

# Ask®

## What Is Alchemy?

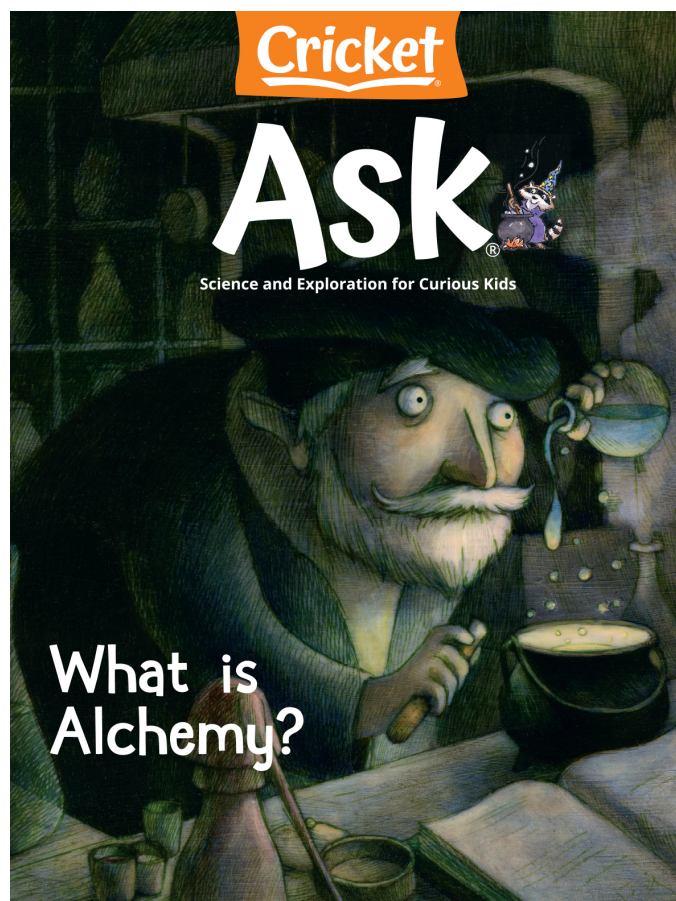
Scientific principles and magic words fill the pages of this month's ASK magazine. Students will read about the people, places, and experiments that led from the medieval sorcery of alchemy to the contemporary discipline of chemistry.

### CONVERSATION QUESTION

How did alchemy shape modern science?

### TEACHING OBJECTIVES

- Students will be introduced to the science of alchemy.
- Students will learn how the tricks of the dishonest alchemists were based on scientific principles.
- Students will learn how fireworks are the result of chemical reactions.
- Students will obtain information from a nonfiction text.
- Students will identify steps of the scientific method.
- Students will examine the function of various explosive structures.
- Students will study the literary element of setting.
- Students will study the science of "magic."
- Students will create firework scratch art to illustrate a fact from the article.



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

- **Secrets of the Alchemists**  
Expository Nonfiction, ~700L
- **Sneaky Tricks of the Alchemists**  
Expository Nonfiction, ~900L
- **The Magic of Fireworks**  
Expository Nonfiction, ~900L

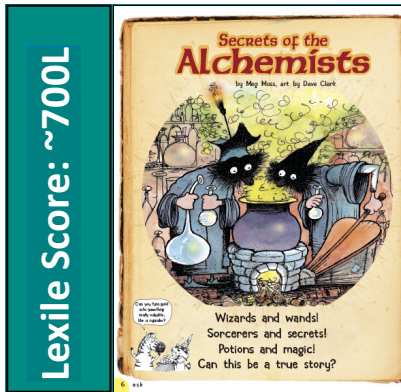
# Ask® Teacher Guide: October 2020

## Secrets of the Alchemists

pp. 6–13, Expository Nonfiction

Legitimate science or practical magic?

This article explores the medieval discipline of alchemy. Students will learn how the branch of science we know as “chemistry” evolved from potions and ancient secrets.



## RESOURCES

- Abracadabra!

## OBJECTIVES

- Students will be introduced to the discipline of alchemy.
- Students will obtain information from a nonfiction text.
- Students will study the literary element of *setting*.

## KEY VOCABULARY

- **alchemists** (p. 7) people who practiced medieval chemical science and philosophy to try to cure diseases, prolong life, and discover how to change common metals into gold
- **philosopher** (p. 6) a person who seeks wisdom or enlightenment; scholar, thinker

## ENGAGE

**Conversation Question:** How did alchemy shape modern science?

Introduce the title of the article and have students share any prior knowledge of alchemy. (If they have no/little background with the term “alchemy,” supply them with the definition from the key vocabulary section.) Tell students that one of the things the article explores is the alchemists’ use of secret codes. Why might they use secret codes? Discuss responses and then display the text box on page 8, “Can We Keep a Secret?” to reveal the answer.

