Problem Solvers

FOCUS QUESTION

How can people use technology to solve problems?

About the Lesson

OBJECTIVES

Content Objectives

- Identify key details in a text.
- Use key details to determine and support the main idea of an informational text.
- Understand the process of invention and how inventions help people.

Language Objectives

- Record key details in a chart to figure out the main idea of a text.
- Agree or disagree with a partner about the main idea of a text and explain why.
- Discuss with a group and take notes about ways people use technology to solve problems.

ACADEMIC TALK

See **Glossary of Terms** on pp. 478–485. *main idea, key detail, topic*

Build Knowledge

Lesson texts build knowledge about:

- How a trash-eating machine has helped to clean a city harbor
- How experimenting with chemicals led to the incredible invention of Kevlar[®]
- How a social robot helps at a retirement community

Plan Student Scaffolds

- Use **i-Ready data** to guide grouping and choose strategic scaffolds.
- Use **Teacher Toolbox** resources as needed to address related skills:
 - -Connect important ideas in a text
 - -Main idea and supporting details
- Create mixed language-proficiency pairings so students can support each other during Sessions 1 and 3. EL
- Preview texts and activities to anticipate barriers to engagement, access, and expression. Modify based on needs.

Use Protocols That Meet the Needs of All Students

In order to increase engagement and validate cultural and linguistic behaviors, specific protocols are included in the lesson. To further customize activities for your students, consider optional protocols listed on pp. A46–A51.

PROTOCOL	SESSION	VALIDATES
Individual Think Time	1	independence
Give One, Get One	1, 4	movement, shared responsibility
Pick a Stick	2	spontaneity
Silent Appointment	2	social interaction, nonverbal expression
Stand and Share	3, 5	spontaneity, movement, connectedness
Musical Shares	4	movement, musicality, social interaction
Merry-Go- Round Share	6	multiple ways to show focus, connectedness

LEARNING PROGRESSION | Determine Main Idea and Key Details

Students build on this skill: RI.3.2 Determine the main idea of a text.

Students learn this skill:

RI.4.2 Determine the main idea of a text and explain how it is supported by key details.

Students prepare for this skill: RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details.

Students review and practice:

- RI.4.1 Make inferences
- RI.4.3 Analyze a scientific text
- **RI.4.4** Determine word meanings

LESSON PLANNING GUIDE

TEXT 1: Googly-Eyed and Gobbling Garbage • TECHNOLOGY ARTICLE

	SCAFFOLD	1.0	TEXT AT-A-GLANCE	ENGLISH LEARNER SUPPORT (EL)
SESSION 1	READING	<section-header><section-header><section-header>Contract of the state of</section-header></section-header></section-header>	 Concepts/Background Baltimore's Inner Harbor, Jones Falls River the flow of litter from rivers to harbors and oceans designing and prototyping inventions how a machine is powered by renewable energy from water and 	 Reading Role-play, Leverage cognate knowledge Listening/Speaking Use word bank
SESSION 2	PRACTICE THE FOCUS STANDARD • Formative Assessment		 the sun Language Vocabulary: habitats, waterwheel, prototype, rough (model), solar panels, conveyor belt Figurative Language: a floating monster guards, snail-like shell, monster's yawning mouth, snacks on some plastic bags, a family of monster friends Descriptive Language: looked like a floating garden shed 	 Listening/Speaking Reinforce academic vocabulary Writing Talk before writing

TEXT 2: The Strongest Thread • TECHNOLOGY ARTICLE

SESSION 3	SCAFFOLD READING	<section-header></section-header>	 Concepts/Background the scientific process chemistry, including the use of spinning machines the strength of steel Kevlar and protective materials Language 	 Reading Leverage cognate knowledge, Explore content vocabulary, Build background knowledge, Gesture Listening/Speaking Paraphrase
SESSION 4	PRACTICE THE FOCUS STANDARD • Formative Assessment	Contract of the second se	 Vocabulary: chemical, test batches, fabric, liquid, machine, (next) step, relief Idiom: give up 	Speaking/Reading Use sentence frames Writing Establish peer support

TEXT 3: Meet Stevie • TECHNOLOGY ARTICLE

SESSION 5	<section-header><text></text></section-header>	 Concepts/Background retirement communities coding and robots the human need for social interaction Language Vocabulary: (robotic) engineer, (types) commands, compliment, smells (multiple meanings) Idiom: keep them company Descriptive Language: the robot stretches its peg-like arms while a grin flashes on its digital face 	 Reading Explore content vocabulary Speaking/Reading Role-play, Gesture, Analyze phrases Listening/Reading Read aloud questions and answer choices Writing Annotate text 		
KN	KNOWLEDGE BUILDING				
SESSION 6	 RESPOND TO THE FOCUS QUESTION How can people use technology to solve problems? 	 Integrate information from the lesson texts Collaborative discussion Short response 	WritingUse sentence frames		

Before Teaching the Lesson

Preview the texts before teaching the lesson. Plan scaffolds to use and provide background information as needed before reading each text.

- Googly-Eyed and Gobbling Garbage: Trash in Waterways If trash is not disposed of properly, it can end up in waterways, causing damage to the animals and plants that live there. As an alternate means of representation, you can search online for videos of Mr. Trash Wheel in operation.
- The Strongest Thread: Kevlar[®] Kevlar is a strong but lightweight fabric that is used for many purposes. It is used in the military and in manufacturing to protect people from getting hurt.
- **Meet Stevie: Robots** Robots can be programmed for many purposes, such as completing tasks. As an alternate means of representation to support comprehension, share videos of Stevie in action.

