Click® Teacher Guide: February 201

PLUS+ GUIDE TO THE INVENTION CHALLENGE

I Can Invent!

click®

LET'S INVENT

Children will be delighted to learn how some of the world's most wonderful inventions were created by children, natural events, and even animals. This issue of CLICK will inspire readers young and old to consider how simple materials and creative thinking can produce astounding results.

CONVERSATION QUESTION

How do inventors make use of the world around them?

TEACHING OBJECTIVES

- **Students will learn how the Popsicle was invented.**
- **Students will learn how animals are nature's best inventors.**
- **Students will learn that the invention process can include using old things to make new things.**
- **Students will explore the cause-and-effect relationships presented in the article.**
- **Students will collect evidence from a science-based text.**
- **Students will construct explanations related to the inventions in the text.**
- **Students will create a comic strip that tells the story of young Frank Epperson's invention.**
- **Students will create a mini-report explaining and illustrating other inventions in the animal kingdom.**
- **Students will study linear and elapsed time, and create a basic timeline.**

In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

SELECTIONS

- **A Yummy Invention**
  Narrative Nonfiction, ~550L
- **Animal Inventors**
  Expository Nonfiction, ~750L
- **Ada's Amazing Ideas**
  Narrative Nonfiction, ~550L

Special Feature Discussion Guide

I CAN INVENT

What are inventions and how can kids invent things that matter?

Inventions are all around us. They solve problems and make our lives easier. **Use this month's magazine to help students learn about the invention process and meet some young inventors through reading about them and their work.** Then, they can try inventing on their own and/or in groups, at school or at home.

Dear Educator,

Your students are invited to use this month's magazine to spark discussion about invention and then share their own invention ideas in the Dr. InBae Yoon Spark!Lab Invention Challenge, an international contest for young inventors sponsored by the Smithsonian and Cricket Media. Students can enter as individuals or teams by submitting a PowerPoint presentation or video outlining their idea. (Your whole class can even participate as a single team!)

For 2019, the Challenge is asking students to create entries that enhance the lives of older adults, and we are accepting entries from January 17, 2019–April 5, 2019. Winners can receive prizes, a trip to Washington, DC, to meet other inventors, and an educational session on how to patent their invention!

Learn all about this year's challenge on the website, and use this special edition teacher guide to discover how to integrate the magazine into your classroom discussions with Challenge participation!

Happy Inventing!

The Cricket Media Education Team

UNIT OVERVIEW

Essential Question:

What are inventions and how can kids invent things that matter?

Supporting Questions:

- How do inventors get their ideas?
- What are some common inventions and what problems do they solve?
- How do inventors impact our everyday lives and make our world a better place?
- What makes an invention successful?
- What special needs might older people have?
- How might I come up with an invention that helps older people stay independent and be mentally, socially and physically active?

Objectives:

Students will know and be able to:

- describe the steps in the invention process
- engage in the invention process
- participate in a global invention challenge
- explain how inventors use the invention process
- explain the impact of inventions on human society over time
- explore the invention process through articles and by designing and/or inventing an invention
- communicate design ideas using words, drawings and/or models

Resources:

- February 2019 Invention edition of magazine
- Teacher Resources for leading students in Spark!Lab Invent It Challenge submission: https://inventitchallenge2019.epals.com/educator-resources/
- Student Resources for Spark!Lab Invent It Challenge participation: https://inventitchallenge2019.epals.com/student-resources/

Next Generation Science Standards:

- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria).

- Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

See additional standards at the end of the discussion guide.

Vocabulary

- **invent:** the process of coming up with new ideas or designs to solve problems
- **invention:** a new device or process that's designed to solve a problem
- **inventor:** a person who dreams up, designs, and builds new things that make our lives better
- **invention process:** a series of steps that inventors might follow to come up with a solution to a problem
- **patent:** a legal right given to an inventor by the government that allows the inventor to prevent others from making, selling, or using their invention for a period of time
- **prototype:** a model or practice version of a design that can be tested and checked before an actual version is created
- **senior:** an elderly or aging person, usually retired (also called "senior citizen")
- **sketch:** a drawing (Inventors use sketches to show and explain their ideas and inventions. Sketches are needed to apply for a patent.)
- **user:** a person who will use an invention

Use the following activities to gives students opportunities to explore ideas about the topic by participating in both small and large group peer discussions, using the articles they have read and their discussions to support their statements and opinions.