## INTRODUCE VOCABULARY

Post the key vocabulary terms and definitions. Make a T-chart on the board with the headings **Alchemist** and **Philosopher** and have students help to fill in each column with a subject or question that each would likely study. Is there an overlap on the list between the two columns? Revisit the chart and amend the list after reading the article.

## READ & DISCUSS

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

- What was a common goal of alchemists in 1548?
- Why did metal and glass craftsmen seem mysterious and even magical to the rest of the world?
- Why did many alchemists devote their life to finding the “philosopher’s stone”?
- How do an alchemist and a chemist differ?

## CONCEPT/SKILL FOCUS: Obtaining Information

**INSTRUCT:** Guide students to obtain information from the text and captions in the article. Remind them that the article was written to present the reader with information about people and places that detail how alchemy evolved into chemistry. Instruct students to reread the article and distribute the *Abracadabra* worksheet. Students should correctly match the name on the left with the contribution on the right.

**ASSESS:** Collect and review graphic organizers. Have students revisit the text to correct errors, if necessary.

## EXTEND

**Language Arts** Reread the first paragraph of the article, which begins, “An old castle, a small room. . . .” Review the definition of *setting* (the time and location in which a story takes place). Discuss how the first six sentences establish a setting, prior to even introducing the subject or characters. Ask students why they think this an effective or ineffective technique for storytelling. Challenge students to select a well-known tale and rewrite the first paragraph, modeling this technique of leading with the setting.

# Abracadabra!

*Use information from the article, "Secrets of the Alchemists," to correctly match the alchemist with his contribution. Place the letter on the line next to the name.*

- |                               |   |
|-------------------------------|---|
| 1. _____ Aristotle            | A. alchemist most famous for figuring out the secret to making gunpowder                                      |
| 2. _____ Hermes Trismegistus  | B. with a new way of thinking/working, he was responsible for turning alchemy into the science of "chemistry" |
| 3. _____ Jabir Ibn Hayyan     | C. claimed to have made the philosopher's stone from a recipe in an old book                                  |
| 4. _____ Henning Brand        | D. a Greek thinker who said that everything in the universe is made of earth, air, water, and fire            |
| 5. _____ Roger Bacon          | E. figured out that all chemical change is the breaking apart and putting together of molecules               |
| 6. _____ Isaac Newton         | F. discovered many useful chemicals, especially acids   |
| 7. _____ Robert Boyle         | G. discovered the basic laws of motion, gravity, and optics   |
| 8. _____ John Dee             | H. cover name used by many writers of early alchemy books   |
| 9. _____ Antoine de Lavoisier | I. alchemist/fortune-teller who invented spy codes  |
| 10. _____ Nicholas Flamel     | J. thought it might be possible to make gold from urine   |

# Ask® Teacher Guide: October 2020

## Sneaky Tricks of the Alchemists

### page 22, Expository Nonfiction

Hocus Pocus, Lose Your Focus! This article will enchant readers as it describes the methods that dishonest alchemists used to trick their gullible audience.



## RESOURCES

- Fool's Gold

## OBJECTIVES

- Students will learn how the tricks of dishonest alchemists were based on scientific principles.
- Students identify the steps of the scientific method that overlap with the magician's process.
- Students will research the science of magic.

## KEY VOCABULARY

- **bogus** (p. 22) not genuine; untrue
- **faker** (p. 22) a person who is not authentic and gives a false appearance; fraudulent
- **gullible** (p. 22) easily persuaded into believing something

## ENGAGE

**Conversation Question:** How did alchemy shape modern science?

Tell students that they are going to write magical instructions for turning an ordinary object into gold. Instruct them to include materials needed, procedural steps, and most importantly . . . the magic words! Invite students to share their sorcery.

## INTRODUCE VOCABULARY

Post the vocabulary words and definitions where they are visible to the class. Explain that words can have positive or negative connotations. Ask students if these three words are negative or positive. Discuss responses. Have students use each word in a well-written sentence that clearly demonstrates its meaning.

## READ & DISCUSS

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

- Why were some alchemists dishonest?
- List three common tricks used by sneaky alchemists.
- What element were alchemists leading people to believe they could magically produce?
- What type of people did the “fakers” hope to have in their audience?
- When can being fooled be great fun, and when can it be harmful?

