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Fresh Food On The Move

Feast upon this issue of MUSE and learn how scientists and citizens are working to reduce food waste and to bring healthy, fresh foods to larger populations. Advanced packaging and refrigeration techniques combined with mindful actions of consumers will not only result in a healthier society, but a healthier planet as well.

CONVERSATION QUESTION

What is being done to ensure that healthy food resources are available to more people?

TEACHING OBJECTIVES

- Students will learn how advancements in food packaging can reduce food waste.
- Students will learn how Iceland is an unlikely agricultural success.
- Students will learn about refrigeration in the 20th century.
- Students will study the cause-and-effect relationship between the various factors surrounding food waste.
- Students will identify problem-and-solution relationships.
- Students will compare and contrast differences in food storage and refrigeration that took place over time.
- Students will develop a strategic plan for reducing the amount of their personal food waste.
- Students will research the commonalities of nations that use primarily green energy.
- Students will create a timeline depicting the life of a famous woman in science.



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

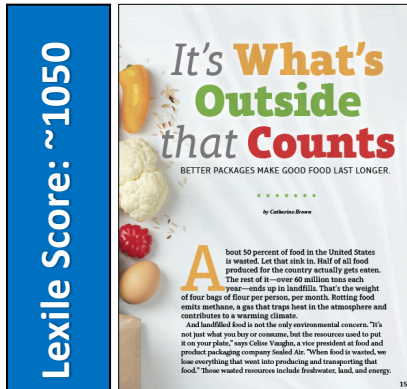
- **It's What's Outside That Counts**
Expository Nonfiction, ~1050L
- **Volcano Power**
Expository Nonfiction, ~950L
- **Dr. Mary Engle Pennington**
Expository Nonfiction, ~850L

Muse® Teacher Guide: February 2020

It's What's Outside That Counts

pp. 15–17, Expository Nonfiction

Box, bag, paper, or plastic? This article will educate students about the staggering level of food waste in the United States and explain how better packaging is extending the life of foods.



RESOURCES

- Waste Not, Want Not

OBJECTIVES

- Students will learn how advancements in food packaging can reduce food waste.
- Students will study the cause-and-effect relationship between the various factors surrounding food waste.
- Students will develop a strategic plan for reducing their personal food waste.

KEY VOCABULARY

- **microperforated films** (p. 17) containers with many tiny, invisible holes to control moisture in foods
- **modified atmosphere packaging** (p. 16) replaces regular air with an ideal mixture of gases to extend shelf life and visual appeal
- **vacuum-sealed packaging** (p. 16) removes oxygen between the food and packaging

ENGAGE

Conversation Question: What is being done to ensure that healthy food resources are available to more people?

Place different food containers in front of the class, or ask students to bring back packaging from their lunch period. Discuss why things come in various containers and how packaging can affect the shelf life of food. Pose the question: “What changes in food packaging have you seen in your lifetime?”

INTRODUCE VOCABULARY

Discuss the key terms and definitions. Have groups of students brainstorm a list of foods that are packaged using each of the three methods (microperforated film, modified atmosphere, and vacuum-sealed). Instruct students to amend their lists after the reading.

READ & DISCUSS

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

- How much food is wasted annually in the United States?
- Explain the meaning of this sentence on page 15: “When food is wasted, we lose everything that went into producing and transporting that food.”
- How is progress being made in the effort to reduce food waste?
- What is the YPACK project?

CONCEPT/SKILL FOCUS: Cause and Effect

INSTRUCT: Lead the students in a discussion that guides them to recognize the many cause-and-effect relationships (relationships in which one event makes another event happen) that are presented in this article. Introduce the graphic organizer, *Waste Not, Want Not*, and advise students that they will be searching through the article for such relationships. Allow students to share ideas and assist each other in locating suitable passages in the text.

ASSESS: Circulate and converse with students as they are working. Collect and review the worksheets to evaluate individual understanding of cause-and-effect relationships. Consider arranging peer remediation groups if necessary.

EXTEND

Language Arts: Focus on the final sentences of the article (page 17): “Unlike many of the challenges we face right now on our planet, food waste is something that literally every single person can do something about. What are you going to do to try to waste less food?” Challenge students to develop a personal strategy for reducing food waste and present it in a detailed strategic plan format.

Waste Not, Want Not

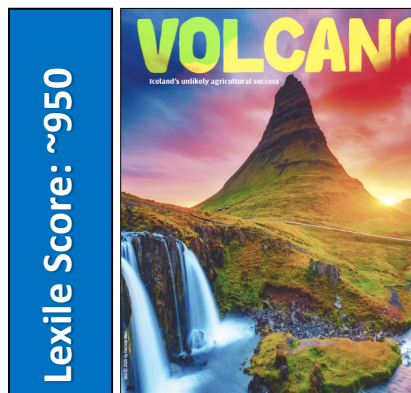
Use information from the article, "It's What's Outside That Counts," to record the cause-and-effect relationships presented.

Page #	Cause/Behavior	Effect/Result
p. 15	Rotting food emits methane, a gas that traps heat in the atmosphere.	Rotting food contributes to a warming climate and is an environmental concern.

Volcano Power

pp. 26–29, Expository Nonfiction

Rocky lava fields and long periods of darkness and frigid temperatures make Iceland an unlikely farming utopia. Students will be amazed to learn how this nation is using green energy and magma-heated water to create thriving greenhouse produce.



RESOURCES

- Some Like It Hot!

