

Ask®

Fairy Tale Science

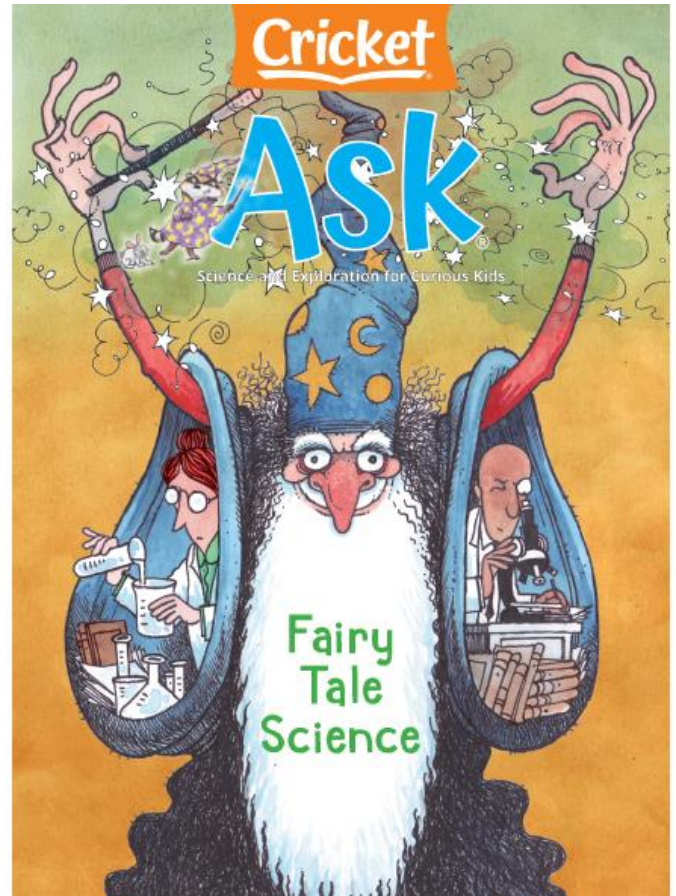
Readers of all ages enjoy fairy tales, as the storyline is never limited to reality. Magic spells, evil witches, and fantastical creatures bring us to the edge of our imaginations. This issue of ASK explores how countless fairy tales are rooted in biology, chemistry, and the principles of physics.

CONVERSATION QUESTION

How does science resemble fantasy?

TEACHING OBJECTIVES

- Students will learn how advancements in science can produce magical outcomes.
- Students will learn about the possible connection between prehistoric bones and fairy tale beasts.
- Students will learn about the invasive plant species Kudzu.
- Students will compare and contrast.
- Students will construct explanations.
- Students will classify plants.
- Students will use a mathematical process to solve a word problem.
- Students will research an example of a story that was created to explain the unknown.
- Students will create a fairy tale around a given moral.



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

- **Fairy Tale Science**
Expository Nonfiction
- **Dragons & Dinosaurs**
Expository Nonfiction
- **Jack and the Giant Kudzu**
Historical Fiction

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Fairy Tale Science

pp. 6–13, Expository Nonfiction

Advancements in science have made dreams of flying and instant communication a reality. This article compares fairy tale magic to the scientific breakthroughs looming in the near future.



RESOURCES

- Compare and Contrast: Fantastical Facts

OBJECTIVES

- Students will learn how advancements in science can produce magical outcomes.
- Students will compare and contrast.
- Students will use a mathematical process to solve a word problem.

KEY VOCABULARY

- **dormant (p. 7)** not active but able to become active
- **tempered (p. 8)** brought to the desired hardness or strength by heating and cooling
- **camouflage (p. 13)** to hide something by covering it up or making it harder to see

ENGAGE

Conversation Question: How does science resemble fantasy?

Discuss magical realism with the class, defined as a genre of literature that depicts the real world as having an undercurrent of magic or fantasy. Arrange the class into small groups to discuss examples of literature and film in which the setting is still grounded in the real world, but fantastical elements are the norm. (Ex: *Where the Wild Things Are* by Maurice Sendak, *James and the Giant Peach* by Roald Dahl, the “Harry Potter” series by J.K. Rowling) Have students identify common themes and elements in the stories.

INTRODUCE VOCABULARY

Post and discuss the three vocabulary words and definitions. Have students Think-Pair-Share with a partner. Give them the following directives, one at a time:

1. Discuss why plants or animals would go **dormant**.
2. Where might **tempered** glass be used?
3. How does **camouflage** serve animals in the wild?

READ & DISCUSS

Reinforce comprehension of the concepts presented in the article by using the following questions to direct a discussion.