SPARKING COMPREHENSION AND CONVERSATION

Introduce the Magazine and the Invent It Challenge

1. **Engage: Introduce Inventors.** Start by sharing pictures of the inventors in the articles. What do these kids and adults have in common? They have invented things that make life better.

   In this magazine, we're going to learn about inventors and their inventions. And, if the class is interested, we can try inventing ourselves and participate in the Spark!Lab Invent It Challenge. Winners can receive prizes, a trip to Washington, DC, to meet other inventors, and learn how to patent and sell their inventions!

2. **Present the Essential Question: *What are inventions and how can kids invent things that matter?*** Ask students to list inventions they have seen or heard about. Who came up with each invention? How did the person or team come up with the idea? What might have been the process? Post the Essential Question and read it aloud, connecting it to the inventions students mentioned. Remind students that this question does not have one right answer and that they should revisit it with each selection they read.

3. **Activate Prior Knowledge.** As a class, start a 3-column *What, How, Why* Chart. Make the chart on paper or a place on a board where you can keep it throughout the discussion. Ask students to fill in an invention they already know about. Have students continue to complete the class chart as they read selections from the magazine, listing inventions they learn about, who came up with them and how they did it, and finally why the invention is important.

What? What is the invention?	**How?** Who came up with the invention? How did they come up with it?	**Why?** Why is the invention important?

4. **Build Background:** Teach the Invention Process. Tell students that there are key steps that inventors often use. Read each step aloud as you write it on the board and share with them the step-by-step videos found here, which contains an explanation of each step.

   Invention is a process, from creative ideas all the way to successful marketing. Inventors will usually pass through each of the following steps (though not always in the same order!):

   Think It - Identify a problem or need

   Explore It - Conduct Research

   Sketch It - Make sketches

   Create It - Build prototypes

   Try It - Test the invention

   Tweak It - Refine the invention

   Sell It - Market the invention Ask students to think about why each step is important. Tell them to think about these steps as they read and discuss the articles. How is the invention process used by inventors in the articles?

5. **Get Students Thinking About The Challenge.** This year's challenge is about helping older people. Sometimes as we get older, it's harder to do things, such as get up out of a chair, fasten a seat belt, or open a jar. Show the Learn About the Challenge Video. Ask students if they have a grandparent or older person in their lives. Can they think of inventions that make these older people's lives easier?

Use a Read-Aloud to Spark More Discussion


Helping Seniors Communicate

Matias Osuna, 17, knows that talking is an important part of our lives. "Our personality is what we say and how we say it," he says. "Communication is what makes us 'us.'"

He thought about communication when his school's FIRST Lego League team was entering an inventing contest. The challenge was to solve a problem seniors face as they age, or get older. Seniors is the term for people age 60 and up.

That was 2012. Matias was 11 and new to the team. He was eager to learn from the other students. And he was excited to invent something helpful!

Think It = FIND A PROBLEM

Matias's team of 7 kids set out to learn about aging. They visited a senior care home near their school. They learned that a common problem is "dementia." People with dementia can have trouble remembering things. They can forget how to do simple tasks. They might even have trouble putting words together in a sentence. That makes it hard for them to say what they need. And it makes it hard for caregivers to help them.

In Colombia, where Matias lives, and around the world, dementia is a serious problem that affects a lot of people. Matias' team wanted to invent something to help people with dementia and their caregivers.

Explore It = STUDY THE OPTIONS

Matias and his team knew some computer programming. They wondered if they could make a communication app. They learned about an emergency communication system that asks people questions. In that app, the people select an answer from a set of options. The team liked this model. The team also learned that many people in Colombia have tablets. Tablets are easy for seniors to hold and tap. An app for a tablet could be a good solution!

