EXPEDITIONARY LEARNING

Grade 5: Module 2B: Unit 1:
Overview

Unit 1: Building Background Knowledge: *Investigating the Scientific Method with Max Axiom* and Considering How Technologies are developed to Meet Societal Needs

In this unit, students begin to build background knowledge about the process of scientific inquiry and how new or improved technologies are developed to meet the needs of society. Students begin the unit by reading the graphic novel *Investigating the Scientific Method with Max Axiom Super Scientist*. As they read, they focus on identifying the steps Max Axiom, the main character, takes to solve a societal problem, as well as analyzing how the visual elements found in a graphic novel support their understanding of complex ideas. After reading the graphic novel, students continue to build their knowledge through informational texts about real inventions developed to meet people's needs, such as the electric motor, windshield wipers, the paper bag machine, and the game of basketball. Students will focus on learning about the ways authors structure informational texts to relay the story of each invention and support readers' understanding of complex ideas, as well as how to form and share an opinion based on research and evidence.

Guiding Questions And Big Ideas

- **How do authors structure text and use visual elements to engage and support readers' understanding of complex ideas?**
- **How do new or improved technologies meet societal needs?**
- *Text structure and visual elements can support our understanding of complex ideas.*
- *New or improved technologies are developed to meet societal demands.*

Mid-Unit 1 Assessment	**Text Dependent Questions: *Investigating the Scientific Method with Max Axiom Super Scientist*, pages 24–27** This assessment centers on NYSP12 ELA CCLS RL.5.7, W.5.9, and L.5.4. For this assessment, students read unfamiliar pages from *Investigating the Scientific Method with Max Axiom Super Scientist* to answer multiple-choice and short response text-dependent questions in order to demonstrate their ability to determine the meaning of unfamiliar words and phrases from context, analyze how visual elements support readers' understanding, and use details and key terms from the text to support their explanations.
End of Unit 1 Assessment	**Using Quotes to Explain Relationships and Support an Opinion** This assessment centers on NYSP12 ELA CCLS RI.5.1, RI.5.3, RI.5.4, RI.5.5, and W.5.1a and b. Students read two new informational articles: "Big Thinkers: Was Steve Jobs this Generation's Thomas Edison?" and "Steve Jobs." They first determine the meaning of unfamiliar words from context. Then, students compare and contrast the structure of the two articles and explain how the information presented in each article supports their understanding of how Steve Jobs developed technologies to meet people's needs. Students synthesize their thinking by writing an opinion paragraph about which of the inventions they have read they feel is most important to people. The task requires students to draw upon new information from the articles, plus information and key terms from other informational texts they read during the second half of the unit.

Content Connections

This module is designed to address English Language Arts standards as students read literature and informational text about the scientific method and how technologies are developed to meet societal needs. However, the module intentionally incorporates Scientific Practices and Themes to support potential interdisciplinary connections to this compelling content. These intentional connections are described below.

NYS Science Standard 1: Analysis, Inquiry, and Design: Engineering Design

Key Idea 1:

Engineering design is an iterative process involving modeling and optimization (finding the best solution within given constraints); this process is used to develop technological solutions to problems within given constraints.

- T1.1: Identify needs and opportunities for technical solutions from an investigation of situations of general or social interest.
  - T1.1a: Identify a scientific or human need that is subject to a technological solution which applies scientific principles.
- T1.2: Locate and utilize a range of printed, electronic, and human information resources to obtain ideas.
  - T1.2a: Use all available information systems for a preliminary search that addresses the need.

