Muse® Teacher Guide: July 2017

TEACHING OBJECTIVES

- **Students will read and analyze a nonfiction article**
- **Students will ask questions and define problems**
- **Students will obtain, evaluate, and communicate information**
- **Students will engage in arguments from evidence**
- **Students will analyze and interpret data**

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.

ISSUE THEME

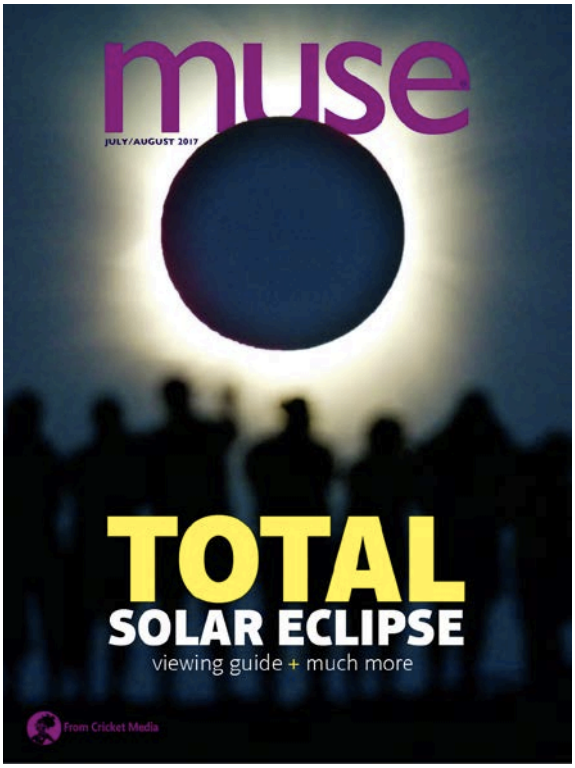
Students will explore how teams work together to merge science knowledge, engineering expertise, and the quest for knowledge to explore our solar system.

CONVERSATION QUESTION

Why do people take great risks, effort, and expense to study space?

ABOUT MUSE® MAGAZINE

MUSE® is a guidebook for the exploration of ideas. With unique approaches to science, technology, history, and the arts, MUSE® can help educators teach students how to analyze and synthesize information from the past, present, and future.



SELECTIONS

- **I Saw the Eclipse—from Space**

Expository Nonfiction, ~950L

- **So Long, Saturn**

Expository Nonfiction, ~1150L

- **A Mission to Discover**

Expository Nonfiction, ~950L

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I Saw the Eclipse —from Space

pp. 20–23, Expository Nonfiction

Lexile Score: ~950L

THE ARTICLE

This article explains how teams of students are working to get a space-side view of the eclipse through the Eclipse Ballooning Project.

OBJECTIVES

- Students will read and analyze a nonfiction article
- Students will ask questions and define problems
- Students will obtain, evaluate, and communicate information

KEY VOCABULARY

- ***payload* (p. 20)** what is carried by an aircraft or spacecraft
- ***penumbra* (p. 23)** the partially shaded outer region of a shadow
- ***satellite* (p. 21)** an object that is sent into space and orbits around the moon, sun, or a planet
- ***silhouetted* (p. 20)** when a dark shape is in front of a light background

ENGAGE

Conversation Question: Why do people take great risks, effort, and expense to study space?

Before reading the article, have students view the photograph of the excited students on the first page of the article. Explain that these students in the Eclipse Ballooning Project are designing ways to view the eclipse from space. Have students work with partners to draw pictures of what they imagine the balloon will look like and carry on the day of the eclipse.

INTRODUCE VOCABULARY

Together, review the vocabulary words and read them aloud. Have students copy each word, then scan the article with partners to locate the words. Using context clues, students suggest definitions. Finally, students look up the words and correct any of their misconceptions.

READ & DISCUSS

Read the article with a partner, and then use these prompts for discussion:

- What are some challenges students will face when designing payloads?
- What challenges might occur during the day of the eclipse?
- What are students hoping to gain from this project?

CONCEPT FOCUS: Obtain Information

INSTRUCT: After reading the article, have students work in small teams to design a balloon with payload for observing a solar eclipse. They will use the article to obtain information for their designs and what components will be needed. Ask students to be as detailed as possible and create labeled diagrams, as well as a description of the important features of their design. Be sure and have students address the design problem of keeping the cameras straight as described in the article.

ASSESS: Students present their designs to the class, taking turns sharing important features and reasons for the chosen elements.

EXTEND

Math Have students review the NASA website for the ballooning project: https://eclipse2017.nasa.gov/eclipse-ballooning-project. There are several interactive maps on the page. Use the maps to make calculations about the path of the eclipse and distances from your location.