Talk About the Topic

BUILD STUDENTS' INTEREST

- Introduce the lesson topic and the Focus Question. Tell students they will read, talk, and write about how people solve problems using inventions and technology.
 - Ask students to Raise a Hand to share examples of inventions and the problems they may have solved in their own lives.
 - Introduce the focus standard. **Say,** *As you read, you will determine the main idea and pay attention to key details that support that idea.*
- Ask students to complete Notice and Wonder with a partner. Circulate to identify gaps in background knowledge.
 - Provide **Individual Think Time** for students to jot down ideas before talking.
 - Invite students to identify the Spanish cognate for technology (*tecnología*). Discuss examples. **EL**
 - Use **Thumbs Up** to have students vote on the text they are the most interested in reading.

SESSIO

Problem Solvers

FOCUS QUESTION

How can people use technology to solve problems?

NOTICE AND WONDER

Look at the titles and images of the texts you will read in this lesson. What do you notice? What do you wonder? Discuss your ideas with a partner.

3 WORD SORT

How are the words below connected to the process of invention? Sort the words into the categories in the chart.

problem	scientist	experiment
design	idea	solve
invention	test	engineer

Who Invents	Why They Do It	How They Do It	What They Create
scientist	problem	test	invention
engineer	idea	experiment	design
	solve	design	

118 UNIT 2 | Technology



3 INTRODUCE ESSENTIAL CONCEPTS

- Have students work in pairs to complete Word Sort. Explain that these words are related to the process of designing and improving inventions and are found in this lesson's texts.
- Model examples, such as: A scientist is a person who often works to make things. So, I will put scientist in the "Who Invents" column.
- Demonstrate how the words *experiment* and *test* can be used as both nouns and verbs.
- Use LISTEN FORs to monitor understanding. Use Help & Go scaffolds as needed.
- **LISTEN FOR** Students understand the terms *invention, design, and engineer.*

HELP & GO: Vocabulary

- Explain that an invention is something made to solve a problem. Give examples of inventions, such as smartphones or exercise equipment. **Ask**, *What problem did the smartphone solve? being able to call people and use the internet from anywhere*
- Tell students that a design is a drawing that shows how something should look. Point out that *design* can be used as a noun or a verb.
- **Say,** An engineer is a person who designs, builds, and tests inventions that solve problems.
- **LISTEN FOR** Students show their understanding when they discuss the words.

HELP & GO: Academic Discussion

- Guide students to share what they think or know about different words as they complete this task. Have students repeat and rephrase to show understanding.
- Encourage students to give examples of *tests,* problems, inventions, or experiments.
- Have students use **Give One**, **Get One** to share their ideas.

Support Reading

- Set a purpose for reading. Say, In this session, you will read to learn how an invention helps keep water trash-free.
- Have students read paragraphs 1–4. Have them circle unknown words and mark confusing parts with a question mark.
- Use CHECK INs and related Help & Go scaffolds as needed to support understanding. Monitor based on annotations, observation, and your knowledge of students.
- CHECK IN Students understand the figurative language in paragraph 1.

HELP & GO: Language

- Ask, What is Mr. Trash Wheel compared to in paragraph 1? a floating monster, a school bus, a snail
- Explain that the author uses language that makes Mr. Trash Wheel seem like a monster in the harbor. Ask, What words make Mr. Trash Wheel seem alive? guards, yawning mouth, snacks on some plastic bags, swallows a tire
- Ask some students to act out munching the soda can, snacking on the bags, and swallowing a tire. Have the others shout out the words *chomp*, slurp, and gulp when they see the action that corresponds to the sound. EL
- Point out the words chomp, slurp, and gulp. Explain these words make it seem like Mr. Trash Wheel is really eating, not just collecting trash.

Stop & Discuss

- Have students Turn and Talk to complete the Stop & Discuss.
- LISTEN FOR Students discuss Kellett describing the trash in the harbor.

HELP & GO: Comprehension

- Guide students to the understanding that the trash in the harbor came from humans.
- Students identify the Spanish cognate disgusto/a (disgusted) to clarify meaning. EL

©Curriculum Associates, LLC Copying is not permitted.



2 That's right. It's eating garbage! This monster is actually a machine named Mr. Trash Wheel. John Kellett designed this unusual machine to deal with a big problem: trash in the river.

snacks on some plastic bags. Gulp. It swallows a tire.

- 3 Back in 2006, there was nothing to stop garbage as it made its way from the Jones Falls River, through the harbor, and out into the open ocean. Most of the trash was plastic. Plastic in the ocean is a big problem because it harms sea life and destroys their habitats.
- 4 People who saw all the trash in the river and in the harbor felt **disgusted**. Kellett saw the trash every day on his walk to work at the Baltimore Maritime Museum. When it rained, he says, "you [would] see the flow of trash just dumping into the harbor, making it look terrible. I thought about it every day." 🕕

©Curriculum Associates, LLC Copying is not permitted.

2 RI.4.2 **Stop & Discuss**

READ

think about every day? Talk with a partner about details in paragraph 4 that tell about what he observed.

