

# 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.

### 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



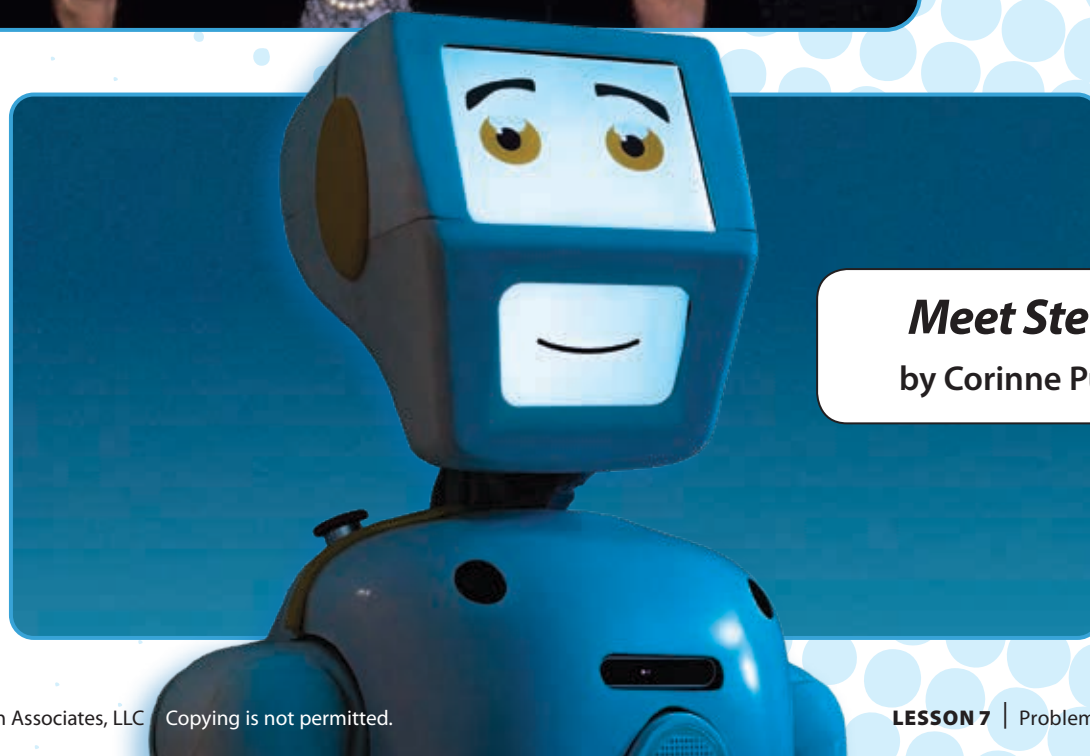
## ***Googly-Eyed and Gobbling Garbage***

by Helen Walz



## ***The Strongest Thread***

by Tracy Vonder Brink



## ***Meet Stevie***


by Corinne Purtill





# Googly-Eyed and Gobbling Garbage

by Helen Walz

- 1 A floating monster guards Baltimore's Inner Harbor. Bigger than a school bus, the monster has a snail-like shell and huge googly eyes. The flowing water powers the monster's yawning mouth so it can eat. *Chomp*. It munches a soda can. *Slurp*. It snacks on some plastic bags. *Gulp*. It swallows a tire.
- 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.
- 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." 

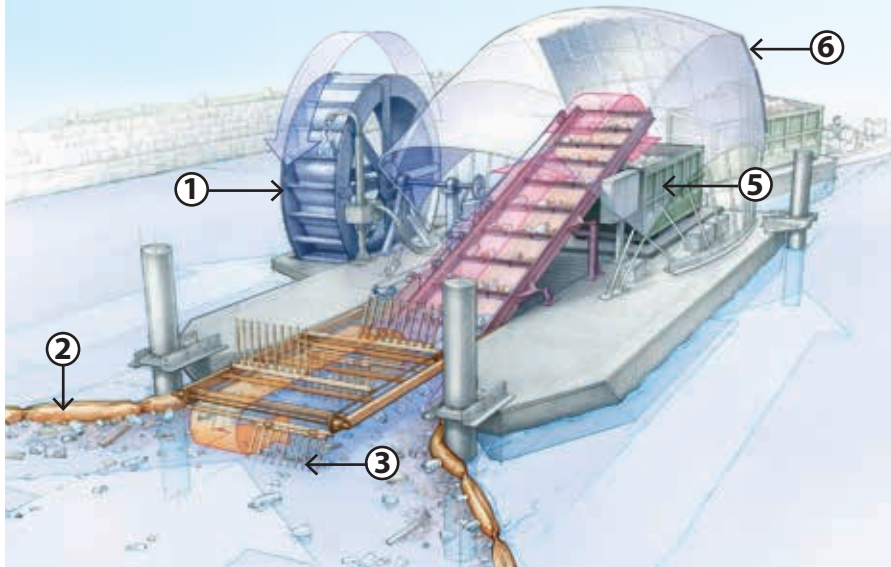
**disgusted** = upset, angered

## Stop & Discuss


**What problem did Kellett think about every day?**

Talk with a partner about details in paragraph 4 that tell about what he observed.