1. What “magical ideas” have scientists turned into reality?
2. How can figuring out hibernation affect humans?
3. How can sapphires be made in a lab?
4. What are the challenges to communicating with animals? How is progress being made?
5. How are scientists working toward creating a viable one-person flying machine?

SKILL FOCUS: Compare and Contrast

INSTRUCT: Students will compare and contrast fairy tale magic and legitimate science. Discuss the elements on the *Compare and Contrast: Fantastical Facts* worksheet. Instruct students to work in pairs to revisit the text and underline information that will be helpful for completing the worksheet. Have the partners record the data on the worksheet. Then have students work individually to complete the THINK TANK activity at the bottom of the worksheet.

ASSESS: Reconvene and review the worksheet with the class. Invite students to read their comparison paragraphs aloud.

EXTEND

Mathematics: Present the following word problem, based on information from article page 11: *Xie Qiuping of China holds the current world record for the longest hair at 18 feet long. How long would her hair be if she cut off 53 inches?* Remind students that they will need to convert measurements (1 foot=12 inches) in order to calculate correctly. Instruct them to use the Read-Draw-Write process to show their work. (**Answer:** 163 inches = 13.591 feet, approximately)

Fantastical Facts

Compare and Contrast Record the information on the chart and then complete the assignment with the THINK TANK activity below.

Elements	Fairy Tale Magic	Actual Science
glass slippers		
gold		
gems		
invisibility cloak		

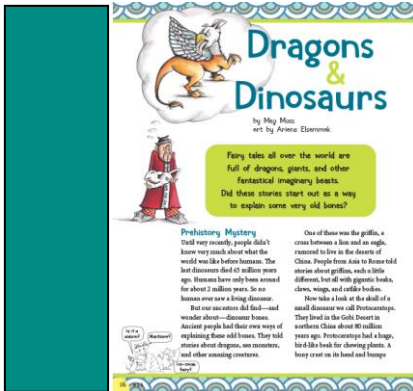
THINK TANK: Choose one of the pairs from the chart and compare and contrast the elements in paragraph form.

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Dragons & Dinosaurs

pp. 16–21, Expository Nonfiction

Fairy tales all over the world portray magical worlds brimming with dragons, giants, and other fantastical beasts. This article takes readers on a journey back in time to discover how unearthed dinosaur bones could be the inspiration behind these imagined creatures.



RESOURCES

- Constructing Explanations: Beastly Bones
- Mini-Research Outline

OBJECTIVES

- Students will learn about the possible connection between prehistoric bones and fairy tale beasts.
- Students will construct explanations.
- Students will research an example of a story that was created to explain the unknown.

KEY VOCABULARY

- crest (p. 16)** a comb or tuft of feathers, fur, or skin on the head of an animal
- paleontologists (p. 19)** scientists who study fossils
- sauropod (p. 20)** a large, plant-eating dinosaur that had a long neck, a long tail, and a small head

ENGAGE

Conversation Question: How does science resemble fantasy?

Encourage students to think creatively while bringing elements of “Dragons & Dinosaurs” to life. Cut drinking straws to various lengths. Give each student ten random pieces. Have students work in pairs to combine their “bones” and create an animal skeleton. The only rule is that the skeleton cannot be from a known animal. Have students glue the pieces onto a piece of colored paper and draw the outline of animal/beast around the bones. Give students a few minutes to do an “art walk” around the room to admire classmates’ skeletons. Discuss the challenges of trying to recreate an animal from excavated bones—a challenge faced by ancient people and modern paleontologists.

INTRODUCE VOCABULARY

Display the following statements and underline the key vocabulary terms. Review how to infer the meanings of new words by using context clues and background knowledge. Then have partners work together to determine the meaning of each word. Reveal definitions.

- The bird’s crest was brightly colored and stood tall on its head.
- Dr. Rocco is a paleontologist and a world authority on fossils.
- Scientists wondered why sauropods developed long necks.

READ & DISCUSS

Post and discuss questions prior to reading. Have students read the article independently and answer the questions in full sentences.

- Why did ancient people tell stories about fantastical creatures?
- What kinds of questions do scientists ask when they find bones?
- What was one of the first dinosaurs to be studied?
- Why does the author say the Apatosaurus had an identity crisis?
- How do computer models help scientists reconstruct dinosaurs?

SKILL FOCUS: Construct Explanations

INSTRUCT: Advise students to review the article and review the theories on how the recovered bones of dinosaurs may explain the inspiration for fairy tale creatures. Distribute the *Constructing Explanations: Beastly Bones* graphic organizer. Tell students they will use information directly from the text to complete the two columns of the chart. Students should use text details to explain ancient and modern interpretations.

ASSESS: Collect and review the worksheets to check skills.

