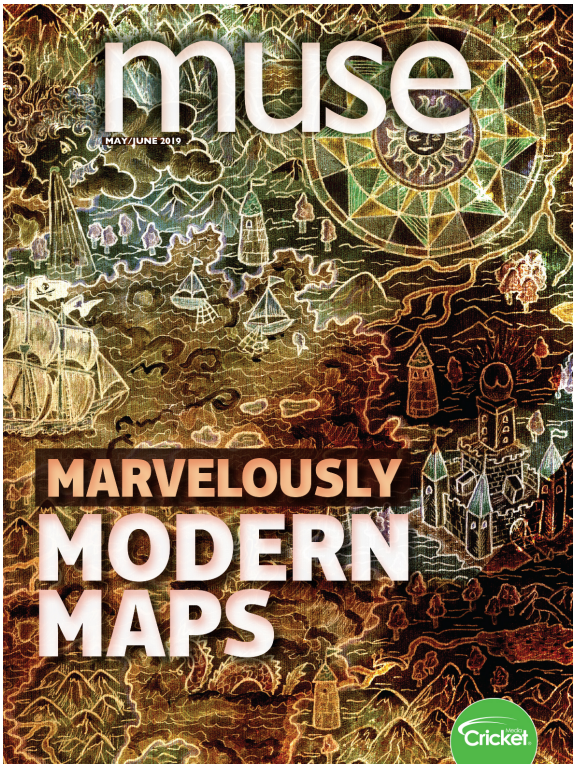
Muse® Teacher Guide: May/June 2019

Marvelously Modern Maps

Delve into the rich content of this magazine to learn how the accuracy of maps is constantly evolving due to new technology and talented mapmakers. From exploring new territories, to mapping ocean floors, to protecting the health of a city, this issue of *Muse* examines the value of reliable maps and their importance in the scientific community.



CONVERSATION QUESTION

Why are maps useful tools?

TEACHING OBJECTIVES

- **Students will learn how the ability to create accurate maps is constantly evolving.**
- **Students will learn how search and rescue missions are conducted.**
- **Students will learn about the scientific contributions of Marie Tharp, the woman who mapped the ocean floor.**
- **Students will examine the structure and function of inventions that have helped to advance the accuracy of mapmaking.**
- **Students will interpret and analyze information.**
- **Students will identify cause-and-effect relationships.**
- **Students will create a timeline depicting 15,000 years of mapmaking.**
- **Students will write an informative acrostic poem.**
- **Students will research famous women 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

- **Picturing Our Planet**

Expository Nonfiction, ~750L

- **Search & Rescue Kids**

Expository Nonfiction, ~1050L

- **Marie Tharp**

Expository Nonfiction, ~750L

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Picturing Our Planet

pp. 16–17, Expository Nonfiction

From cave diagrams to virtual maps, humans have been collecting navigational data since the beginning of time. Students will learn how invention and exploration are equally important in helping us to "picture our planet."

Lexile Score: ~750


Picturing Our Planet

TRACING (ROUGHLY) 15,000 YEARS OF MAPMAKING

RESOURCES

- Where in the World Are We?

OBJECTIVES

- Students will learn how the ability to create accurate maps is constantly evolving.
- Students will examine the structure and function of inventions that have helped to advance the accuracy of mapmaking.
- Students will create a timeline depicting 15,000 years of mapmaking.

KEY VOCABULARY

- ***navigate* (p. 16)** to plan and direct a route of travel
- ***pendulum* (p. 17)** a weight suspended from a fixed point so as to swing freely
- ***spherical* (p. 16)** shaped like a round solid figure, with every point on its surface equidistant from its center

ENGAGE

Conversation Question: Why are maps useful tools?

Distribute or display a map of the school and ask the following questions: *What information can you gather from this map? Why is it useful?* Repeat those questions as you display a map of the town/city, state, country, and finally the world. Guide students to notice and discuss how answers changed as different maps are displayed.

INTRODUCE VOCABULARY

Introduce this as a *Jeopardy!*-style learning activity. Provide the class with only the definitions of the key vocabulary terms. Have them read and discuss. Inform students that they will revisit these definitions after reading and pose the proper question using words from the article. (What is to navigate? What is a pendulum? What is spherical?) Have them create seven more answers needing questions, for a total of ten, and share with other classes as a post-reading activity.

