Ask® Teacher Guide: May/June 2018

Metal Mania

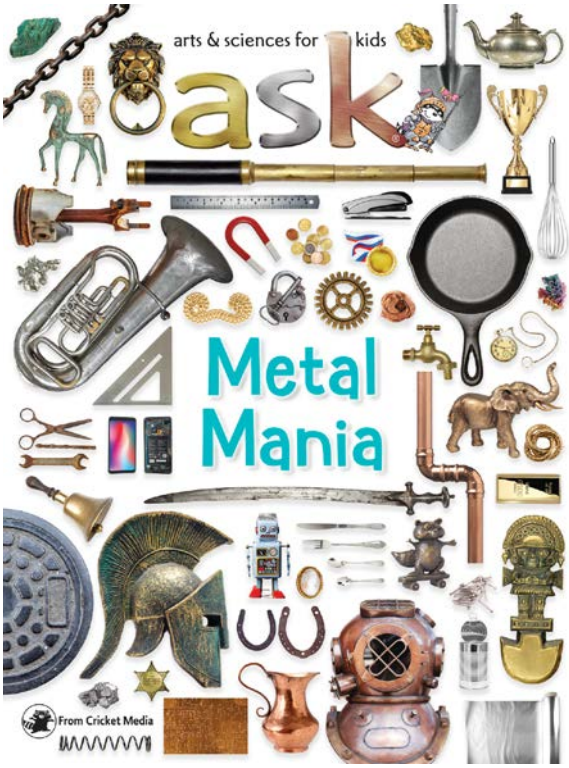
From bridges and rockets to cell phones and foil, metals are important resources. Find out how people learned to extract and use different metals that change the way we build and live.

CONVERSATION QUESTION

Why are metals important resources?

TEACHING OBJECTIVES

- **Students will learn about the discoveries that helped people use different forms of metal**
- **Students will learn about where metals come from and how they are formed**
- **Students will learn about the value of aluminum and why it is now commonly used**
- **Students will identify cause and effect relationships**
- **Students will construct explanations about how metals are formed**
- **Students will obtain and organize information**
- **Students will make a timeline of copper or iron use throughout history**
- **Students will create a diagram or model to help them explain how metals are formed**
- **Students will locate mathematical information and create story problems based on this 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.

SELECTIONS

- **Great Moments in Metal**

Informational: List of Facts, ~850L

- **Stardust**

Expository Nonfiction, ~850L

- **More Precious Than Gold**

Expository Nonfiction, ~650L

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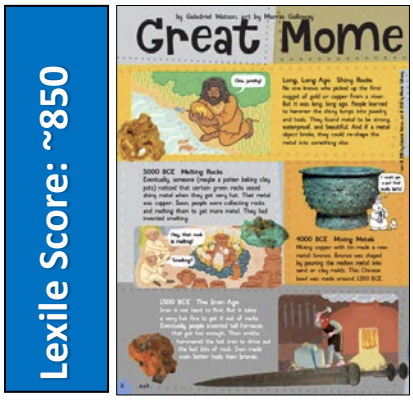
Great Moments in Metal

pp. 6-9, Informational

Use this article about metal milestones to teach cause and effect.



RESOURCES

- **Metal Makers: Cause and Effect**

OBJECTIVES

- Students will learn about the discoveries that helped people use different forms of metal
- Students will identify cause and effect relationships
- Students will make a timeline of copper or iron use throughout history

KEY VOCABULARY

- ***nugget* (p. 6)** a solid lump of a valuable metal
- ***smelting* (p. 6)** to melt rock that contains metal in order to get the metal out
- ***molten* (p. 6)** melted by heat
- ***furnaces* (p. 6)** a large structure in which rock containing a metal is melted so that the metal can be separated from the rock
- ***alchemy* (p. 7)** a science that was used in the Middle Ages with the goal of changing ordinary metals into gold

ENGAGE

Conversation Question: Why are metals important resources?

Create a list of metals known by the students. Ask the following questions to engage prior-knowledge and topic engagement:

- How do we know if something is a metal?
- How are metals used?
- Are all metals used the same way?

INTRODUCE VOCABULARY

Project the vocabulary words and have students search for these words in the article with a partner. Have students use the text to help define each word in context of the topic. Review the meanings in class to share and compare the meanings.

READ & DISCUSS

Have students read the article with a partner, and then use the following prompts in a class discussion to addresses the conversation question:

- Why is heat important in making and using metals?
- What uses of metal caused the biggest changes in how humans live?
- How is one form of metal changed to another?

CONCEPT/SKILL FOCUS: Cause and Effect

INSTRUCT: Guide students to look for cause and effect relationships in the article. Explain that science discovery builds on the work of others and takes generations of learning to gain understanding. Students record their information using the **Metal Makers: Cause and Effect** graphic organizer**.**

ASSESS: Use the graphic organizer to assess if students recorded cause and effect relationships from the article.