## HOW MR. TRASH WHEEL WORKS



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.

- 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." 

**guzzled** = eaten in a messy, hurried way

**inspiration** = something that excites and brings change

### Stop & Discuss

**What problems did the prototype have? How did Kellett improve his invention?**

Reread paragraph 6 and discuss it with a partner.



# 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.

## 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	
Paragraphs 5 and 6	
Paragraphs 7 and 8	








# THE STRONGEST THREAD

by Tracy  
Vonder Brink

- 1 Stephanie Kwolek peered at the chemical mixture on the table. All her other test batches had been thick and clear, but this one was thin and cloudy. She frowned. Had something gone wrong with the experiment?
- 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!
- 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. 

**fibers** = thin threads


## Stop & Discuss

**Why was Kwolek doing experiments?**

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



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. 

**operated** = managed, controlled

**clog** = block up

### Stop & Discuss

Why did Kwolek think of throwing out her new batch?

Talk with a partner about the details in paragraph 5.

She thought it was \_\_\_\_.



**penetrate** = make a hole in

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

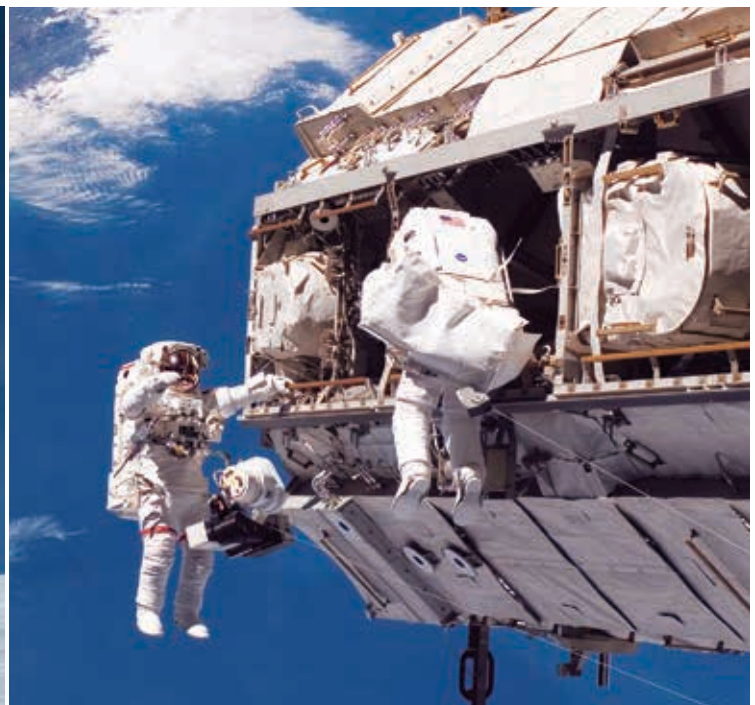
### Stop & Discuss

**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.
- 12 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.**





# 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.

## 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	<ul style="list-style-type: none"> <li>• "Ten years before, in 1955, her company had given her a huge challenge: create the strongest fibers ever made, fibers even stronger than steel!"</li> <li>• "Over time, Kwolek and her team had mixed batch after batch of chemicals."</li> <li>• "To test their mixtures, the team sent them to the spinning room."</li> </ul>
Paragraphs 4–7	
Paragraphs 8 and 9	
Paragraphs 10–12	



## Talk

Discuss the key details in the chart.

- Who is the article about? What was she trying to do?
- What do most sections of the text explain about her?
- What is the main idea that the author wants you to know about her?

Most sections of the text explain \_\_\_\_.

I think the main idea of the whole text is \_\_\_\_.

## Write

What is the main idea of “The Strongest Thread”? Use key details to explain your thinking.

[illegible]

## WRITING CHECKLIST

- ☐ I explained the main idea of the text.
- ☐ I included details that support the main idea.
- ☐ I used correct spelling, punctuation, and capitalization.