READ & DISCUSS

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

- What features were recognizable to modern mapmakers when studying ancient maps?
- What were the pros and cons of Ptolemy's original world map?
- What information can be displayed on a thematic map?
- Why did "new forms of transportation" mean "new kinds of maps"?

CONCEPT/SKILL FOCUS: Structure and Function

INSTRUCT: Elicit from students that the main idea of the article is to provide information that details how the process of mapmaking is constantly evolving as more knowledge of the planet is acquired. Present the graphic organizer, *Where in the World Are We?,* and tell students that they will be using information from the article to record the special function of each navigational structure listed. They will be essentially recording how the accuracy of mapmaking evolves.

ASSESS: Collect and review the graphic organizers, as well as their questions from the vocabulary activity to determine understanding.

EXTEND

Social Studies Direct students to notice that the subtitle of this article is "Tracing (roughly) 15,000 Years of Mapmaking." Have students work in small groups to represent the information from the article (and the internet) on a timeline. Each student in the group should choose one of the plotted points and write a caption to explain why the event or invention was critical for improving navigation.

Where in the World Are We?

Refer to the article, "Picturing Our Planet," and record how the following structures have helped the process of mapmaking to become more accurate.

Structure	Function
cave drawings	
magnetic compass	
astrolabe	
timepiece that could absorb ship's motion	
virtual map	

Think Tank: On the back of this paper, write a paragraph stating how you think that today's technology will advance the ability to accurately map our planet.

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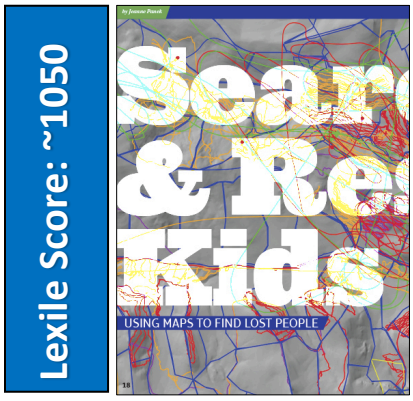
Search & Rescue Kids

pp. 18–22, Expository Nonfiction

Young readers will be impressed with the skills and hope that adolescent members contribute to Search and Rescue missions. Engaging text and informative photographs tell the story of how these dedicated professionals use manpower and maps to bring the lost home safely.



RESOURCES

- Lost and Found

OBJECTIVES

- Students will learn how search and rescue missions are conducted.
- Students will interpret and analyze information.
- Students will write an informative acrostic poem.

KEY VOCABULARY

- ***ATV* (p. 20) All Terrain Vehicles;** motorized off-highway vehicles
- ***CP* (p. 22) Command Post;** headquarters of a unit
- ***GPS* (p. 20) Global Positioning System;** uses satellite signals to pinpoint location
- ***SAR* (p. 19) Search And Rescue;** the search for and provision of aid to people who are in distress or imminent danger

ENGAGE

Conversation Question: Why are maps useful tools?

Take the children to a large space such as the gymnasium, cafeteria, or the schoolyard. Invoke a simple game of Marco Polo or Hide and Seek. Allow the children time to enjoy the game and then gather students to discuss the experience. What things made someone harder to find? (Distance, obstacles, participation, etc.) Launch the theme of the article.

INTRODUCE VOCABULARY

Use key vocabulary words to review the use of acronyms (condensed versions of phrases). Ask the students why they are useful and brainstorm commonly used acronyms (ex: ASAP, FBI, ATM). Discuss key words prior to reading and highlight terms as they appear in the text.

READ & DISCUSS

Read the article aloud with the class, pausing to study the graphic images. Have students reread the article in small groups and answer the questions below.

- What are some important SAR skills that Kobe Pole possesses?
- Explain how a specific area is methodically searched. What kinds of areas can usually be ruled out?
- Why is rapid response critical?
- Why do Emma Lauter and other members of SAR teams give up their own commitments to do this work? List adjectives that you would use to describe such people.

CONCEPT/SKILL FOCUS: Interpret and Analyze

INSTRUCT: Direct students to return to page 22 and to study the box containing the text alert from the Marin County Search and Rescue unit. Stress the fact that members of the team are responsible for accurately decoding and responding to such texts. Discuss the meaning of the alert given. Next, distribute copies of *Lost and Found* and allow the class to work in the small groups from the Read & Discuss activity to interpret the alerts. Instruct them to create their own alert independently and have a classmate decipher the meaning.

ASSESS: Circulate and converse with the students as they are working. Collect and review worksheets to evaluate individual abilities to interpret information.