Next Generation Science Standards: 3–5 Engineering Design

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

Texts
1. Donald B. Lemke, *Investigating the Scientific Method with Max Axiom Super Scientist* (Mankato, Minnesota: Capstone Press, 2008), ISBN: 978-1-4296-1760-4.
2. "The Electric Motor" (written by Expeditionary Learning for instructional purposes).
3. "Ingenious Inventions by Women: The Windshield Wiper and Paper Bag Machine" (written by Expeditionary Learning for instructional purposes).
4. "Dr. James Naismith, Inventor of Basketball," as found at www.kansasheritage.org/people/naismith.html (excerpts).
5. "First College Basketball Game," as found at www.americaslibrary.gov/jb/progress/jb_progress_basketball_1.html, www.americaslibrary.gov/jb/progress/jb_progress_basketball_2.html, and www.americaslibrary.gov/jb/progress/jb_progress_basketball_3.html.
6. "Big Thinkers: Was Steve Jobs this Generation's Thomas Edison?" in *Junior Scholastic*, November 21, 2011, as found at *The Free Library* at http://www.thefreelibrary.com/Big+thinkers%3A+was+Steve+Jobs+this+generation's+Thomas+Edison%3F-a0274791330.
7. "Steve Jobs," as found at www.timeforkids.com/news/steve-jobs/21806 (excerpts).

This unit is approximately 2 weeks or 10 sessions of instruction.

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 1	Building Background Knowledge: *Investigating the Scientific Method with Max Axiom Super Scientist*	• I can engage effectively in a range of collaborative discussions with diverse partners about fifth-grade topics and texts. (SL.5.1) • I can analyze how visual and multimedia elements contribute to the meaning, tone or beauty of a text. (RL.5.7) • I can recognize, interpret, and make connections in narratives, poetry, and drama to other texts, ideas, cultural perspectives, eras, personal events, and situations. (RL.5.11) a. I can self-select texts to develop personal preferences regarding favorite authors. b. I can use established criteria to categorize, select texts, and assess to make informed judgments about the quality of the pieces.	• I can use group norms to locate and discuss the visual elements in the graphic novel *Max Axiom*. • I can analyze the visual elements and splash page in *Max Axiom* to make predictions about the story. • I can use established criteria to select a text for independent reading.	• Written prediction (in journal) • Independent text selection • Independent Reading Choice Board Response	• Triad Talk Norms • Criteria for Selecting Texts • Infer the Topic protocol

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson2	Paraphrasing Quotes and Analyzing Visual Elements: Investigating the Scientific Method with *Max Axiom Super Scientist*	• I can quote accurately from a text when explaining what the text says explicitly and when drawing inferences. (RL.5.1) • I can paraphrase information in notes and finished work. (W.5.8) • I can analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text. (RL.5.7) • I can determine the meaning of unknown and multiple –meaning words and phrases based on fifth-grade reading and content, choosing flexibly from a range of strategies. (L.5.4) a. I can use context as a clue to the meaning of a word or phrase. b. I can use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word.	• I can explain the first steps Max Axiom takes to solve a problem by paraphrasing quotes from *Max Axiom*. • I can analyze how visual elements in *Max Axiom* contribute to my understanding of the steps Max Axiom takes to solve a problem. • I can determine the meaning of unknown words and phrases using a variety of strategies.	• Gist statement (in journal) • *Max Axiom*: Details and Visual Elements graphic organizer, page 1 • Vocabulary defined (in journal) • Independent Reading Choice Board response	• Group Norms • Close Readers Do These Things

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 3	Paraphrasing Quotes and Analyzing Visual Elements, Part 2: *Investigating the Scientific Method with Max Axiom Super Scientist*	• I can paraphrase information in notes and finished work. (W.5.8) • I can analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text. (RL.5.7) • I can determine the meaning of unknown and multiple-meaning words and phrases based on fifth-grade reading and content, choosing flexibly from a range of strategies. (L.5.4) a. I can use context as a clue to the meaning of a word or phrase. b. I can consult reference materials, both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	• I can explain the next steps Max Axiom takes to solve a problem by paraphrasing quotes from *Max Axiom*. • I can analyze how visual elements in *Max Axiom* contribute to my understanding of the steps Max Axiom takes to solve a problem. • I can use context clues and reference materials to determine the meaning of key words and phrases.	• Entry task (from Lesson 2 homework) • Gist (in journal) • *Max Axiom*: Details and Visual Elements graphic organizer, page 2. • Vocabulary defined (in journal) • Independent Reading Choice Board response	• Close Readers Do These Things • Quote/Paraphrase • Vocabulary Strategies