120 UNIT 2 | Technology

disgusted = upset, angered What problem did Kellett

SESSION 1

HOW MR. TRASH WHEEL WORKS



- **5** But Kellett didn't just think about the problem. He also invented a way to solve it. He imagined a waterwheel that could pick up trash. He talked to other people about his idea and got funding to build a prototype, or a rough model of an invention.
- ⁶ The original prototype needed work. It looked like a floating garden shed, and it wasn't strong enough to handle the large amount of trash in the river. So Kellett got back to work, improving his design with strong steel parts, extra solar panels for more power, and a new look.
- 7 The new garbage gobbler got to work in 2014. So far, Mr. Trash Wheel has guzzled more than one million water bottles, 4,600 sports balls, a guitar, and many other things. Mr. Trash Wheel also has a family of monster friends: Professor Trash Wheel and Captain Trash Wheel, which work on nearby rivers.
- 8 Kellett is surprised and delighted by how famous his invention has become. Mr. Trash Wheel encourages people to think about where litter and non-recycled plastic could end up. Kellett says that the trash wheel is "an inspiration to people to become part of the solution to the problem."

©Curriculum Associates, LLC Copying is not permitted.

- LESSON 7

- **1.** A waterwheel is one source of power for the machine.
- 2. Floats capture trash, moving it toward Mr. Trash Wheel's mouth.
- **3.** Rakes pick up the trash and drop it on the conveyor belt.
- **4.** The conveyor belt moves the trash into a dumpster.
- **5.** When the dumpster is full, workers take it away.
- **6.** Large solar panels are another source of power for Mr. Trash Wheel.

3 Support Reading

- Have students read paragraphs 5–8.
- **CHECK IN** Students understand the words *prototype* and *waterwheel*.

HELP & GO: Vocabulary

- Have students look around the word to understand prototype. **Ask**, What words in paragraph 5 help you understand prototype? a rough model of an invention
- Have students look inside the word for *waterwheel*, breaking it into *water* and *wheel*.

4 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LISTEN FOR** Students understand how and why Kellett improved the prototype.

HELP & GO: Comprehension

- Have students reread paragraph 6. **Ask**, *What wasn't working about the prototype? It wasn't strong enough to handle all the trash. How did Kellett improve it? strong steel parts, more solar panels*
- Draw students' attention to the diagram and use it to explain how the machine functions.
- Have students discuss the machine's appearance.
 Ask, Why might Kellett have designed his machine to look like a monster? It's in a public place, so he wanted it to look fun.
- Have partners explain how the prototype for Mr. Trash Wheel changed. Provide a word bank: *eats, trash, strong, floats,* and *sun.* **EL**

Discuss the Whole Text

Revisit the Focus Question. Have students **Raise a Hand** to tell how Kellett used technology to solve his problem. Record the responses for later reference.

did Kellett improve his invention?

Stop & Discuss

What problems did the

prototype have? How

guzzled = eaten in a messy,

inspiration = something that

RI.4.2

excites and brings change

hurried way

4

Reread paragraph 6 and discuss it with a partner.

LESSON 7 | Problem Solvers 121

Reconnect to the Text

SESSION 2

Use **Pick a Stick** to have students recall "Googly-Eyed and Gobbling Garbage." **Ask**, *What technology did John Kellett invent*?

1 Introduce the Standard

- Read the information at the top of the student page with students. Explain that the main idea and the topic of a text are related.
- Explain that the topic of "Googly-Eyed and Gobbling Garbage" is Mr. Trash Wheel. **Ask**, What is the author's big idea about Mr. Trash Wheel? Let's reread the text, bit by bit, to find key details that help us determine the main idea.
- Assess students' familiarity with academic terms: *topic, key details,* and *support*. **EL**

2 Reread/Think

MODEL THE STANDARD Display the chart. Model how to find the key details of each part of the text.

• Have students reread paragraphs 1 and 2. **Say,** *As I read, I ask myself, "What is the most important thing in this part of the text?" I think the most important thing is at the end of paragraph 2, where it says that John Kellett designed Mr. Trash Wheel to pick up trash in the harbor.* Model underlining this sentence.

GUIDE STANDARDS PRACTICE Guide students to find the key details of paragraphs 3 and 4. Have them reread the paragraphs and determine the most important thing they read.

- Explain that there could be multiple key details in each set of paragraphs. Guide them to add those important details to the second row of the chart.
- Have students complete the last two rows of the chart independently.

RI.4.2 Determine the main idea of a text and explain how it is supported by key details . . .

Determine Main Idea and Key Details

- The **main idea** of a text is the big idea, or the most important thing the author wants you to know about the topic.
- Key details are facts and examples that support the main idea.

2 Reread/Think

Reread "Googly-Eyed and Gobbling Garbage." Write the key details from each part of the text in the chart.