Sketch It = DRAW A PICTURE

The team imagined an app with simple icons. The icons would stand for basic needs. They sketched the icons and the screens the seniors would see. They drew icons for food, bathroom, dressing, and health needs. There was also an emergency "panic button" and an icon for basic words, such as "Hello" and "Goodbye."

Sketching plans for the icons

1. **Preview the Read-Aloud.** Introduce and project the Read-Aloud article, "Helping Seniors Communicate." Tell students this invention was created for the Spark!Lab Invention Challenge.
   - Remind students that they will be discussing this and other articles with each other. Encourage students to jot down details or questions to share with each other.
   - Encourage students to listen for details that build understanding around the Essential Question, as well as the invention process, and any information they might add to the class *What, How, Why* Chart.

2. **Introduce the Reading Skill: Prereading.** Before you begin reading, tell students that this article contains headings, pictures, and captions that give clues about the text. Invite students to skim the headings and look at the pictures. Invite students to skim the headings and look at the pictures. Then, ask the following questions:
   - What do you think this article is about?
   - What does it mean to invent?
   - What problem does Matías want to solve?

3. **Introduce Vocabulary.** Introduce two topic-specific words that students will encounter in this article:
   - prototype: a working model
   - patent: a legal right given to an inventor by the government that allows the inventor to prevent others from making, selling, or using their invention for a period of time

   Before providing each definition, have students look for these words in the article itself. Ask students to infer the meanings based on the context. Help students look for context clues in the text and refine their definitions.

4. **Read and Model.** Complete the following activities as you read the selection. Using Headings, use "Think-Alouds" to model how the headings help you navigate the text. For example, after the introductory paragraph, point out the first heading and link it to the first step in the diagram of the Invention Process. Then present this Think- Aloud:

   The heading of this next section is Think It: Describing the Problem. This is the first step in the Invention Process. This helps me know as a reader where I am in the invention process and what happens during the first step. After I read this section, I'll see if I can describe the first step in the invention process.

5. **Discuss.** After you read, show students a list of the key steps in the Invention Process. Then discuss each step in the context of Matías' process.
   a. Think It: What problem was Matías and his team trying to solve? (They wanted to find a way to help older people communicate with their caregivers.)
   b. Create It: How did Matías' team create his invention? (They used a computer program called Flash to create the application.)
   c. Try It: What did Matías' team learn from the first round of tests? (The buttons were too small and not all needs could be communicated.)
   d. Tweak It: How did Matías improve the invention? How could you improve on it? (He made the icons bigger, added more options, and changed the basic words to basic questions.)

Explore and Discuss the Articles

1. **Preview the Selections.** Tell students it's now time to read about the process of invention on their own! Direct them to flip through the magazine and preview the articles in this unit. Encourage them to skim each article as they think about which one interests them the most. Explain that while they are encouraged to read all the articles in this magazine, they will be choosing one "focus article" to read closely and discuss with their peers.

2. **Select a Focus Article.** After students have had time to preview the articles, tell them to pick one that they'd like to spend more time on and discuss with their classmates. Have them read a few paragraphs to see if they have any trouble reading it but encourage them to "stretch" their reading skills a little if they like the story.

3. **Read and Take Notes.** Suggest that students track the invention process steps used by the inventor(s) in their focus article. Also remind them to jot down questions they'd like to share with their classmates. When they are finished, encourage students to think about an invention they would like to work on. If they aren't sure, encourage them to read additional articles in the magazine to continue to build their knowledge about inventions and the invention process.

4. **Discuss the Articles.** Have students form small groups based on the article they read. Provide them with the following questions to use as discussion prompts. Tell them that they will be sharing what they learned with the rest of the class, and suggest that one or more students record the answers they come up with. Also, encourage them to add the invention they read about to the class *What, How, Why* Chart.

   Discussion Prompts
   - What problem does each inventor try to solve?
   - What solutions does the inventor consider or try?
   - How well did the first design or prototype work?
   - How did the inventor improve the invention over time?
   - Which steps in the invention process did the inventor follow?
   - Who is likely to use the invention and how might it help them?