EXTEND

Research: Tell students that stories and myths were created to explain the unknown in the days predating modern science. For example, in ancient Greece, earthquakes were thought to be caused by the god Poseidon angrily banging his trident on the sea floor. Have students research an example to share with the class. Use the *Mini-Research Outline* provided.

Beastly Bones



Constructing Explanations Review the text to explain how unearthed bones were believed to have belonged to fantastical creatures in the past. Then provide the modern-day scientific explanations.

BONES	Ancient Explanations	Modern Explanations
	1.	1.
	2.	2.
	3.	3.

Mini-Research Outline

Choose a myth and then complete the mini-research outline below.

1. What continent is the tale/myth from? _____

2. What is the tale/myth attempting to explain? _____

3. Who are the characters? _____

4. Describe the characters. _____

5. Explain the time and place in which the tale/myth originated. _____

6. Was the tale/myth believable at the time? Why/why not? _____

7. Is the tale/myth believable now? Why/why not? _____

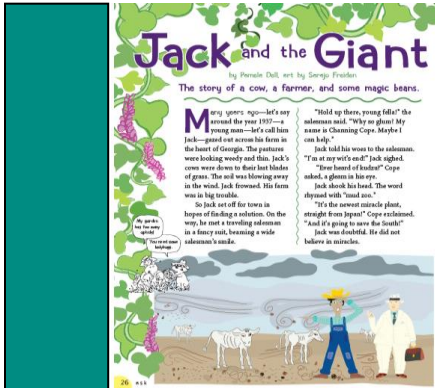
8. How and why did the explanation change as science advanced? _____

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Jack and the Giant Kudzu

pp. 26–28, Historical Fiction

Similar to “Jack and the Beanstalk,” this story tells about a boy who traded his money for a miracle plant that would save his farm. Readers will learn that while it did indeed create green fields to feed his animals, the magic vine created new problems.



RESOURCES

- Classifying Information: Messy Morals

OBJECTIVES

- Students will learn about the invasive plant species Kudzu.
- Students will classify plants.
- Students will create a fairy tale around a given moral.

KEY VOCABULARY

- glum** (p. 26) sad or depressed
- soil erosion** (p. 27) a slow process that happens when wind and water wash away soil
- scaled** (p. 28) climbed to the top of something

ENGAGE

Conversation Question: How does science resemble fantasy?

Introduce “Jack and the Giant Kudzu.” Ask students if the title reminds them of a specific fairy tale. (“Jack and the Beanstalk”) Tell students that the story they are about to read follows the events of “Jack and the Beanstalk,” but, as the title implies, it has a twist. It also has an element of truth. Ask students what they know about fractured fairy tales.

INTRODUCE VOCABULARY

Post and review the three vocabulary words and definitions. Allow students to roll a die for vocabulary activities for each word.

- 1 = Use the word in a sentence.
- 2 = Draw a picture that demonstrates the word.
- 3 = Act out the word and have a classmate guess which word it is.
- 4 = Make up a silly story using all three words. Share it with a classmate.
- 5 = Break the word into syllables and list the part of speech.
- 6 = Make a connection between the word and your life, a book, or a movie.

READ & DISCUSS

Lead a post-reading discussion based on the following questions.

1. Why was Jack’s farm in big trouble?
2. Who did Jack meet on his way into town?
3. What was the salesman’s solution to Jack’s problem?
4. What happened after Jack’s wife threw the beans out a window?
5. Why doesn’t the story have a happy ending?

SKILL FOCUS: Classifying Plants

INSTRUCT: Scientists classify plant life in many different ways.

Classifying plants helps researchers to study the diversity of life and to group plants in a logical manner. Remind students that although “Jack and the Giant Kudzu” reads like a fairy tale, it is an accurate account of the spread of an invasive plant (kudzu). Invasive species plants are defined as plants that are not native to a particular area. Once introduced, invasive species establish quickly, reproduce, and spread, causing harm to the ecosystem. Students will use information from the story to answer the questions in **Part I** of the *Classifying Information: Messy Morals* organizer and other resources to complete **Part II**.

ASSESS: Review the worksheet and have students share their research.

EXTEND

Language Arts: Discuss the moral of the story, which is stated at the bottom of page 28: “Be careful what you wish for.” Students will write their own fairy tales that express this moral. Tales should include characters, magic, obstacles/tasks, moral/lesson, resolution. Have students read aloud their tales. Discuss how very different stories can have the same moral.

Messy Morals

Classifying Information Use information from the story to complete **Part I** of the chart. Use book and online resources to detail a different invasive species to complete **Part II**.

PART I

Invasive species:	<i>kudzu</i>
Appearance:	
Native to:	
Now exists in:	
Threat to the ecosystem:	

PART II

Invasive species:	
Appearance:	
Native to:	
Now exists in:	
Threat to the ecosystem:	