Part of Text	Key Details from This Part of the Text
Paragraphs 1 and 2	"John Kellett designed this unusual machine to deal with a big problem: trash in the river."
Paragraphs 3 and 4	 "Back in 2006, there was nothing to stop garbage as it made its way from the Jones Falls River, through the harbor, and out into the open ocean."
	 "When it rained, he says, 'you [would] see the flow of trash just dumping into the harbor, making it look terrible. I thought about it every day."
Paragraphs	• "He imagined a waterwheel that could pick up trash."
5 and 6	 "He talked to other people about his idea and got funding to build a prototype, or a rough model of an invention."
	 "So Kellett got back to work, improving his design with strong steel parts, extra solar panels for more power, and a new look."
Paragraphs 7 and 8	 "So far, Mr. Trash Wheel has guzzled more than one million water bottles, 4,600 sports balls, a guitar, and many other things."
	 "Mr. Trash Wheel encourages people to think about where litter and non-recycled plastic could end up."

122 UNIT 2 | Technology

3 Talk

LESSON 7

5555

- Use **Silent Appointment** to have students find a partner for the Talk activity.
- After partners discuss the main idea, challenge them to take turns explaining it in a single sentence.
- **LISTEN FOR** Students identify the main idea of the text. Use **Help & Go** scaffolds as needed.

HELP & GO: Standards Practice

- With students, look back at the completed chart. **Ask**, What do all of these sections of the text talk about? Kellett's invention, Mr. Trash Wheel What does this text say several times about the invention? It solved a problem. What do you think might be the main idea of the whole text? Kellett saw a problem with garbage in the water and created an invention to help clean it up.
- Ask, Why do you think that is the main idea? What details support it? Details in every section explain how Kellett created Mr. Trash Wheel to clean up garbage. One detail is that Kellett's disgust at the garbage he saw every day led him to invent Mr. Trash Wheel.
- Encourage students to use the sentence frames as they discuss the main idea. Have students repeat and rephrase to show understanding.

4 Write

- Have students complete the Write task and use the checklist to check their work.
 - Remind students to explain the author's idea rather than their own opinions.
 - Have students use Stronger and Clearer
 Each Time to get feedback and refine their writing. EL
 - —Use written responses to determine whether students need additional support.
- Use Pick a Stick to select several students to share their responses.

3 Talk

Review the key details for each part of the text.

- What is Mr. Trash Wheel?
- Who made it? Why did they make it?
- What is the main idea the author wants you to understand about Mr. Trash Wheel?



I agree/disagree because __

0000

WRITING CHECKLIST

☐ I described the main

idea of the text.

that support the

☐ I used information

from the graphic

spelling, punctuation,

and capitalization.

organizer in my response.

☐ I used correct

☐ I included details

main idea.

text is that ___.

4 Write

What is the main idea of "Googly-Eyed and Gobbling Garbage"? What two key details support this main idea?

Sample response: The main idea of "Googly-Eyed and

Gobbling Garbage" is that an inventor named John Kellett

made a clever and creatively designed machine named

Mr. Trash Wheel to solve the problem of cleaning up

garbage in a river. Kellett saw a problem he wanted to fix

in his town, so he worked hard to create an invention to

solve it. The text supports this main idea by describing

how Kellett noticed a problem, came up with a solution,

and kept working to make his invention better.

©Curriculum Associates, LLC Copying is not permitted

LESSON 7 | Problem Solvers 123

Support Reading

SESSION 3

- Set a purpose for reading. Say, In this text, you will read to learn how taking a risk can lead to a new discovery.
- Have students read paragraphs 1–4. Have them circle unknown words and mark confusing parts with a question mark.
- In the text, the author includes questions that convey what Stephanie Kwolek was thinking. Point out that the last sentence in paragraph 1 is an example of this.
- Use CHECK INs and related Help & Go scaffolds as needed.
- CHECK IN Students understand words such as chemicals, liquid, and machine.

HELP & GO: Vocabulary

- Explain that chemists like Stephanie Kwolek mix chemicals in a lab to make new discoveries. Tap students' knowledge of everyday chemistry, such as mixing baking soda and vinegar to produce bubbles or the process of making slime.
- Ask students to identify the Spanish cognates líquido (liquid), químicos (chemicals), and máquina (machine) to help clarify word meanings. EL

2 Stop & Discuss

- Have students Turn and Talk to complete the Stop & Discuss.
- LISTEN FOR Students discuss the goals described in paragraph 2.

HELP & GO: Comprehension

- Ask, What was Kwolek trying to find? new ways to make fabric from chemicals
- Ask, What challenge did Kwolek's company give her? to create the strongest fibers ever made
- Confirm that students understand that challenge means "something hard and difficult to do," such as solving a problem or creating something new. Explain that in this context, it also refers to a task that the company gave Kwolek. EL



fibers = thin threads

SESSION

READ

RI.4.2 **Stop & Discuss**

Why was Kwolek doing experiments?

Discuss paragraph 2 to identify at least two goals behind Kwolek's work.

124 UNIT 2 | Technology

by Tracy

Vonder Brink

2 Kwolek was a chemist, a scientist who studies materials in the world around us. She was trying to find new ways of making threads and fabric out of chemicals. Ten years before, in 1955, her company had given her a huge challenge: create the strongest fibers ever made, fibers even stronger than steel!

1 Stephanie Kwolek peered at the chemical mixture on the table.

one was thin and cloudy. She frowned. Had something gone

wrong with the experiment?

2.....

All her other test batches had been thick and clear, but this

- **3** Over time, Kwolek and her team had mixed batch after batch of chemicals. They were looking for chemicals that would stick together to form strong fibers. To test their mixtures, the team sent them to the spinning room.
- 4 Spinning chemicals into thread is complicated. First, the liquid chemicals are poured into a machine that pushes them through tiny holes in a steel plate. This step creates solid fibers from the liquid. The fibers are then wound around a spool, creating a kind of thread.