EXTEND

Social Studies Have students choose either cooper or iron and make a timeline of how this metal was used through history. Information can be found in the article, as well as other sources.

Metal Makers: Cause and Effect

Use this chart to organize information you find about the causes and effects through history as new ways of using metals were invented.

Page	Cause	Effect
6	Discovery that fire melted copper metal in rocks.	People started smelting to get the copper from rocks so they could use it.

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Stardust

pp. 10-12, Expository Nonfiction

Use this article about the formation of metals to help students collect information to support an explanation.

Lexile Score: ~850

RESOURCES

- **Collecting Information to Support an Explanation**

OBJECTIVES

- Students will learn about where metals come from and how they are formed
- Students will construct explanations about how metals are formed
- Students will create a diagram or model to help them explain how metals are formed

KEY VOCABULARY

- ***gravity* (p. 10)** the force that causes things to move towards each other
- ***fusion* (p. 10)** the process or result of joining two or more things together to form a single entity
- ***supernova* (p. 11)** a star that suddenly increases greatly in brightness because of a catastrophic explosion that ejects most of its mass
- ***neutron star* (p. 12)** stars created when giant stars die in supernovas and their cores collapse

ENGAGE

Conversation Question: Why are metals important resources?

Ask students where they think metals come from. They may be share that metals come from rocks and the ground. Ask them how the metals to share ideas about how the metals got there and how they are different from other rock and soil material. Explain that this article will help to explain how metals are formed.

INTRODUCE VOCABULARY

Assign each student with one of the four words to become an "expert" at explaining this word to a group of four. Each student will look for his or her word in the article and other sources in order to explain the meaning of the word to their group. When reading the article, have students stop at these words and allow the expert to explain what it means in the context of the article.

READ & DISCUSS

Have students read the article and study the diagrams and illustration in the article. Ask students to look for information as they read to understand how metals are formed. Then use the following prompts in a class discussion:

- What do stars have to do with metals?
- Do you think people take the value of metals for granted?
- Why are metals important resources?

CONCEPT/SKILL FOCUS: Constructing Explanations

INSTRUCT: Explain that this article shows that the formation of metals is a very long process that requires extreme forces. Have students review the article and use the **Collecting Information to Support an Explanation** graphic organizer to record information that helps explain: How are metals created?

ASSESS: Use the graphic organizer to assess if students were able to list the machines and explain how each machine is used to make pasta efficiently.

EXTEND

Language Arts Have students use the information they collected to create their own diagram of model that helps explain how metals are formed. Students share their models and diagrams as props to help them verbally explain how metals are formed.

How are metals created?

Collecting Information that Supports an Explanation

The article explains how the metals we use are formed by activity in space. Use your reading skills to look for information that helps explain how metals are formed.

Page	Information	How this information supports an explanation
10	The Big Bang formed gas that turned into stars.	Atoms fuse together in a star to make heavier elements like iron.

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More Precious Than Gold

pp. 26-28, Expository Nonfiction

Use this article guide students to obtain information about the value of aluminum.

Lexile Score: ~650

RESOURCES

- **Collect Information**

OBJECTIVES

- Students will learn about the value of aluminum and why it is now commonly used.
- Students will obtain and organize information.
- Students will locate mathematical information and create story problems based on this data.

KEY VOCABULARY

- ***exotic* (p. 26)** very different, strange, or unusual
- ***chemicals* (p. 27*)*** substances made by a chemical process
- ***extracting* (p. 27)** to get (a substance) *from* something by the use of a machine or chemicals
- ***produced* (p. 28)** to have made something

ENGAGE

Conversation Question: Why are metals important resources?

Provide students with a piece of aluminum foil and have them discuss with a partner the benefits of this metal. Next have students create a list of questions they have about aluminum such as where it comes from, how it is used, and what special properties it has. Have students look for answers to their questions as they read the article with their partner.

INTRODUCE VOCABULARY

Review the vocabulary words and ask for volunteers to explain their meanings. Clear up any confusion. Next, write the sentences that contain the vocabulary words leaving blanks where these words go. Have students decide which of the vocabulary words correctly fill the blanks.

READ & DISCUSS

Have students read the article. Then use the following prompts in a class discussion to addresses the conversation question: **Why is aluminum and important resource?**

- What characteristics make something valuable?
- Why was aluminum considered exotic in the past?
- Why is aluminum valuable today?
- Why is 75% of the aluminum ever produced still being used?

CONCEPT/SKILL FOCUS: Obtain Information

INSTRUCT: Explain that this article is filled with examples and information to help the readers learn about the metal aluminum. Distribute copies of the **Collect Information** graphic organizer and review the four categories of information. Have students search for information and add it to each section.

ASSESS: Use the graphic organizer to assess if students recorded information that relate to each of the four categories.

EXTEND

Math Have students locate how mathematics is used to communicate information throughout the article. They will find dates, numbers of years, percentages, and weights. Have students use this data to create aluminum story problems for classmates to solve.

Collect Information

Search the article for information that provides examples for each category.