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 4	Paraphrasing Quotes and Analyzing Visual Elements, Part 3: *Investigating the Scientific Method with Max Axiom Super Scientist*	• I can quote accurately from a text when explaining what the text says explicitly and when drawing inferences. (RL.5.1) • I can paraphrase information in notes and finished work. (W.5.8) • I can analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text. (RL.5.7) • I can determine the meaning of unknown and multiple –meaning words and phrases based on fifth-grade reading and content, choosing flexibly from a range of strategies. (L.5.4) a. I can use context as a clue to the meaning of a word or phrase. c. I can use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word.	• I can explain the next steps Max Axiom takes to solve a problem by paraphrasing quotes from *Max Axiom*. • I can analyze how visual elements in *Max Axiom* contribute to my understanding of the steps Max Axiom takes to solve a problem. • I can determine the meaning of unknown words and phrases using a variety of strategies.	• Gist (in journal) • *Max Axiom*: Details and Visual Elements graphic organizer, page 3. • Response to reflection questions (in journal) • Vocabulary defined (in journal) • Independent Reading Choice Board response	• Group Norms • Vocabulary Strategies

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 5	Paraphrasing Quotes and Analyzing Visual Elements, Part 4: *Investigating the Scientific Method with Max Axiom Super Scientist*	• I can quote accurately from a text when explaining what the text says explicitly and when drawing inferences. (RL.5.1) • I can paraphrase information in notes and finished work. (W.5.8) • I can analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text. (RL.5.7) • I can draw evidence from literary texts to support analysis, reflection, and research. (W.5.9)	• I can explain the next steps Max Axiom takes to solve a problem by paraphrasing quotes from *Max Axiom*. • I can analyze how visual elements in *Max Axiom* contribute to my understanding of the steps Max Axiom takes to solve a problem. • I can draw evidence from the text and visual elements in *Max Axiom* to support my analysis of how Max Axiom used a process to solve a problem.	• Graphic Novel Template A, B, or C (from homework) • Gist (in journal) • *Max Axiom*: Details and Visual Elements graphic organizer, page. 4 • Response to reflection questions (in journal) • Open Response task card • Independent Reading Choice Board response	• Vocabulary Strategies • Think-Aloud protocol
Lesson 6	Mid-Unit Assessment: Analyzing Visual Elements in a Graphic Novel	• I can analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text. (RL.5.7) • I can draw evidence from literary texts to support analysis, reflection, and research. (W.5.9) • I can determine or clarify the meaning of unknown and multiple-meaning words and phrases based on fifth-grade reading and content, choosing flexibly from a range of strategies. (L.5.4)	• . I can explain how visual elements add meaning to the description of the scientific problem Max Axiom will encounter next. • I can determine the meaning of unfamiliar words and phrases using a variety of strategies. • I can reflect on my learning about how visual elements add meaning to the text and use a variety of strategies to determine the meaning of unfamiliar words and phrases.	• Mid-Unit 1 Assessment: Analyzing Visual Elements in a Graphic Novel • Tracking My Progress: Mid –Unit 1 recording form	• Close Readers Do These Things • Vocabulary Strategies

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 7	Using Quotes to Explain Relationships: The Invention of the Electric Motor	• I can quote accurately from a text when explaining what the text says explicitly. (RL.5.1) • I can determine the meaning of general academic and domain-specific words and phrases. (RI.5.4) • I can explain the relationship between two or more individuals, events, ideas, or concepts in a scientific text based on specific information in the text. (RI.5.3)	• I can explain how the electric motor meets societal needs using quotes from the text. • I can determine the meaning of unfamiliar words and phrases from context. • I can identify the relationships between electricity and the electric motor based on information from the text.	• Independent Reading Choice Board response (from homework0 • Gist statement (in journal) • Cause and Effect note-catcher: "The Electric Motor" • Vocabulary (in glossary) • Answers to text-dependent questions: "The Electric Motor"	• Close Readers Do These Things • Vocabulary Strategies
Lesson 8	Using Quotes and Opinion Writing: Ingenious Inventions by Women	• I can quote accurately from a text when explaining what the text says explicitly. (RI.5.1) • I can determine the meaning of general academic and domain-specific words and phrases. (RI.5.4) • I can write opinion pieces supporting a point of view with reasons and information. (W.5.1) a. I can introduce a topic clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support my purpose. b. I can provide logically ordered reasons that are supported by facts and details.	• I can explain how the windshield wiper and paper bag machine met societal needs using quotes from the text. • I can determine the meaning of unfamiliar words and phrases from context. • With peers, I can write an opinion paragraph about which invention meets a greater societal need.	• Graphic Novel Template A, B or C (from homework) • Gist statement (in journal) • Compare and Contrast note-catcher • Vocabulary (in journal) • Group opinion paragraph (on chart paper) • Independent Reading Choice Board response	• Close Readers Do These Things • Group Norms • Vocabulary Strategies • Opinion Paragraph