– LESSON 7

Kwolek proudly displays her invention.

- 5 Kwolek and her team had tested more than 100,000 mixtures in the ten years since the challenge was given. None of them had worked. Now she was staring at this strange new cloudy, watery batch. It wasn't like any other she had seen before. Was it just another failure? Should she throw it out?
- 6 No! Just because this mixture was puzzling didn't mean it was bad. Maybe she should take it to the next step. The scientist who **operated** the spinning machine didn't want to test Kwolek's mixture, however. He was afraid it would **clog** and break the machine, so he told her no.
- 7 But Kwolek wasn't ready to give up. She checked the mixture again and told the scientist she didn't think it would break anything. Finally, he agreed to test it.
- 8 Kwolek waited. Would her mixture be a success? Or would it wreck the machine? Then she heard from the spinning room—her mixture had been turned into thread! That was a relief. Now the thread needed to be tested.

©Curriculum Associates, LLC Copying is not permitted.

operated = managed, controlled clog = block up

4

Stop & Discuss

RI.4.2

Why did Kwolek think of throwing out her new batch? Talk with a partner about the details in paragraph 5.

She thought it was

LESSON 7 | Problem Solvers 125

Support Reading

- Have students read paragraphs 5–8.
- **CHECK IN** Students understand the purpose of the spinning machine.

HELP & GO: Background

- Explain that when the scientists tested the chemicals, they used a spinning machine to wind the substance into thread.
- Have students reread paragraph 4, which explains how strong threads are made.
- Show videos of a spinning top or a spinning ride to help explain how the spinning machine winds the chemicals into fibers and then winds the fibers around a spool. **EL**

4 Stop & Discuss

- Have students think about the **Stop & Discuss**, then **Turn & Talk**.
- **LISTEN FOR** Students understand that Kwolek at first wondered if her mixture was another failure.

HELP & GO: Comprehension

- Explain that scientists and engineers usually have to try different procedures many times before they make a discovery.
- Have students reread paragraph 5. **Ask**, *What questions did Kwolek ask herself? Was it just another failure? Should she throw it out? Did she think at first that the mixture was a success? No.*
- Guide students to notice that Kwolek took a big risk when she tested the mixture. **Ask**, What did the other scientist think would happen? He thought it would clog the machine.
- Have mixed language-proficiency pairs explain in their own words what Kwolek was thinking in paragraph 5. EL

5 Support Reading

- Have students read paragraphs 9–12.
- **CHECK IN** Students understand that the text skips forward in time in paragraph 10.

HELP & GO: Text Structure

- Guide students to the understanding that most of this story is about Kwolek's discovery of Kevlar, which occurred in 1965. It took another five years, until 1970, for Kevlar to be named and become widely available. Clarify for students that paragraph 2 only mentions 1955, so it requires gathering other text details such as "ten years before" to figure out that the events of paragraph 1 take place in 1965.
- Ask, What words and phrases help signal the passage of time in paragraphs 10 and 11? It took the company five more years; in 1970; Today

6 Stop & Discuss

- Have students **Turn and Talk** to complete the **Stop & Discuss**.
- **LISTEN FOR** Students understand that Kevlar is five times stronger than steel and is strong enough to bend a metal needle.

HELP & GO: Comprehension

- Expand students' knowledge about the strength of steel by explaining that many things are made of steel, like car parts, appliances, medical devices, etc. **Say**, *Imagine a fabric that is even stronger than steel*. Not just a little bit stronger, but much stronger!
- Pantomime what it might look like to try to put a needle through Kevlar, bending a finger to show how the needle bent. **EL**

Discuss the Whole Text

Revisit the Focus Question. Have students **Stand and Share** to respond to the following: *What problems do you think Kevlar solves*? Record student responses for later reference.



determination = strength to move forward with a goal even when it's difficult

Stop & Discuss

RI.4.3

6

What did Kwolek discover about the new mixture?

Reread paragraph 9 and underline what was extraordinary about the strength of this new material.

- 9 When the results came back, Kwolek was amazed. Her thread was five times stronger than steel! In fact, a sewing needle couldn't penetrate fabric woven from the thread. The needle bent instead of poking through.
- 10 It took the company five more years to figure out how to turn her super-strong invention into a fabric that could be made in large amounts. When they did, in 1970, it was named Kevlar*.
- **11** Today, Kevlar strengthens helmets, skis, skateboards, and other sports equipment. It's used in tires and in the outer shells of space rockets. Kevlar's super-strong thread is even used to create bulletproof vests for police officers and soldiers.
- Stephanie Kwolek could have thrown out the strange mixture or given up when she was told she shouldn't test it. But because of Kwolek's **determination** and her willingness to experiment, the world now has this incredible thread.

Kevlar is also used in parachutes and protective suits.



126 UNIT 2 | Technology

©Curriculum Associates, LLC Copying is not permitted.

126 UNIT 2 | Technology



RI.4.2 Determine the main idea of a text and explain how it is supported by key details...

LESSON 7

Determine Main Idea and Key Details

- Think about the important key details in each part of the text.
- Put the key details together to figure out the main idea of the whole text.

