EXPEDITIONARY LEARNING

Grade 5: Module 2B: Unit 2: Lesson 4

Making Inferences and Summarizing: Philo Farnsworth's Idea for "Capturing Light in a Bottle"

Long-Term Targets Addressed (Based on NYSP12 ELA CCLS)
I can quote accurately from the text when explaining what the text says explicitly and when making inferences. (RI.5.1) I can determine the meaning of general academic and domain-specific words. (RI.5.4) I can determine two or more main ideas from a text and explain how they are supported by key details. (RI.5.2) I can summarize the text. (RI.5.2)

Supporting Learning Targets	Ongoing Assessment
• I can make inferences using quotes and paraphrased details from *The Boy Who Invented TV*. • I can determine the meaning of academic and scientific words using a variety of strategies. • I can write a summary paragraph explaining the multiple main ideas in pages 2–17 of *The Boy Who Invented TV*.	• Graphic novel templates (from homework) • Making Inferences graphic organizer: Developing a Solution • Vocabulary, four-column chart (in journal) • Summary of pages 2–17 (in journal)

Agenda	Teaching Notes
1. Opening A. Homework Review and Engaging the Reader: Starting the Graphic Organizer (5 minutes) 2. Work Time A. Reading for Gist: *The Boy Who Invented TV* Pages 14–17 (10 minutes) B. Second Read: Making Inferences and Exploring Vocabulary (20 minutes) C. Writing a Summary Paragraph: *The Boy Who Invented TV* Pages 2–17 (20 minutes) 3. Closing and Assessment A. Debrief and Review Learning Targets (5 minutes) 4. Homework A. Read independently for at least 30 minutes and respond to one question on your new Independent Reading Choice Board for this unit. B. If needed, complete the four-column chart in your journal glossary.	• This lesson follows a similar format to Lesson 3. Students make an inference using their knowledge base during the Opening of this lesson. After reading pages 14–17, they are asked to revise the inference using relevant details from the text and their knowledge base as well as new ideas the text inspired. • The vocabulary discussion in this lesson fits within Work Time B to encourage students to use their understanding of key terms to support their inferences. Because vocabulary time is more limited during this lesson, students should be encouraged to record a definition or synonym for each term and complete the remaining parts of the four-column chart only if time allows. • Students revisit their work from Lessons 2–4 to develop a summary paragraph of pages 2–17 of *The Boy Who Invented TV*. This activity builds on the summary work from Lessons 1 and 2. Students write using a similar paragraph structure but are required to summarize a larger section of text with more main ideas. Students work in groups to complete a graphic organizer that provides scaffolding for their summary paragraph and serves as a first draft. The graphic organizer intentionally provides space for only five main idea sentences to encourage students to identify the most important ideas expressed in this section of the text. • In advance: – Review Popcorn Read protocol (see Appendix). – Consider displaying directions for group work to save time in Work Times B and C. – Familiarize yourself with the Summary Paragraph graphic organizer (answers, for teacher reference). • Post: Learning targets.

Lesson Vocabulary	Materials
inferences, quotes, paraphrased, summary, explaining, multiple, main ideas; stimulated, devices, doubted, harness, parallel, fused, transmitting, reassembling	• Journals (begun in Unit 1, Lesson 1; one per student) • *The Boy Who Invented TV: The Story of Philo Farnsworth* (book; one per student) • Making Inferences anchor chart (from Lesson 3) • Making Inferences graphic organizer: Developing a Solution (one per student) • Making Inferences graphic organizer: Developing a Solution (answers, for teacher reference) • Inferences and Key Terms task card (one per student) • Main Ideas and Summary anchor chart (from Lesson 1) • Summary Paragraph graphic organizer (one per student) • Document camera • Main Ideas and Summary graphic organizer: Philo's Childhood (from Lesson 2) • Summary Paragraph graphic organizer (answers, for teacher reference) • Independent Reading Choice Board (one per student)