EXTEND

Language Arts Extend your discussion of acronyms from the vocabulary activity into a review of acrostic poems (a poem in which the first letter of each line spells out a word or message). Instruct students to create an informative acrostic poem that encompasses a theme from this issue of *Muse* (Mapmaking, Search and Rescue, Exploration, etc.).

Lost and Found

Use information from the article, "Search and Rescue Kids" to interpret the alerts. Use the last box to create your own alert and have a friend decode your text.

Alert	Interpretation
57 yo M hiker, Oct 3 0500 overhead, 0600 dogs, 0800 briefing CP @ Nomi Campground. Are you available?	
23 yo F biker, April 6 0600 overhead, 0700 dogs, 0800 briefing CP @ Challenger Mountain Base. Are you available?	
18 yo M 19 yo F runners, March 27 1600 overhead, 1700 dogs, 1800 briefing CP @ Sienna Dog Park. Are you available?	

On the back of the paper, chose one of the alerts that you are most interested in assisting with and tell why. What essentials would you bring? What useful skills/abilities do you have?

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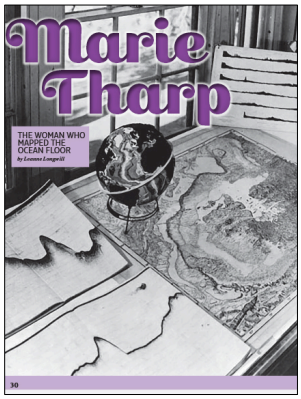
Marie Tharp

pp. 30–33, Expository Nonfiction

Introduce your students to Marie Tharp, the amazing woman who is responsible for mapping the ocean floor. Young readers will be inspired by her accomplishments and gain a sense of how difficult it has been for women in scientific fields to gain recognition and credibility.

Lexile Score: ~750



RESOURCES

- A Life of Science

OBJECTIVES

- Students will learn about the scientific contributions of Marie Tharp.
- Students will identify cause-and-effect relationships.
- Students will research famous women in science.

KEY VOCABULARY

- ***expedition* (p. 33)** a journey undertaken by a group of people with a particular purpose, especially scientific research
- ***fathogram* (p. 33)** a record made by means of a sonic depth finder
- ***geology* (p. 31)** the science that deals with the earth's physical structure, substance, processes, and history

ENGAGE

Conversation Question: Why are maps useful tools?

Write the heading "Famous Scientists" on the board. Conduct a brainstorming session with the class and list the names that they provide. After at least ten names have been given, guide students to notice how many are females. Question the class as to why they think that this is the case and then introduce the article.

INTRODUCE VOCABULARY

Display the three vocabulary terms and have students use resources to procure definitions. Encourage students to notice that the initial letters of the words are in consecutive alphabetical order (E-F-G). Challenge students to define three additional words/events from the article that begin with three different letters in alphabetical order. Ex: **R**esearch-**S**urveyor-**T**harp.

READ & DISCUSS

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

- What type of work does a soil surveyor do?
- Why were career options limited for women during most of Marie Tharp's life?
- What is continental drift?
- Why are more jobs open to women during wartime?

CONCEPT/SKILL FOCUS: Cause and Effect

INSTRUCT: Lead the students in a discussion that guides them to recognize the cause-and-effect relationships that are studied in this article. Emphasize the fact that it was a series of accomplishments that ultimately led Marie Tharp to be respected in her field, rather than a single event. Introduce the graphic organizer and tell students that they will be rereading the article and highlighting pertinent information to record on the chart. Encourage peer assistance and dialogue.

ASSESS: Converse with students as they are working on the graphic organizer. Collect and review the worksheets to evaluate individual understanding of the cause-and-effect relationship.

EXTEND

Language Arts Have students conduct research on the accomplishments of women in science. There are many resources online that discuss women such as Jane Lubchenco, Patricia S. Goldman-Rakic, Jane Goodall, and many other important female contributors. Instruct the students to choose one woman and to write a short biography detailing her life. Bind the finished research papers into a book for your Science Center.

A Life of Science

Use information from the article, "Marie Tharp," to record the cause-and-effect relationships that shaped this brilliant scientist's life.

Page #	Cause	Effect(s)
p. 31	Marie's father had a job with the Department of Agriculture.	The family moved often, and Marie was introduced to the world of geology.
p. 31	Most men were away fighting in World War II.	
p. 33		Marie moved to New York to apply for a job at Columbia University.