2 Reread/Think

Reread "The Strongest Thread." Write the key details from each part of the text in the chart.

Part of Text	Key Details
Paragraphs 1–3	 "Ten years before, in 1955, her company had given her a huge challenge: create the strongest fibers ever made, fibers even stronger than steel!" "Over time, Kwolek and her team had mixed batch after batch of chemicals." "To test their mixtures, the team sent them to the spinning room."
Paragraphs 4–7	 "Now she was staring at this strange new cloudy, watery batch. It wasn't like any other she had seen before."
	 "The scientist who operated the spinning machine didn't want to test Kwolek's mixture, however."
	"But Kwolek wasn't ready to give up."
Paragraphs 8 and 9	"Now the thread needed to be tested."
	"Her thread was five times stronger than steel!"
Paragraphs 10–12	 "Today, Kevlar strengthens helmets, skis, skateboards, and other sports equipment."
	 "But because of Kwolek's determination and her willingness to experiment, the world now has this incredible thread."

©Curriculum Associates, LLC Copying is not permitted.

LESSON 7 | Problem Solvers 127

Reconnect to the Text

Have students **Raise a Hand** to recall "The Strongest Thread." **Ask**, *What discovery did Kwolek make in her lab? How did she make it?*

1 Practice the Standard

Review the information at the top of the student page.

2 Reread/Think

MODEL THE STANDARD Have students reread paragraphs 1–3. Model for them how to find key details in that part of the text.

- Say, I ask myself, "What are the key details in this part of the text?" The most important detail is that Stephanie Kwolek was asked to make a strong thread out of chemicals. I will add that to the first row in the chart.
- Say, In the first line of paragraph 3, I learn that Kwolek and her team worked with many batches of chemicals. In the last line of this paragraph, I see that the team sent many batches to be tested in a spinning room. These details are important because they show that many batches were made and how they were tested. I will also add these two lines to the first row of the chart.
- Clarify the order of events by pointing out the jump in time: In paragraph 1, Kwolek's test has failed. In paragraph 2, we learn why Kwolek was doing tests in the first place.

GUIDE STANDARDS PRACTICE Guide students to complete the second row of the chart. Then have them work in pairs to complete the other rows.

 Use the following sentence frames to guide discussion: The most important thing that happens is ____. Another important detail is ____. EL

3 Talk

- Use **Give One**, **Get One** to have students share key details from their chart.
- Have partners discuss the Talk questions.
- After partners discuss the main idea, challenge them to take turns explaining it in a single sentence.
- LISTEN FOR Students identify the main idea. Use Help & Go scaffolds as needed.

HELP & GO: Standards Practice

- Provide an example of an idea that is too broad to be the main idea: Kevlar. **Ask**, *Why is the idea "Kevlar" not enough to be the main idea? It doesn't explain how Stephanie Kwolek invented it.*
- Provide an example of a main idea that is several sentences long and includes details such as the color of the mixture. Ask students to identify details that could be left out.

4 Write

- Have students work independently to complete the Write activity.
- Have students get feedback from a partner and revise as needed. **EL**
- Use Help & Go scaffolds as needed.
- **LOOK FOR** Students identify a main idea and support it with key details from the text.

HELP & GO: Standards Practice

- Ask, Who is the text mostly about? Stephanie Kwolek What words could describe her? determined, risk-taker What is the main idea that the author wants to get across about Kwolek and her invention? She did not give up and successfully created a strong material for her company.
- Have students use **Musical Shares** to share their writing with their classmates.
- Use written responses to determine whether students need additional support.



128 UNIT 2 | Technology

LESSON 7

Meet Stevie

by Corinne Purtill

SESSION

1

- 1 Phil Soriano, age 86, hosts fun sing-alongs at his retirement community. Today, Soriano wants to sing while a special guest, Stevie, leads the crowd through the song's dance moves. This dance party will be special, though. Why? Because Stevie is a robot.
- 2 While Soriano sets up the music, Niamh Donnelly, an engineer who helped create the robot, works with Stevie. "We could try to make him dance," says Donnelly. She types commands on a laptop, and the robot stretches its peg-like arms while a grin flashes on its digital face.
- Researchers are working hard to learn what staff and residents might want from a robot. In fact, there are a lot of ways Stevie can add to the retirement community.
- 4 Stevie is a social robot. It's designed to interact with people. People talk to Stevie, and the robot responds with speech and movements. For example, tell Stevie you're sick, and it frowns and says, "I'm sorry to hear that." Compliment Stevie, and its screen changes to a smile. At other times, its digital eyes blink, waiting for a command.

©Curriculum Associates, LLC Copying is not permitted

Reconnect to the Texts

Have students **Raise a Hand** to share what they learned in the first two texts and make connections between them.

Independent Reading

- Set a purpose for learning. **Say,** *Today you will read to learn about how a robot helps people. Then you'll show what you know about main idea and details.*
- Demonstrate correct pronunciation of names in this text, including Niamh (NEEV) Donnelly and Menbere (MEN-bah-ray) Gebral.
- Have students read paragraphs 1–4. If they need more support, work with them in small groups to guide reading. Use CHECK INs and Help & Go scaffolds as needed.
- **CHECK IN** Students understand *peg-like arms, grin flashes*, and *digital face* in paragraph 2.