Opening	Meeting Students' Needs

A. Homework Review and Engaging the Reader: Starting the Graphic Organizer (5 minutes)
• Direct students to bring their completed graphic novel templates, **journals**, and text, ***The Boy Who Invented TV***, and sit in their discussion groups.
• Ask students to share their graphic novel templates with a partner from their group. Encourage them to discuss the visual elements and specific details that help communicate the main ideas from pages 10–13 of *The Boy Who Invented TV* that they expressed in their graphic page.
• After 1 or 2 minutes, invite several students to share out whole class about some of the visual elements and details their partner included that helped communicate the main ideas. Answers will vary.
• Praise the students for their ability to use details from the text to express ideas in new ways. Explain that today they again have the opportunity to use details from the text to support their thinking, as they work to make inferences and summarize main ideas.
• Refer to the **Making Inferences anchor chart**. Cold call students to read aloud the definitions for *infer* and *inference*:
  * "*Infer* is to draw conclusions based on evidence from the text, your thoughts, and your knowledge base."
  * "An *inference* is a conclusion drawn from evidence from the text, your thoughts, and your knowledge base."
• Invite a few students to restate the definitions in their own words.
• Explain that similarly to the last lesson, students will make an inference about *The Boy Who Invented TV* and then revise their inference after collecting more information from the text during today's lesson.
• Distribute the **Making Inferences graphic organizer: Developing a Solution**. Read the focusing question aloud or invite a student to read it aloud:
  * "Why do you think Philo Farnsworth, a 14-year-old boy, was able to develop an idea for the TV when other scientists were still struggling to make it work?"
• Ask students to discuss the focusing question in their groups and complete the first half of the graphic organizer. Remind them to refer to relevant details from their notes and what they have already read in *The Boy Who Invented TV* to answer the question. Explain that even within a single group, inferences may differ from one student to the next. Their inference does not need to be identical to their group members' inferences.
	• Offer a sentence starter to give all students access to the discussion around the focus question ("I think Philo was able to make the TV work, even though scientists were struggling to make it work, because ...").

Opening (continued)	Meeting Students' Needs
• After 2 or 3 minutes, cold call several students to share their inferences with the whole class. Refer to the **Making Inferences graphic organizer: Developing a Solution (answers, for teacher reference)** for possible student responses. • Tell students they will complete the graphic organizer after they collect more information during Work Time B.	

Work Time	Meeting Students' Needs
A. Determining the Gist: *The Boy Who Invented TV* Pages 14–17 (10 minutes) • Ask students to work collaboratively as they read pages 14–17 of *The Boy Who Invented TV* to determine the gist. Remind them that they should consider both the images and text in their discussion. • After 3 or 4 minutes, cold call several students to share their gist statements. Listen for responses such as: – "Philo figured out a way to make the TV work by thinking about it in a different way." – "Philo didn't think that spinning machines would work, so he tried to devise a TV based on electricity." – "Philo had an idea to use electrons to transmit images from one place to another." • Give students 1 minute to record their gist statement on the same page as previous gist statements from *The Boy Who Invented TV*.	• To support struggling readers, consider abbreviating the amount of text they read to determine the gist. Be sure to choose the selection wisely so that students can still contribute meaningfully to the group discussion about the gist. • Consider guiding students through the process of determining gist in a small group. • Encourage struggling readers to find the gist in "baby steps" by reading a little at a time, collecting the gist as they go.

Work Time (continued)	Meeting Students' Needs

B. Second Read: Making Inferences and Exploring Vocabulary (20 minutes)
• Say something like:
  * "Now that you have the gist of pages 14–17, let's read a little more closely so you can collect evidence to use as you revise your inferences from earlier."
• Read the first learning target aloud or invite a student to read it aloud:
  * "I can make inferences using quotes and paraphrased details from *The Boy Who Invented TV*."
• Draw students' attention to the terms *inferences*, *quotes*, and *paraphrased*. Ask them to consider these terms as they think about how to restate the learning target in their own words. Cold call a few students to paraphrase the learning target.
• Review the **Popcorn Read protocol** and clarify any directions as needed. Refer to the Making Inferences anchor chart and ask one student to start the Popcorn Read by reading aloud one suggestion for making inferences that was particularly helpful in Lesson 3.
• Once the Popcorn Read has reached a natural conclusion, invite a few students to share out any patterns they noticed, such as strategies that were helpful for many students. Probe students' thinking by asking questions such as:
  * "In what ways are these strategies useful?"
  * "What other strategy could you try to use to support your thinking in this lesson?"
• Student answers will vary, but listen for them to make specific references to the strategies they find most helpful and explain how the strategies supported their ability to make inferences.
• Remind students to refer to the anchor chart and try to use more than one strategy as they work to make and revise their inferences about today's reading. Read the second learning target aloud or invite a student to read it aloud:
  * "I can determine the meaning of key words using a variety of strategies."
• Explain that today students will determine the meaning of vocabulary words while they are rereading to make inferences.
• Ask them to consider and discuss:
  * "Why might it be helpful to consider the meaning of key terms while you are working on making inferences?"
• After 1 or 2 minutes, invite several students to share their thinking whole class. Listen for ideas similar to these:
  – "If you understand the meaning of the key terms, you will have a better idea of what the author is trying to say, so it will be easier to make inferences."
	• To support synthesis of new vocabulary, consider writing student-generated synonyms above or below key terms in the target.
	• To support visual learners, invite a student with a proficient inference to display the inference under the document camera as they read it aloud.