## CONCEPT/SKILL FOCUS: Scientific Method

**INSTRUCT:** Guide students to notice that “sneaky” alchemists used a version of the Scientific Method to fool the audience. Review the steps if necessary, and discuss the elements that are common to their current science class experiments. Distribute the *Fool's Gold* graphic organizer and have students work in pairs to complete the chart. The **Think Tank** question should be answered independently.

**ASSESS:** The objective of this lesson is to help students identify steps of the Scientific Method while learning about the tricks of the ancient alchemists. Collect organizers to evaluate individual understanding.

## EXTEND

**Science** Many magicians are quoted as saying that science and math, in addition to imagination, are at the core of their performances. Have students research a particular magician or a specific magic trick to explore this connection. Invite students to share their findings . . . and maybe a trick or two!

## Fool's Gold

*Reread the article, "Sneaky Tricks of the Alchemists." Complete the chart below.*

Trick	Materials	Procedure	Promised Outcome	Actual Outcome
The Nail Trick				
Gold Seeding				
The Vanishing Alchemist				

**Think Tank:** *On the back of the paper, write a paragraph discussing the similarities/differences between science and "magic."*

<http://www.cricketmedia.com/teacher-guides>

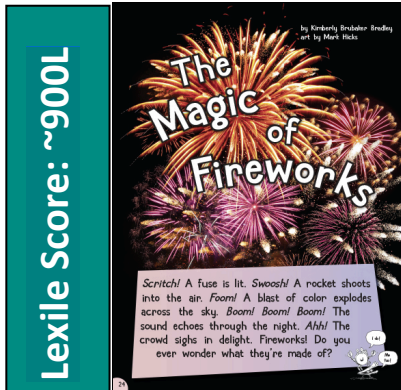


# Ask® Teacher Guide: October 2020

## The Magic of Fireworks

pp. 24–28, Expository Nonfiction

With our eyes to the sky, the anticipatory whistle and boom fill the air, and we are dazzled by the beautiful explosions above. This article explores the chemical reactions that ignite fireworks, as well as the careful planning necessary to make a pyrotechnic show safe and enjoyable.



## RESOURCES

- Burning Bright

## OBJECTIVES

- Students will learn how fireworks are the result of chemical reactions.
- Students will examine the function of various explosive structures.
- Students will create firework scratch art to illustrate a fact from the article.

## KEY VOCABULARY

- **mortar** (p. 26) a sturdy vessel; metal tube packed with explosive materials
- **pyrotechnician** (p. 25) a person trained to be responsible for the safe storage, handling, and functioning of explosives
- **stars** (p. 25) small, hard pellets inside explosives made of a paste of black powder and other chemicals to give off light after ignition

## ENGAGE

**Conversation Question:** How did alchemy shape modern science?

Review the definition of onomatopoeia (words that describe the sound associated with the object). Tell students that the following words lead the article: *Scratch! Swoosh! Foom! Boom! Ahh!* Ask students to guess the subject of the article, and then proceed to the vocabulary activity for extra clues.

## INTRODUCE VOCABULARY

Discuss the key vocabulary words and definitions with your students. Ask them to identify the category that all of these words belong to (fireworks). Have students share experiences that they have had watching fireworks. What other words could fit into this category? List responses on the board and add new words after reading the article.

## READ & DISCUSS

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

- What is an explosion?
- What role did alchemists play in the invention of gunpowder?
- Why do sheds used for making fireworks have thick walls and thin roofs?
- Why do fireworks explode in different colors?
- How are music and fireworks timed for a firework show?

## CONCEPT/SKILL FOCUS: Structure and Function

**INSTRUCT:** Elicit from students that the main idea of the article is to provide information that details how specific chemical reactions are responsible for creating the magic of a firework show. Present the graphic organizer, *Burning Bright*, and tell students that they will be using information from the article to record the function of various firework structures that are necessary for creating these explosions.

**ASSESS:** Circulate and discuss content with students. Collect graphic organizers to assess their ability to understand the **structure and function** relationship.

## EXTEND

**Art** Have students review the article and choose one new fact that they learned about fireworks. Students will create a firework illustration to attach to their fact by using a “scratch art” technique:

1. Entirely color a heavyweight piece of paper using colorful crayons.
2. Add a drop of soap to black tempera paint and cover over the crayon.
3. Let dry, and then use a pointed object (stick, paper clip) to scratch out the colorful lines of fireworks. Display finished work.

# Burning Bright

Use information from the article, “The Magic of Fireworks,” to record the function of each structural element.

Structure	Function
fuse	
stars	
shells	
mortar	
black powder (gunpowder)	