HELP & GO: Language

- Ask students to act out Stevie dancing while stretching "its peg-like arms while a grin flashes on its digital face."
- Explain that in paragraph 2, *flashes* means Stevie displays a big, bright smile. Have students pantomime a big, bright smile. **EL**
- **CHECK IN** Students understand how a robot can be helpful to people.

HELP & GO: Comprehension

- Ask, What can Stevie do that most robots can't do? dance, smile, say kind words Why might people enjoy a social robot? It might be fun to communicate with a robot and see how it will respond.
- Reread paragraph 4. Ask, What does the author want you to know? Robots like Stevie can talk to and respond to people, including sharing different expressions.
- Ask pairs of students to make up questions Stevie can answer. Then have students role-play an interaction between a resident and Stevie. **EL**

©Curriculum Associates, LLC Copying is not permitted.

129

residents = people who live

LESSON 7 | Problem Solvers

in a certain place

interact = talk to or

communicate with

2 Independent Reading

- Have students read paragraphs 5–8 independently.
- **CHECK IN** Students understand why residents enjoyed having a social robot instead of one that could help with chores.

HELP & GO: Comprehension

- Reread paragraph 6. **Ask**, What happened when residents asked Stevie to do chores? Stevie would do them and not interact. How did the researchers figure out that the residents wanted a social robot? Residents said that they liked having a robot that could make them laugh and keep them company.
- Help students understand the joke in paragraph 5. Demonstrate by pointing to your two eyes and then your nose as you read the joke aloud. Explain that a nose isn't smelly, but it does smell things, or "smells." EL
- Explain that *keep them company* (paragraph 6) means "to remain with someone and make them feel comfortable and relaxed." **EL**

• **CHECK IN** Students understand how the sing-along mentioned in paragraph 8 connects to the rest of the text.

HELP & GO: Text Structure

- Remind students that the text started out by talking about a sing-along and a dance party with Stevie. Have them reread paragraphs 1 and 2 as a reminder.
- Ask, What does Stevie do during a sing-along? a robot version of dancing Did the residents like it? Yes.

session = meeting; gathering

SESSION

READ

130 UNIT 2 | Technology

- 5 Stevie can answer about 100 common questions, such as "How are you?" A person has to type the words for Stevie to say in other kinds of conversations. The team even had Stevie tell a joke: "What did the left eye say to the right?" Answer: "Between you and me, something smells!"
- 6 Researchers thought people would want Stevie to do chores. But surprisingly, residents didn't want to give Stevie an order and have the robot roll away. They wanted Stevie to stay and keep them company. When the team asked residents what they liked most about the robot, they said, "It made me laugh."
- 7 When Stevie showed up at a recent bingo session, staff member Menbere Gebral wasn't sure what to expect. But then Stevie began to call out the numbers, and it all made sense. This meant Gebral could keep doing the part of her job that she likes best—interacting with and helping residents.
- 8 What about the sing-along? It was a success! Phil led the singing while Stevie's arms circled around, doing its best to copy the dance moves. Stevie's dancing wasn't perfect, but it didn't matter. The audience was happy. Stevie was a fun, helpful addition to the community.

RI.4.2 Determine the main idea of a text and explain how it is supported by key details...

LESSON 7

Respond to Text

3 Reread/Think

Reread "Meet Stevie." Then choose the best response to each question.

1. PART A

What is the main idea of the text?

- **A.** Stevie is one of the only robots that has the same feelings that humans have.
- **B.** Researchers built Stevie so it could teach people how to dance at sing-alongs.
- C. Stevie is helping researchers understand how robots can be useful for retirement communities.
- **D.** Researchers created Stevie to answer questions from people who live in retirement communities.

PART B

Which key detail from the text **best** supports the answer to Part A?

- (A.) "Researchers are working hard to learn what staff and residents might want from a robot." (paragraph 3)
- **B.** "For example, tell Stevie you're sick, and it frowns and says, 'I'm sorry to hear that." (paragraph 4)
- **C.** "Stevie can answer about 100 common questions, such as 'How are you?'" (paragraph 5)
- **D.** "Phil led the singing while Stevie's arms circled around, doing its best to copy the dance moves." (paragraph 8)
- 2. Read this sentence from paragraph 1.

Phil Soriano, age 86, **hosts** fun sing-alongs at his retirement community.

What is the meaning of the word hosts?

- A. plays with
- **B.** entertains guests
- C. listens to musicians
- **D.** watches closely

©Curriculum Associates, LLC Copying is not permitted.

LESSON 7 | Problem Solvers 131

3 Reread/Think

- Have students complete the Reread/Think items independently.
- Consider reading aloud questions and answer choices as needed. **EL**
- Point out that item 1 has two parts. Students should answer Part A first. Then they should answer Part B.

Answer Analysis

Use the answer analysis below to review the practice items with students. Have students **Stand and Share** the answer to each question. Then review the correct answers with students.

 PART A The correct choice is C. Stevie is a guest at the retirement community because researchers want to know how robots can be useful there. Choices A and D represent misconceptions: The text does not say that Stevie has feelings, and it's only able to answer 100 questions, not any question. Choice B is incorrect because Stevie was not designed to teach people how to dance.