OBJECTIVES

- Students will learn how Iceland is an unlikely agricultural success.
- Students will identify problem-and-solution relationships.
- Students will research the commonalities of nations that use primarily green energy.

KEY VOCABULARY

- **geothermal energy (p. 28)** heat energy that is generated and stored in the earth
- **geyser (p. 27)** a hot spring that discharges intermittent jets of steam and water
- **magma (p. 28)** molten material beneath the earth's crust
- **tectonic plates (p. 28)** massive, irregularly shaped slabs of rock floating over the earth's mantle

ENGAGE

Conversation Question: What is being done to ensure that healthy food resources are available to more people?

Post the title of the article, “Volcano Power.” Read aloud the first sentence of the final paragraph on page 29: “Volcanoes can be a blessing or a curse.” Have students reflect on the meaning of this sentence and share their thoughts. Revisit this activity after reading the article.

INTRODUCE VOCABULARY

Post and discuss the key terms. Be sure that students understand the definitions before reading the article. As a post-reading activity, have students use the four vocabulary words to summarize the article in paragraph form.

READ & DISCUSS

Pose the following questions to the students to facilitate meaningful discussion following the reading of the article.

- Describe the climate of Iceland.
- Explain the process by which the Olafsson family is able to use magma-heated water to sustain their farms.
- How do the farmers in Iceland “trick” plants into thinking that it is summer year-round?
- In past decades, how did most of the produce arrive at this remote island?

CONCEPT/SKILL FOCUS: Problems and Solutions

INSTRUCT: Inform students that they will be rereading the article with a partner and highlighting passages that depict how food-resource problems are being solved in Iceland. Distribute the graphic organizer, *Some Like It Hot!*, and tell students that they will be responsible for recording the problem/solution relationships from the article. Encourage pairs of students to discuss their findings as they complete the chart.

ASSESS: Review the information that the students listed on their charts. Evaluate the thoroughness and accuracy of their statements. If errors are noted, direct students to return to the text and to make corrections.

EXTEND

Science The article states that 100 percent of Iceland’s electricity is green (from geothermal plants and turbines spun by waterfalls/wind), compared to only about 17 percent in the United States. Have students research other nations that use primarily green energy. What do these regions have in common?

Some Like It Hot!

Use information from the article, "Volcano Power," to detail solutions to the problems listed below.

Problems	Solutions
Frigid winters, short periods of sunlight, and rocky lava fields make traditional farming impossible.	<ol style="list-style-type: none"> 1. 2. 3.
Iceland lost most of its money during a global crisis, and the eruption of Eyjafjallajokull Volcano isolated the island from food resources.	<ol style="list-style-type: none"> 1. 2. 3.

Explain the experience of lunchtime at Fridhamar Farm.

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Dr. Mary Engle Pennington

pp. 42–45, Expository Nonfiction

Travel back in time to the beginning of the 20th century and learn why keeping food fresh was a challenge. Rising to meet this challenge despite huge obstacles was Mary Engle Pennington, a pioneer for women in science.



Lexile Score: ~850

RESOURCES

- **One “Cool” Scientist**

OBJECTIVES

- Students will learn about refrigeration in the 20th century.
- Students will compare/contrast differences that transpired over time.
- Students will create a timeline depicting the life of a famous woman in Science History.

KEY VOCABULARY

- **consultant (p. 45)** a person who provides expert advice professionally
- **perishable (p. 43)** likely to decay or go bad quickly
- **springhouse (p. 43)** a small storehouse constructed over a spring for keeping dairy products and meats fresh and cool

ENGAGE

Conversation Question: What is being done to ensure that healthy food resources are available to more people?

Create interest in this topic by telling students that they are going to read about a woman who persevered in her studies despite originally being refused access to the field of science, as it was considered an “unladylike” subject. Engage students in a class discussion about the power that women have gained in various fields of study. Take this opportunity to discuss your school’s STEM program.

INTRODUCE VOCABULARY

Post and discuss the three key terms prior to reading. Focus on the fact that one word refers to Mary (*consultant*), one word refers to food resources (*perishable*), and one word refers to storage/preservation (*springhouse*). As a post-reading activity, have students find other words from the article that belong to these three categories.

READ & DISCUSS

Read the article aloud with the class. Have students reread the article in small groups and answer the questions below. Discuss responses.

- Why was buying fresh food difficult in the beginning of the 20th century?
- How was Pennington able to enroll in graduate studies if she wasn’t granted a bachelor’s degree?
- What sciences do Pennington’s field of studies include?
- Why did Pennington receive a Notable Service Medal in 1919?
- Explain Pennington’s life work.

CONCEPT/SKILL FOCUS: Compare and Contrast

INSTRUCT: Elicit from the students that the main idea of the article is to recognize the historical importance and contributions of Mary Engle Pennington, a female pioneer in science. Allow students to remain with their small groups from the Read & Discuss activity to complete the graphic organizer, *One “Cool” Scientist*, recording how times have changed. Encourage the groups to share their finished work, instructing them to amend their own charts if necessary.

ASSESS: Collect and review the *One “Cool” Scientist* organizers.

EXTEND

Social Studies As a whole-class activity, have students participate in creating a timeline of Mary Engle Pennington’s 40-year career as the greatest authority on refrigeration in the early 20th century. Challenge students to research other famous women in history and to create a timeline including at least ten events that depict the person’s contribution to Science History.

One “Cool” Scientist

Reread the article, “Dr. Mary Engle Pennington.” Explain the changes that took place over time.

	THEN...	NOW...
Food Transportation and Storage		
Education Suitable/Accessible for Women		