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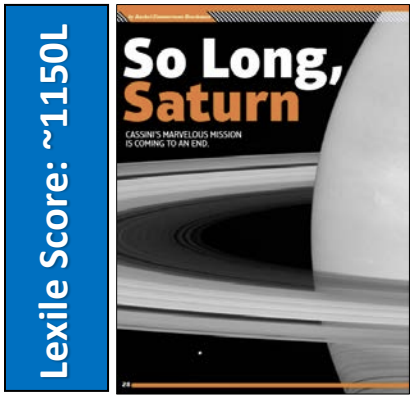
So Long, Saturn

pp. 28–31, Expository Nonfiction



THE ARTICLE

Introduce your students to *Cassini*, the spacecraft that is entering its last days after twenty years in space. Students will discover what was learned from this successful mission to Saturn.

OBJECTIVES

- Students will read and analyze a nonfiction article
- Students will ask questions and define problems
- Students will obtain, evaluate, and communicate information

KEY VOCABULARY

- ***interplanetary* (p. 29)** existing or occurring between planets
- ***trajectory* (p. 31)** the curved path along which something (such as a rocket) moves through the air or through space
- ***transmit* (p. 29)** to send (information, sound, etc.) in the form of electrical signals
- ***traverse* (p. 29)** to go across something

ENGAGE

Conversation Question: Why do people take great risks, effort, and expense to study space?

Before reading the article, ask students what they know about Saturn and record their ideas. Ask them why they know this information. Tell students they will be reading about Cassini, a spaceship that has been sending information back to Earth and is about to end its twenty-year mission.

INTRODUCE VOCABULARY

Together, review the vocabulary words and read them aloud. Have students copy each word, then scan the article with a partner to locate the words. Using context clues, students suggest a definition. Finally, students look up the word and correct any of their misconceptions.

READ & DISCUSS

Read the article with a partner, and then use these prompts for discussion:

- How has Cassini contributed to our understanding of Saturn?
- What makes Saturn's moons especially interesting to study?
- What was unexpected about the Cassini mission?
- Why will the mission end?

CONCEPT FOCUS: Communicate Information

INSTRUCT: Students work with a partner to create a digital or print poster that commemorates the important contributions of the Cassini mission. Have them review the article for facts and information that highlight these accomplishments. Encourage them to include that information, draw pictures or diagrams, or insert images from NASA.

ASSESS: Students display their posters and share their design and information decisions. Have students use their posters as evidence to explain a response to the conversation question: Why do people take great risks, effort, and expense to study space?

EXTEND

Language Arts Have students imagine they are planning a new mission to study Saturn. Ask them to write a proposal explaining what this new mission hopes to accomplish. Have them choose points from the article to explain how the mission will build on knowledge gained from Cassini.

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A Mission to Discover

pp. 40–44, Expository Nonfiction

Lexile Score: ~950L

THE ARTICLE

This article explains the amazing mission underway to take a sample from an asteroid hurtling toward Earth.

OBJECTIVES

- Students will read and analyze a nonfiction article
- Students will engage in arguments from evidence
- Students will analyze and interpret data
- Students will obtain, evaluate, and communicate information

KEY VOCABULARY

- ***asteroid* (p. 40)** a small, rocky body orbiting the sun
- ***extraction* (p. 42)** the act or process of getting something by pulling it out
- ***maneuver* (p. 40)** a clever or skillful action or movement
- ***rendezvous* (p. 41)** to meet
- ***trajectory* (p. 41)** the curved path along which something (such as a rocket) moves through the air or through space

ENGAGE

Conversation Question: Why do people take great risks, effort, and expense to study space?

Ask students what risks, effort, and expenses a mission to take a sample would entail? Talk about why such a project would be funded and what might be learned from taking an asteroid sample. List ideas to return to after reading the article to revise and extend.

INTRODUCE VOCABULARY

Review the vocabulary words so that students hear each word, repeat it, and search for the words in the context of a sentence in the article. Have them find these sentences and read them aloud with a partner. Ask students to explain to each other what they think the words mean. As a class, share possible definitions. Correct any misunderstandings.

READ & DISCUSS

Read the article with a partner, and then use these prompts for discussion:

- What are some of the physics principles used to power the spacecraft toward the asteroid?
- Why is this mission important?
- How do the text features contribute to your understanding of this mission?

CONCEPT FOCUS: Analyze and Interpret Data

INSTRUCT: In small groups, have students imagine they are a team of scientists given a sample of the asteroid material. Using the article for ideas, instruct teams to design a plan that includes what they will look for, what tests they will conduct, and what they hope to learn from their investigation. Then, have them write a conclusion about what was discovered.

ASSESS: Have students report their "findings" to the class and explain what they discovered from their tests and observations. Have them draw conclusions based on their imagined evidence from the sample.

EXTEND

Math & Technology Have students review the official OSIRIS-REx site: http://www.asteroidmission.org/. Ask them to look for all the different ways measurements are used in the mission.