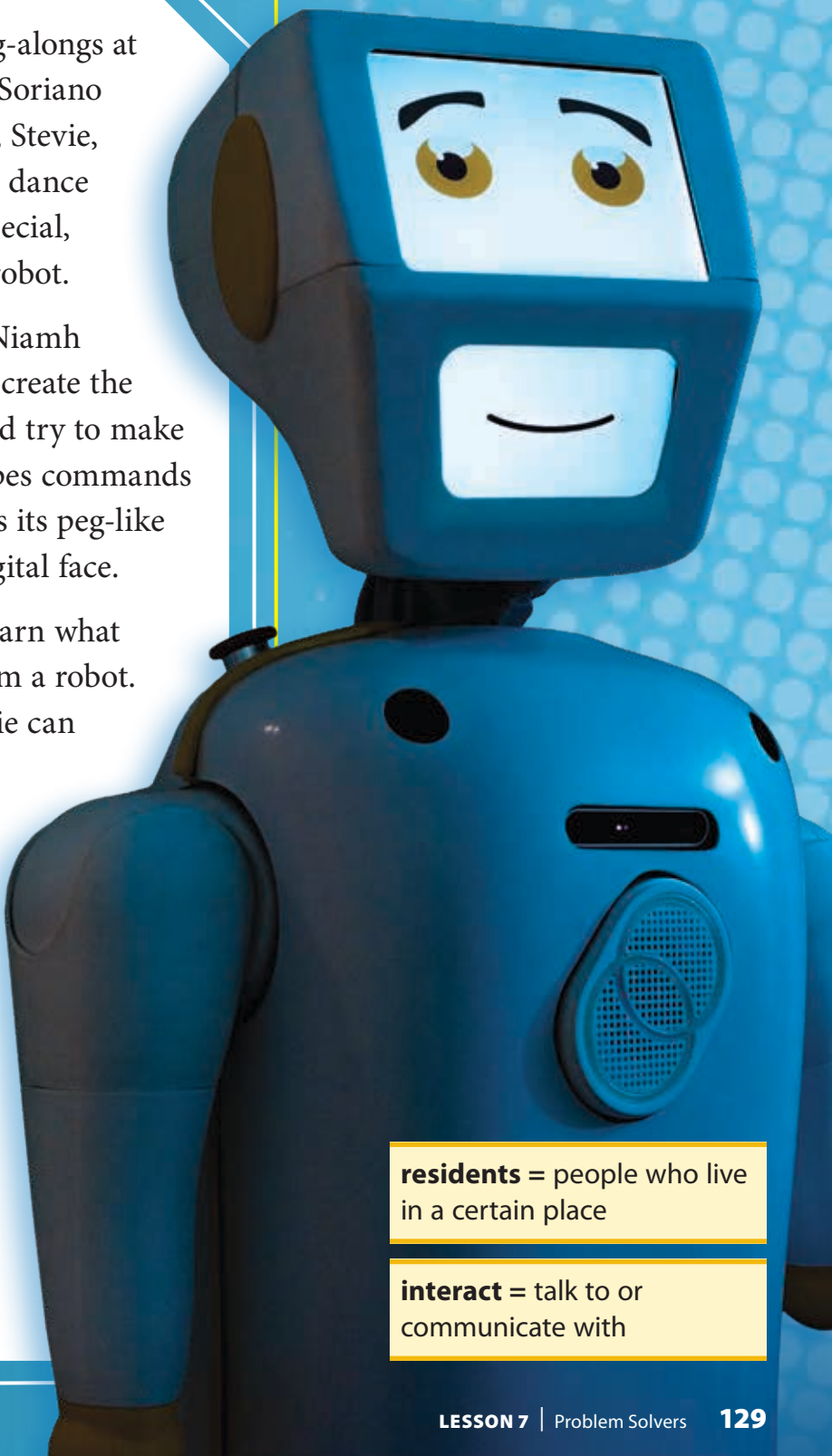




# Meet Stevie

by Corinne Purtill

- 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.
- 3 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.



**residents** = people who live in a certain place

**interact** = talk to or communicate with



**session** = meeting;  
gathering



- 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.



# Respond to Text

## 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





## Reread/Think

- 3.** 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.

## 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.

[illegible]

## WRITING CHECKLIST

- ☐ I explained what makes Stevie a special robot.
- ☐ I used at least three supporting details from the text.
- ☐ I used complete sentences.
- ☐ I used correct spelling, punctuation, and capitalization.



# Respond to the Focus Question

How can people use technology to solve problems?

## Reread/Think

Choose one text from this lesson to reread.

**TEXT:** \_\_\_\_\_

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

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## Talk

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?

## Write

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