Reflect and Discuss

1. **Share Ideas.** Bring the small groups together for a whole-class discussion. Ask students to share what they learned from their individual articles with the rest of the class. Move from group to group, asking volunteers to share the summary of the article, and then important ideas from their discussion.

2. **Synthesize.** After small groups have shared their ideas, discuss the following questions as a class. Encourage students to support their answers with details and evidence from the focus article they read.
   - How do inventions help us in our daily lives?
   - What role might invention play in the future?
   - What would life be like without inventions?

3. **Revisit the Essential Question.** Bring the class together to allow students to share what they've learned. Then, return the conversation to the Essential Question: What are inventions and how can kids invent things that matter?

Allow students to share how their understanding around this question has grown based on their reading and discussions.

Participate in The Spark!Lab Invention Challenge!

Now that students have built their background knowledge about inventors and the invention process, lead your students in engaging in the invention process, using the theme of the Challenge (helping aging people) and help them submit their ideas online to the international competition.

See the Spark!Lab invention website for additional details and resources to support students in creating and submitting their invention ideas.

STANDARDS ALIGNMENT

National Council of Social Studies Standards

- Theme 2: Time, Continuity and Change
- Theme 8: Science, Technology and Society

CCSS Anchor Standards for Reading

Key Ideas and Details

- Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence … to support conclusions drawn from the text.
- Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
- Interpret words and phrases as they are used in a text. Integration of Knowledge and Ideas
- Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.
- Range of Reading and Level of Text Complexity
- Read and comprehend complex literary and informational texts independently and proficiently.

Anchor Standards for Writing

Text Types and Purposes

- Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately.
- Write narratives to develop real or imagined experiences or events. Production and Distribution of Writing
- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
- Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to Build and Present Knowledge

- Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
- Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing - Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiences.

Anchor Standards for Speaking and Listening

- **Comprehension and Collaboration** - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners
- **Presentation of Knowledge and Ideas** - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

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A Yummy Invention

pp. 22–25, Narrative Nonfiction

Sweet and fruity, the invention of the Popsicle began on the porch of young boy and is now enjoyed around the world. This article demonstrates how the simplest invention can be the yummiest!

Lexile Score: ~550

RESOURCES

- The Accidental Invention

OBJECTIVES

- Students will learn how the Popsicle was invented.
- Students will explore the cause-and-effect relationship presented in the article.
- Students will create a comic strip that tells the story of young Frank Epperson's invention.

KEY VOCABULARY

- ***icicle* (p. 23)** a hanging piece of ice formed by the freezing of dripping water
- ***porch* (p. 22)** a covered shelter in front of the entrance of a building or a house
- ***recipe* (p. 24)** a set of instructions and list of ingredients needed to make a particular dish of food

ENGAGE

Conversation Question: How do inventors make use of the world around them?

Display the title, "A Yummy Invention," and ask students to predict what the subject of the article will be. Encourage full class participation and list responses on the board. Revisit the prediction list after completing the vocabulary activity.

INTRODUCE VOCABULARY

Post and discuss the vocabulary terms with the class. Guide them to notice that all of the words are nouns and can be used as clues to more specifically predict the article's content. Amend the list from the previous activity and then distribute "A Yummy Invention." Ask for volunteers to read aloud.

READ & DISCUSS

Reinforce comprehension of the concepts in this article by utilizing the following prompts to direct discussion.

- How did Frank Epperson invent the Popsicle?
- Why did Frank take his ice pops to an amusement park?
- What name did Frank originally give his ice pops? Why did he rename them Popsicles?

CONCEPT/SKILL FOCUS: Cause and Effect

INSTRUCT: Elicit from the class that the main idea of this article is to teach readers how the Popsicle was invented. Discuss how one event (leaving a juice cup with stirring stick on the porch in freezing temperatures) was the catalyst for the invention of this sweet treat. Introduce the graphic organizer, *The Accidental Invention,* and tell students that they will be recording the cause-and-effect relationship that is detailed in the text.