Work Time (continued)	Meeting Students' Needs
– "It will be easier to collect evidence from the text if you have a strong understanding of the key terms." • Direct students to look at the top of their Making Inferences graphic organizers and read the key vocabulary aloud: *stimulated, devices, doubted, harness, parallel, fused, transmitting, reassembling*. • Then, distribute and display the **Inferences and Key Terms task card** directions. Clarify as needed then ask students to begin. • Circulate to provide support to students. Consider assisting them with vocabulary work by pointing out that one of the key terms was listed in the glossary from Lesson 3, that the image on pages 16 and 17 shows parallel rows of overturned earth, that the prefix *trans-* means "across" or "through," and that the prefix *re-* means "again." • After about 15 minutes, refocus students whole class. • Cold call several students to share definitions for the key vocabulary terms. Listen for suggestions such as: – "*Stimulated* means excited or interested." – "*Devices* are pieces of equipment designed to serve a specific purpose." – "*Doubted* means 'did not believe.'" – "To *harness* something is to control it so it can be used for a specific purpose." – "*Parallel* lines are straight, coplanar lines that never intersect." – "*Fused* means 'came together.'" – "*Transmitting* means 'sending from one part or place to another.'" – "*Reassembling* means 'assembling again' or 'putting together again.'" • Invite students to use their understanding of these terms to revise the inferences on their graphic organizer. • After 1 or 2 minutes, cold call several students to share the inferences they wrote in response to the focusing question. Refer to the Making Inferences graphic organizer: Developing a Solution (answers, for teacher reference) for possible student responses. • Ask students to consider and discuss how reading pages 14–17 altered their initial inference in response to the focusing question.	

Work Time (continued)	Meeting Students' Needs
• After 1 or 2 minutes, cold call several students to share out whole class. Encourage them to cite specific details from the text to help them explain their thinking. • Praise students for their ability to identify relevant details in the text that support, expand, or alter their thinking.	

C. Writing a Summary Paragraph: *The Boy Who Invented TV* Pages 2–17 (20 minutes)
• Review students' work in Lessons 1–4, saying something like:
  * "Over the past several lessons, you have practiced reading to determine main ideas, make inferences, explore new vocabulary and summarize sections of the text. This complex thinking has helped you develop a deeper understanding of the text, *The Boy Who Invented TV*. To help synthesize all of your thinking, you are going to take some time today to look back over your work, identify the most important ideas from pages 2–17, and write a summary paragraph."
• Refocus the class before you read aloud, or invite a student to read aloud, the third learning target:
  * "I can write a summary paragraph explaining the multiple main ideas in pages 2–17 of *The Boy Who Invented TV*."
• Draw students' attention to the terms *summary*, *explaining*, *multiple*, and *main ideas*. Ask them to consider and discuss the meaning of each term.
• After 1 to 2 minutes, cold call several students to share possible definitions. Listen for suggestions like these:
  – "A *summary* is a brief explanation of the main ideas presented in a text."
  – "*Explaining* is 'describing with details' or 'teaching others.'"
  – "*Multiple* means 'more than one.'"
  – "*Main ideas* are the most important or central thoughts of a paragraph or larger section of text."
• Invite several students to paraphrase the learning target.
• Refer to the **Main Ideas and Summary anchor chart** and explain to students that today they are using the same skills they have used in previous lessons to write summaries, however because they are reviewing ideas from more than one section of text their paragraphs will be longer. Therefore, a new graphic organizer will be provided to help students plan their paragraph.
• Distribute the **Summary Paragraph graphic organizer** and display a copy on the **document camera**. Tell students that as they review their work from Lessons 2–4, they should record main ideas from each section on their graphic organizer.
	When directing students to discuss the Main Ideas and Summary graphic organizer from Lesson 1, display the three discussion questions so students can talk about them at their own pace.
	• Offer access to word processing or a scribe to support students who struggle with the physical act of writing when recording their summary in their journal.