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 9	Using Quotes and Comparing and Contrasting Structure: The Invention of Basketball	• I can quote accurately from a text when explaining what the text says explicitly. (RI.5.1) • I can compare and contrast the structure of information in two or more texts. (RI.5.5)	• I can explain how the game of basketball was developed to meet societal needs using quotes from the text. • I can compare and contrast the structure of two articles that explain the invention of basketball. • I can explain how comparing and contrasting the structure of what I read supports my understanding of the ideas presented in informational texts.	• Entry task (Lesson 8 homework) • Problem and Solution note-catcher: "Dr. James Naismath, Inventor of Basketball: • Sequential note-catcher: "First College Basketball Game" • Venn Diagram • Synthesis questions (responses in journal) • Independent Reading Choice Board response	• Close Readers Do These Things • Group Norm • Vocabulary Strategies • Back-to-Back, Face-to-Face protocol

Lesson	Lesson Title	Long-Term Targets	Supporting Targets	Ongoing Assessment	Anchor Charts & Protocols
Lesson 10	End of Unit Assessment: Using Quotes to Explain Relationships and Support an Opinion	• I can determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes. (RI.5.4) • I can quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (RI.5.1) • I can explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text. (RI.5.3) • I can compare and contrast the overall structure (e.g. chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts. (RI.5.5) • I can write opinion pieces on topics or texts, supporting a point of view with reasons and information. (W.5.1) a. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose. b. Provide logically ordered reasons that are supported by facts and details.	• I can determine the meaning of unfamiliar words and phrases using a variety of strategies. • I can analyze the way text is structured to support readers' understanding of complex ideas. • I can write an opinion paragraph to explain which invention has been most important to people. • I can reflect on my learning about how new or improved technologies are developed to meet societal needs.	• End of Unit 1 Assessment: Using Quotes to Explain Relationships and Support an Opinion • Tracking My Progress: End of Unit 1 Recording Form • Independent Reading Choice Board response	• Criteria for Selecting Texts • Close Readers Do These Things • Vocabulary Strategies • Four Corners protocol

Optional: Experts, Fieldwork, And Service

Experts:
- Consider inviting local inventors and scientists to discuss their process with students and/or lead them in an experiment that demonstrates their application of methods related to scientific inquiry.

Fieldwork:
- Arrange for students to visit a laboratory conducting authentic research related to a local problem or need, or arrange a trip to a local science museum.

Service:
- Locate and pique students' interest in a local problem or need that would allow them to engage in a process of scientific inquiry that would lead to a possible solution.

Optional: Extensions

- Consider organizing an Invention Convention, an opportunity for students to work independently or in groups to identify a societal/local need or problem, develop a solution using a process of scientific inquiry, and then present their invention and findings to an audience of their peers and/or members of the school and local community.

Preparation and Materials

1. See the Module Overview document for details regarding a stand-alone document, **Foundational Reading and Language Standards: Resources, Guidelines, and Recommendations**. Unit 1 introduces some of these resources, most specifically the Fluency Packet, aligned with RF.5.5 and RF.5.6.
2. See the Recommended Texts list for this unit to gather a variety of texts for students to choose from for independent reading (Lesson 1).