ASSESS: Circulate as the children are working and provide clarification if necessary. Evaluate the students' work on the organizer and review the answer to the final question.

EXTEND

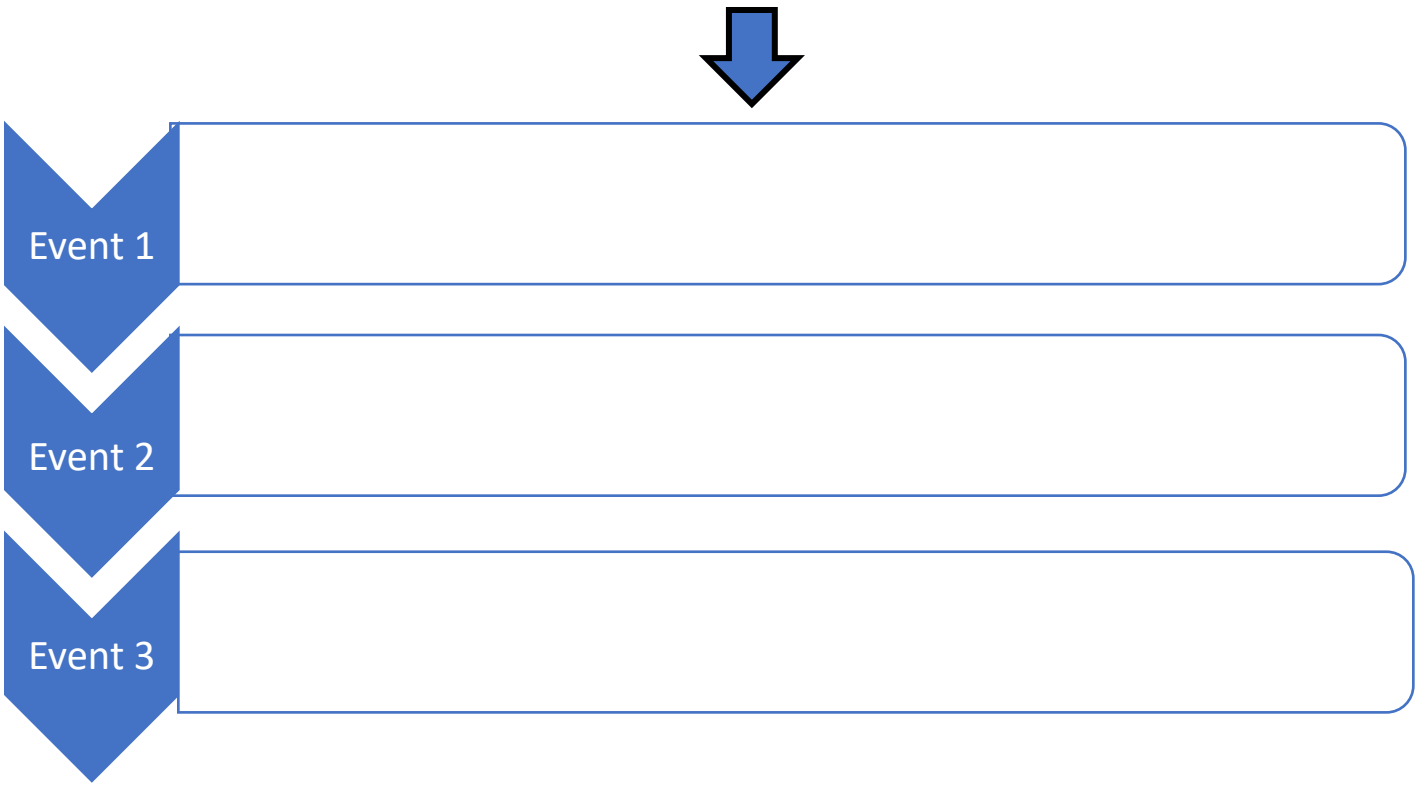
Language Arts Have students retell the story of Frank Epperson's invention in a graphic format. Provide students with a 3" × 5" paneled template to create a comic strip utilizing the main idea from the article and various details. It can be both humorous and informative, but must include drawings and captions. Further challenge students to use some/all of the vocabulary words in their comic strips.