Work Time (continued)	Meeting Students' Needs

• Direct students to look back at the **Main Ideas and Summary graphic organizer: Philo's Childhood** from Lesson 2. Cold call a student to share the first and second main idea recorded on the graphic organizer. Ask students to consider and discuss:
  * "Are each of these main ideas relevant to the larger section of text we are summarizing today?"
  * "Is one of the ideas more important to pages 2–17 than the other?"
  * "Should one or both of these ideas be included in the summary of pages 2–17? Explain your thinking."
• After 2 or 3 minutes, invite several students to share their thinking whole class. Answers will vary, but possible student responses could include:
  – "I think both main ideas are important to pages 2–17 because they help you understand the character traits that made Philo a good inventor."
  – "I think both ideas are important, but the first one is more related to the rest of the story."
• Using the displayed organizer, demonstrate how students might record one main idea in the box labeled Main Idea 1.
• Point out where students will record additional main ideas. Ask them to consider and discuss:
  * "If today's summary paragraph follows a similar format to the paragraphs from Lessons 1 and 2, describe the purpose of the boxes labeled Introductory Sentence and Concluding Sentence."
• After 1 or 2 minutes, cold call a few students to share their thoughts whole class. Listen for:
  – "The first box is where we write an overarching statement that is related to all main ideas."
  – "The conclusion is where we restate the introductory sentence in a new way."
• Give groups these instructions:
  * Review the text, the work in your journal, and your completed graphic organizers.
  * Determine and record the four or five most important main ideas from pages 2–17.
• Remind students that their group members are there to support their thinking, but their work does not need to be identical. Circulate to assist as needed. Encourage students to refer to the Main Ideas and Summary anchor chart to support their thinking.
• After 8 to 10 minutes, refocus students whole class. Cold call several students to share main ideas they identified from the text. Refer to the **Summary Paragraph graphic organizer (answers, for teacher reference)** for possible responses.	

Work Time (continued)	Meeting Students' Needs
• Direct students to work in their groups to: – Develop and record an introductory sentence that synthesizes all of the main ideas they recorded. – Generate and record a concluding sentence that restates the introduction in a different way. • Remind students that once again, their work does not need to be identical to that of their group mates. Circulate to provide support as needed. • After 2 or 3 minutes, cold call several students to share the introductory sentences they recorded. Refer to the Summary Paragraph graphic organizer (answers, for teacher reference) for possible responses. • Give students 2 minutes to make final revisions to their thinking on their graphic organizers and record their complete summary paragraph on a clean page in their journals.	

Closing and Assessment	Meeting Students' Needs
A. Debrief and Review Learning Targets (5 minutes) • Direct students to collect their journals and find a partner who is not in their discussion group. • Ask partners to share their summary paragraphs and discuss the similarities and differences they notice. • After 1 or 2 minutes, invite a few students to share out about the points they discussed. • Display the learning targets and ask students to consider and discuss with their partner: * "Describe how the work you have done in today's lesson has helped you work toward these learning targets." • After 1-2 minutes, cold call several students to share. • Explain to students that in the next lesson, they will have the opportunity to demonstrate their mastery toward each of these targets when they take the mid-unit assessment. • Distribute a new **Independent Reading Choice Board** to each student.	• Offer a sentence starter to support all students in accessing the debrief question ("The work I did in today's lesson helped me work toward these learning targets by ....").
Homework	**Meeting Students' Needs**
• Read independently for at least 30 minutes and respond to a new question on your Independent Reading Choice Board. • If needed, complete the four-column chart in your journal glossary.	• For students who need additional processing or writing time, consider reducing the number of words to enter into their glossary by providing a four-column note for one or more of the words or one for each word with key elements missing for students to fill in as homework and glue into their journal.

EXPEDITIONARY LEARNING

Grade 5: Module 2B: Unit 2: Lesson 4
Supporting Materials

Making Inferences graphic organizer:
Developing a Solution

Name:

Date:

Key vocabulary: stimulated, devices, doubted, harness, parallel, fused, transmitting, reassembling

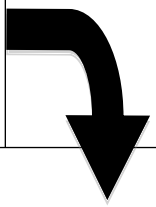
Focusing question: Why do you think Philo Farnsworth, a 14-year-old boy, was able to develop an idea for the TV when other scientists were still struggling to make it work?

