experiences they've had this year with reading complex texts that have unfamiliar vocabulary words and phrases. Ask: * "What can you do to figure out the gist of what the experiment says, even though you may not know all the words?"	

Work Time (continued)	Meeting Students' Needs
• Use equity sticks to call on two or three students to share their thinking. Listen for: "Read around the word to figure out what is being described," or "Look at the pictures and diagrams to help figure out what the text is saying." Refer to the **Vocabulary Strategies anchor chart** to reinforce strategies students are learning. • Read the eight experiment steps aloud as students follow along in their texts. Ask partners to turn and talk: * "What is the gist of what we are going to do in this experiment?" • Tell them it's fine if they don't know what they're supposed to do. They will read the steps at least two more times before they conduct the experiment.	

Work Time (continued)	Meeting Students' Needs
B. Guided Practice: Focusing on Key Vocabulary before Conducting an Experiment (10 minutes) • Tell students they will now hear the experiment read aloud again. Ask students to read along silently and identify unfamiliar or important-sounding words to better understand what a lever is and how it works. • Read aloud. Listen for students to identify these words: *fulcrum*, *lever arm*, *balance*, *midpoint*, *adjust*. • Work with students to briefly define these words so they know how to conduct the experiment. (Note: In Lesson 5, students will spend more time on detailed definitions and on understanding how each of these terms relates to the concept of simple machines.) – *fulcrum*: The Step 1 text states: "The water bottle will be the fulcrum on which your lever rests." Focus students on the picture on page 26 to help them figure out that the fulcrum is the thing the ruler is balancing on and that it can move. Read the definition from the glossary to confirm this description. – *lever arm*: The Step 2 text says: "The ruler is the lever arm." Ask the students to talk with their partners to brainstorm a brief explanation of what this means based on the picture and the description in the text. Ask them to share their thinking with another partnership. Listen for: "It's the flat stick that is placed on top of the fulcrum." – *mid-point*: Explain that *mid* means "being in the middle," and *point* is a particular place on the lever. Ask students to tell their partners what *mid-point* means. Listen for: "The spot that is the middle of the lever." – *balance*: Tell the students this means to have equal weight on each side of something. Ask the students to show you with their bodies what balance means. Look for students to act out something like stretching their arms out to the sides evenly. – *adjust*: Tell them that this means to arrange or move something into a proper position. • Invite students to take 10 minutes and do the following steps (write these on the white board or chart paper). 1. Reread the experiment aloud, one step at a time. Either take turns reading each step or read it all together. 2. After each step, stop to describe what you are being asked to do. • Circulate and listen to partner talk. Probe for understanding by asking: "What do you think is going to happen in this step? Why do you think that?" This will get them thinking about a possible hypothesis.	• Consider giving ELLs and other students needing additional support visual clues for the key vocabulary words in this experiment. They may add these clues to the Vocabulary section in their Science journals.

Work Time (continued)	Meeting Students' Needs
C. Rereading Scientific Text while Conducting a Science Experiment (15 minutes) • Remind students to keep the top right section of page 27 covered. • Ask students to turn to page 13 in their **Simple Machines Science journal**. Remind students that scientists often use the Scientific Method to guide them through experiments. • Review the **Scientific Method anchor chart** from Lesson 2. Ask students to think then tell their partners what the first thing is they need to do as scientists before conducting the experiment. Listen for comments like: "We need to ask a question so we can find the answer by doing the experiment." Tell them the question for this experiment is: "How can the lever help make work easier?" • Now ask: "According to the Scientific Method, what is the next thing you need to do as scientists?" You should hear: "We need to write a hypothesis, or prediction, about what we think will happen." • Ask partners to discuss what a possible hypothesis might be. • Ask students to write their hypothesis in their Science journal. • Also ask them to list the materials needed for the experiment. Remind them that as they are doing the experiment, they will need to record their observations after Steps 6, 7, and 8. • Give students 10 minutes to conduct the experiment. • Circulate and assist as needed. When students have procedural questions, push them back into the text to see if they can answer their own question by saying: "Where might you look for that answer?" or "What does the text tell you?" • Listen for students talking about their need to adjust the distance between the stacks of coins and the fulcrum to balance the lever. Ask probing questions that push them to connect the terms *effort* and *force*. For example: "If force is the ability to push, pull, or twist, what is the force in this experiment?" (the coins). Or "How would you describe the effort that is being used?" • Reinforce vocabulary: Point out to students when you hear them using scientific vocabulary in their discussions. Encourage them to use this as they write their observations.	

Work Time (continued)	Meeting Students' Needs
*Note: Ideally, students will realize it takes less effort to balance the lever if the coins (force) are farther away from the center (fulcrum). It's fine if they don't reach this complex conclusion on their own. They are still building their knowledge about levers. In Lesson 5, they will deepen their knowledge about levers as they read an informational text (*Simple Machines *page 24–25). They may make connections to this experiment as they read the new text.*	
D. Writing a Conclusion (10 minutes) • Remind students after scientists conduct an experiment, they synthesize their findings by writing a *conclusion* statement. This statement explains the main idea of what happened during the experiment and what they learned because of it. • Point students to the last section of page 13 in their Science journals. Invite students to talk with their science partner about a possible conclusion statement, then write it in their Science journal. Inform them their statements most likely will be similar, but that they don't have to be if both people do not agree on the conclusion. • After students write their conclusion statements, ask them to unveil the "How Does It Work?" section of page 27 that has been covered. Invite students to read it aloud as partners, checking to see if they reached the same conclusions as the author did. Remind them if their findings were different from the author's to NOT revise their hypothesis or conclusion. Instead of changing the conclusion, ask them to add to their conclusions by explaining how their conclusion is different from the author's.	• Using sentence frames can help ELLs articulate their learning. Using the word "because" in the sentence frame helps all students support their thinking with evidence. For example: "By changing the distance between the coins and the bottle, _____."

Closing and Assessment	Meeting Students' Needs
A. Read-aloud of Pages 24–25 of *Simple Machines*: Learning More about the Lever (5 minutes) • Tell students that in the next lesson, they will continue learning about levers. For homework, they will read pages 24 and 25 of *Simple Machines: Forces in Action*. Now, they will hear that text read aloud once. • Read pages 24 and 25 of *Simple Machines: Forces in Action* aloud as the students follow along in their texts. • After the read-aloud, give students a few minutes to discuss the gist with a partner. • Tell students that their homework is to reread pages 24 and 25 and write a gist statement on a piece of paper. Remind them that they will be asked to share this gist statement at the beginning of Lesson 5, just like they did with their gist statements about the inclined plane in Lesson 3. *Note: This is a first read. Read the text aloud without stopping or discussing. The goal is to give the students exposure, promote fluency, and provide a scaffold for their rereading for homework and the learning in Lesson 5.*	
Homework	**Meeting Students' Needs**
• Write a gist statement for pages 24 and 25 in your *Simple Machines* text. You will be sharing this with the class tomorrow to post on the Levers anchor chart, which will also be introduced tomorrow.	

There are no new supporting materials for this lesson.