PART B The correct choice is **A**. This is the best choice because it supports the main idea that researchers want to know how robots can help retirement communities. Choice **B** incorrectly supports the idea that Stevie has feelings. Choice **C** incorrectly supports the idea that Stevie's main purpose is to answer questions. Choice **D** incorrectly supports the idea that Stevie can teach people to dance. **DOK 2 | RI.4.2**

 The correct choice is B. Hosting the sing-along means entertaining guests at that event. Choice A incorrectly identifies *fun* with *plays with*. Choice C incorrectly identifies *listens to musicians* with *sing-alongs*. Choice D incorrectly identifies what Phil Soriano may be doing at the singalong. DOK 2 | RI.4.4

Answer Analysis

- The correct choice is D. Researchers learned that residents enjoyed Stevie's company and wanted to spend time with it. The other choices are incorrect because the residents did not want Stevie to roll away, take orders, or do chores. DOK 2 | RI.4.2
- The correct choice is C. Paragraph 7 states that Stevie calling out numbers let the staff interact with residents. The other choices misinterpret Stevie's actions at the bingo game. DOK 2 | RI.4.1

5 Write

- Have students respond independently to the Write prompt. DOK 3 | RI.4.2
- If students need more support, work with them in small groups to guide them through writing. Use **Help & Go** scaffolds as needed.
- Before writing, have students underline evidence in the text that supports the idea that the residents appreciate Stevie. **EL**
- **LOOK FOR** Students identify ways that Stevie is a helpful and unique robot.

HELP & GO: Writing

- Have students reread paragraph 4. **Ask**, What makes Stevie special in this paragraph? It can respond using speech, movement, and expressions.
- Say, A robot that behaves like a human is interesting. How does Stevie behave like a human?
- Have students work in small groups to discuss what makes Stevie special.

Lesson Wrap-Up

Have students revisit the Focus Question using examples from the text. **Ask**, *What problem did Stevie solve in the retirement community?* Use **Raise a Hand** to answer the question, and record students' responses. Invite students to make connections between the three texts they have read.

5 PRACTICE

Reread/Think

- What did researchers discover residents wanted Stevie to do?
 - **A.** to roll away from them
 - **B.** to take orders from them
 - **C.** to help them with chores
 - **D**, to keep them company
- 4. What did Stevie do at the bingo game?
 - A. Stevie helped the residents.
 - **B.** Stevie answered questions.
 - **C.** Stevie called out numbers.
 - D. Stevie danced and sang.

5 Write

Describe what makes Stevie a special robot. Explain how Stevie affects the people around it. Use at least three supporting details from the text.

Sample response: Stevie is a special kind of robot that

works in a retirement community. It can answer questions

and talk to people. It can smile or frown to show feelings.

It can even sing and dance. The residents like having

Stevie around because it makes them laugh. The workers

like having Stevie around because it can do tasks while

they help residents.

132 UNIT 2 | Technology

©Curriculum Associates, LLC Copying is not permitted.

5555

WRITING CHECKLIST

I explained what

makes Stevie a

I used at least three supporting details

special robot.

from the text.

I used complete

sentences.

☐ I used correct

spelling, punctuation,

and capitalization.

132 UNIT 2 | Technology



LESSON 7

Respond to the Focus Question

How can people use technology to solve problems?

1 Reread/Think

Sample responses provided.

Choose one text from this lesson to reread.

TEXT: "The Strongest Thread"

What interesting thing did you learn about how or why the technology was created?

I learned that Kwolek's company wanted her to create a very strong thread.

She experimented and tested mixtures until she achieved this goal.

2 Talk

SESSIO

Share with your group how the technology you read about is useful to others.

The ____ is useful to others because it ___

As a group, discuss these questions. Take notes in the chart.

How do people use technology to solve problems? List some examples of technologies that you use in your own life and explain how they help solve problems.

What is the technology?	How is this technology helpful?
Copy Machines	Instead of buying books, you can make copies of the pages you need, and this helps you avoid carrying heavy books and saves money.
Video Calling	When family or friends are far away, you can see them on a camera immediately, and this makes for an easy way to communicate when you can't visit them in person.

3 Write

Tell about an example of technology that has improved your life. How has it helped you? How does it work?

©Curriculum Associates, LLC Copying is not permitted.

LESSON 7 | Problem Solvers 133

Respond to the Focus Question

Read the Focus Question. Tell students that today they will answer the question using information from all three texts.

1 Reread/Think

Divide students into groups of three. Explain that each student in a group will reread one text and complete the Reread/Think section.

2 Talk

- Have students use **Merry-Go-Round Share** to complete the Talk activity.
- **LISTEN FOR** Students articulate how or why the technology in their text was created, including challenges faced by the inventor. As students work, use **Help & Go** scaffolds as needed.

HELP & GO: Comprehension

- Guide students to the appropriate parts of each text ("Googly-Eyed and Gobbling Garbage," paragraphs 4, 5, 7, and 8; "The Strongest Thread," paragraphs 9–12; "Meet Stevie," paragraphs 6–8).
- Give a few examples of everyday problems: access for people with disabilities, pollution, too much noise, space to study, and so on.

3 Write

- Have students respond to the prompt.
- **LOOK FOR** Students describe technology that has helped them solve a problem.

HELP & GO: Writing

- Provide sentence frames: One thing that makes my life better is . It helps me . It works by . EL
- Help students create a checklist for content (introduction, details, conclusion) and conventions (spelling, punctuation, capitalization).