Knowledge Base:
Details about the focusing question from previous reading and images viewed

Inference:
Response to focusing question

Making Inferences graphic organizer:
Developing a Solution

New Information from the Text:
Paraphrased details, quoted text, and observations from images



Revised Inference:
Revised response to focusing question

Making Inferences graphic organizer:
Developing a Solution
(Answers, for Teacher Reference)

(Some possible student responses)

Focusing question: Why do you think Philo Farnsworth, a 14-year-old boy, was able to develop an idea for the TV when other scientists were still struggling to make it work?

Knowledge Base:
Details about the focusing question from previous reading and images viewed

- *Philo was always asking lots of questions.*
- *Philo had lots of jobs and chores. He was very hard-working.*
- *Philo figured out how to fix things around his house all on his own.*

Inference:
Response to focusing question
Philo Farnsworth was always asking a lot of questions, so I think he was a good critical thinker. He was also a very hard worker, and he taught himself how to fix machines at his house. His critical thinking and hard work probably helped him invent the TV.

Making Inferences graphic organizer:
Developing a Solution
(Answers, for Teacher Reference)

New Information from the Text:
Paraphrased details, quoted text, and observations from images about Philo Farnsworth's motivations

- *Philo wasn't trying to solve the problem with spinning disks and mirrors like everyone else. He tried to think about it in a new way, using electricity.*
- *He didn't just think about machines. He was learning about all different kinds of science. He understood about how electricity and electrons worked.*
- *He got an idea from looking at the lines in his fields.*

Revised Inference:
Revised response to focusing question

Philo Farnsworth was able to create an idea for the TV even when other scientists struggled because he was a creative thinker. Instead of thinking about machines with moving parts, he thought about electrons and light.

Inferences and Key Terms task card

1. Reread pages 14–17.
   A. Identify and record relevant quotes and paraphrased details from the text on your Making Inferences graphic organizer.
   B. Determine the meaning of key vocabulary and add each term to your journal glossary. Record either a definition or a synonym for each term.
   C. Complete your Making Inferences graphic organizer using:
      – Details from the text and images on pages 14–17
      – Your knowledge base
      – Relevant ideas you developed while reading pages 14–17

2. As time allows, complete all parts of the four-column chart in your journal glossary.

Summary Paragraph graphic organizer

Name:

Date:

Introductory Sentence

Main Idea 1

Main Idea 2

Main Idea 3

Main Idea 4

Main Idea 5

Concluding Sentence

Summary Paragraph graphic organizer
(Answers, for Teacher Reference)

Introductory Sentence
Philo Farnsworth's early interest in science and invention influenced many of his actions and encouraged him to start inventing machines.

Main Idea 1
Philo Farnsworth was a curious boy who was interested in the way machines, like the phonograph and telephone, worked.

Main Idea 2
Philo lived on a farm and had many chores and responsibilities, but he still tried to make time to read about machines.

Main Idea 3
When his family moved from Utah to Idaho, Philo had the opportunity to read magazines about science and learn about the electrical machines in his new house.

Main Idea 4
Philo started inventing his own machines to make his chores easier so he could spend more time learning about science and thinking about inventions.

Main Idea 5
When he was plowing his fields, Philo developed the idea for an electrical TV that would break images into parallel rows of light, transmit them as electrons, and put them back together for the viewer.

Concluding Sentence
As a boy, Philo Farnsworth's interest in science and invention influenced his actions and led him to devise a plan for an electrical TV.

Independent Reading Choice Board

Name:

Date:

Title of Independent Reading Book/Author's Name:

After reading independently (silently and/or aloud) for at least 30 minutes, write a response to any ONE question from the board *except* the center square. Complete the center square once you have answered each of the other eight questions. If you need more space, you may continue your answers on the back.

MAIN IDEAS What is *one* of the main ideas presented in your book? List at least two details that support the main idea you identified.	CONNECTIONS What connections were you able to make between your independent reading book and other texts, topics explored, or experiences you have had?	STRUCTURE How is this book structured? How does the structure support your understanding of the text?
GENRE What genre is this book? Do you enjoy this genre? Explain.	**Complete this square last* **What qualities will you look for in the next book you read?** (e.g., same author, same or different genre, more or less visual elements, etc.)	RECOMMENDATION Would you recommend this book and/or this author to someone else? Explain.
WORDS List at least two words from your book that have the same *prefix*. What does the prefix in these words mean?	READABILITY Is your independent reading book too hard, just right, or too easy? Explain.	INTEREST Do you find this book interesting? Explain.