Cause and Effect

The Accidental Invention

Use information from the article, "A Yummy Invention," to record how one event caused other events.

Young Frank Epperson leaves his juice cup on the porch in freezing temperatures.



People all over the world enjoy Popsicles!

Why is Frank Epperson's Popsicle an example of an "accidental invention"?

_____

_____

_____

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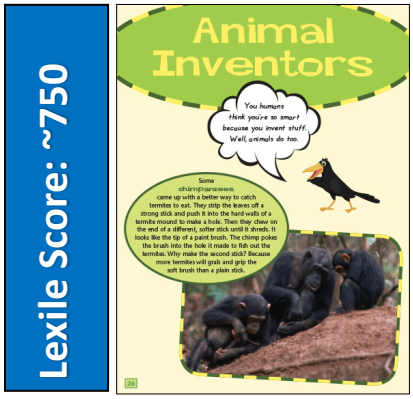
Animal Inventors

pp. 26–27, Expository Nonfiction

Are you smarter than a . . . chimpanzee? This article about animal inventors shares information with young readers through beautiful photographs and simple text.



RESOURCES

- Wonders of the Wild

OBJECTIVES

- Students will learn how animals are nature's best inventors.
- Students will collect evidence from a science-based text.
- Students will create a mini-report explaining and illustrating other inventions in the animal kingdom.

KEY VOCABULARY

- ***crafty* (p. 27)** tricky, clever
- ***mound* (p. 26)** a raised, rounded mass of compacted material (usually of earth or stone)
- ***snout* (p. 27)** the projecting nose and mouth of an animal

ENGAGE

Conversation Question: How do inventors make use of the world around them?

Activate prior knowledge by displaying the title, "Animal Inventors." Guide a discussion that focuses on familiar animal inventions such as a spider spinning a web to catch prey or a bird building a nest to lay eggs. Encourage students to share their ideas and record them on the board. Add new animal inventions to the list after reading the article.

INTRODUCE VOCABULARY

Post the vocabulary words where they are visible to the class. Instruct students to do a word hunt through the article to locate these words. Have them underline the sentences in which they appear. Challenge students to use context clues to determine meanings. Discuss actual meanings and add definitions to the terms posted on the board.

READ & DISCUSS

Lead a class discussion based on the following prompts.

- How do chimpanzees catch termites?
- Why do New Caledonian crows trim and twist sticks?
- What method do dolphins use to protect their snouts from rough seafloors?

CONCEPT/SKILL FOCUS: Collecting Evidence

INSTRUCT: This article presents the reader with detailed information regarding animal inventions in nature. Tell students that they are going to more closely examine these *Wonders of the Wild* and collect evidence that will help them determine which animal a particular fact is referring to. They will need to consult the article to gather accurate information. Allow students to work with a partner if assistance is needed rereading the text. (You can do this activity orally for very young students.)

ASSESS: The objective of this lesson is to help students practice the skill of collecting evidence from a science-based text. Create dialogue as the students are working on their charts, and then collect organizers to evaluate individual understanding.

EXTEND

Science Continue to explore the topic of animal inventors by providing students with the resources to learn more about this subject. Assign students the task of creating a mini-report (one page) that will teach their classmates about other animal inventors. Have them choose one animal, write about their natural creation, and select graphics (or make drawings) that illustrate this phenomenon. Bind all completed reports into a class book to be kept in your science center.

Wonders of the Wild

Collect evidence from the article, "Animal Inventors," to decide which animal the sentence is describing. Choose an animal from the boxes below and match it with the sentences. Write the correct animal name (or letter) on the line. Answers will be used more than once.

chimpanzees (C)	New Caledonian crows (N)	Dolphins (D)

_____ 1. These animals make a pad from a sea sponge to protect their snout.

_____ 2. These animals make a "paintbrush" to gather termites.

_____ 3. These animals have invented a way to move things that are too big for them to hold.

_____ 4. These animals create hooks to reach tasty bugs by twisting twigs.

_____ 5. These animals invented a way to stir up yummy fish that hide among the sand and rocks.

_____ 6. These animals strip the leaves off of a strong stick and poke it into the hard walls of a termite mound.

***On the back of this paper, draw one of the animals studied above (chimpanzee, crow, dolphin) using their natural invention. Details from the article can help with your illustration.**

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Ada's Amazing Ideas

pp. 28–33, Narrative Nonfiction

Go on an adventure with amazing Ada as she creates simple inventions throughout her day. The reader will gain a broader understanding of the term "inventor," and learn how basic problems can be solved with creative ideas and unsophisticated materials.

Lexile Score: ~550


Ada's Amazing Ideas

by Liz Huyck art by Jeff Harter

Someday I'm going to win prizes for my inventions. But now I'm too busy to invent. Take today . . .

8:00 AM I have a great idea for a remote-control robot that picks up toys and puts them away. But Dad says Charlie and I need to clean up our blocks—now.

I look for the block box. Then I remember I flattened it to use as a sled after yesterday's snow. Oops!

I open the closet door to look for another box. That makes the empty shoe holder swing back and forth. The shoes are, um, being used for another project. But I get an idea. We can sort the blocks into the shoe holder. There's a pocket for every size.

RESOURCES

- Simple Solutions

OBJECTIVES

- Students will learn that the invention process can include using old things in new ways.
- Students will construct explanations related to the inventions in the text.
- Students will study linear and elapsed time, and create a basic timeline.

KEY VOCABULARY

- ***funnel* (p. 33)** a hollow tube that is wide at the top and narrow at the bottom, used for guiding liquid or powder into a small opening
- ***jam roll* (p. 31)** a type of sponge cake filled with jam and rolled into a log
- ***pocket* (p. 28)** a flexible compartment providing a separate storage space
- ***wood stove* (p. 32)** a heater or stove that is fueled by wood

ENGAGE

Conversation Question: How do inventors make use of the world around them?

Display the title, "Ada's Amazing Ideas." Motivate students to read by encouraging them to share a time that they have had "an amazing idea." Was their idea helpful or useful? Did it solve a particular problem? Were they able to transform their idea into an action or a device?

INTRODUCE VOCABULARY

Discuss the key vocabulary words and definitions with your students. Provide them with paper and instruct them to fold it into quarters. Have them make a visual representation (picture dictionary) of each key term. Draw attention to these words as you read.

READ & DISCUSS

Read aloud the following questions prior to reading the text. Advise the students to note where in the article these answers are found. Discuss responses to the questions as a post-reading activity.

- Why is it funny that Ada says she is too busy to invent?
- What problem was Ada trying to solve when she put Dad's socks over her shoes?
- How does Ada cut the jam roll without using a knife?
- Why does Ada invent a cat-proof yarn holder?

CONCEPT/SKILL FOCUS: Constructing Explanations

INSTRUCT: Review the information presented in the article. Distribute the graphic organizer, *Simple Solutions*, and instruct students to reexamine the text to further understand how Ada turned simple ideas into useful inventions. Allow students to work with a partner to record information on their charts. They may write and/or draw their responses depending on ability.

ASSESS: Circulate and discuss the information that the students are recording on their organizers. Collect the finished work and remediate if necessary.

EXTEND

Mathematics: Telling Time Guide students back to the text to notice how Ada divides her day by using chronological time. (8:00am, 10:00am, noon, 2:00pm, 4:00pm, and 7:00pm) Take this opportunity to practice the skill of telling time. Use Judy clocks to demonstrate different times of the day. Explore am and pm, and for more advanced students, elapsed time. Have them create a simple timeline of their own amazing day.

Simple Solutions

Refer to the article to see how Ada created simple inventions.

HOW DID . . .
a shoe holder become a block organizer?
socks become grippy winter footwear?
dental floss become a knife?
a funnel become a cat-proof yarn holder?