

Ask®

The Sky at Play

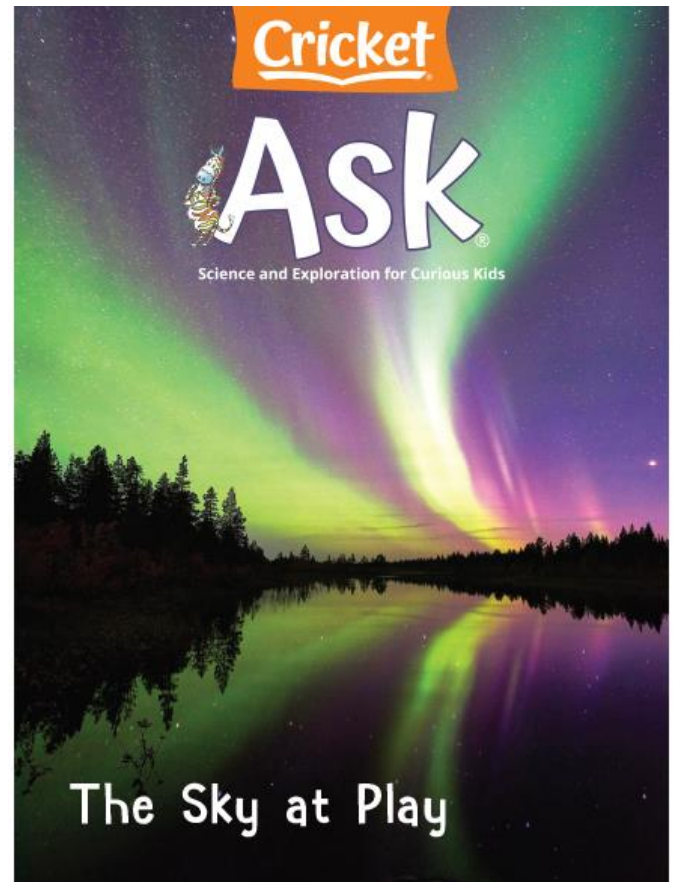
British physicist and author Stephen Hawking once said, “Remember to look up at the stars and not down at your feet. Try to make sense of what you see and wonder about what makes the universe exist. Be curious.” This month’s issue of ASK will educate readers about the wonders of the sky and emphasize the importance of staying curious.

CONVERSATION QUESTION

How does science help us understand the sky?

TEACHING OBJECTIVES

- Students will learn a multitude of facts about clouds.
- Students will learn about the variety of clouds that fill our skies.
- Students will learn the scientific reason that the sky is blue.
- Students will sequence and explain a process.
- Students will obtain information from a nonfiction text.
- Students will construct explanations and questions.
- Students will complete a creative arts project exploring the phenomenon of pareidolia.
- Students will participate in a cloud formation science experiment.
- Students will conduct research to satisfy a science-based question.



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.

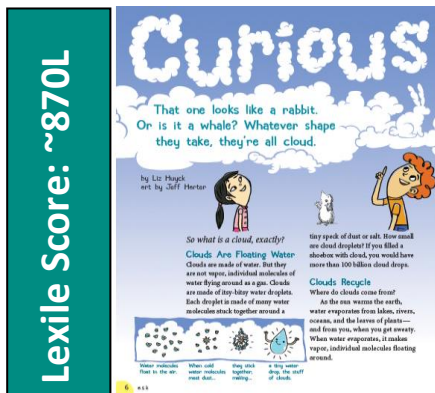
SELECTIONS

- **Curious Clouds**
Expository Nonfiction, ~870L
- **Cloud Spotting**
Expository Nonfiction, ~1020L
- **Why Is the Sky Blue?**
Realistic Nonfiction, ~630L

Curious Clouds

pp. 6–11, Expository Nonfiction

Readers will be astounded to learn that the water that falls to the earth from a cloud is the same water that dinosaurs once drank. This article explains the water cycle and examines the spellbinding nature of clouds.



RESOURCES

- Sequence a Process: Look Up

OBJECTIVES

- Students will learn a multitude of facts about clouds.
- Students will sequence and explain a process.
- Students will complete a creative arts project exploring the phenomenon of pareidolia.

KEY VOCABULARY

- vapor (p. 6)** a substance that is in the form of a gas or that consists of very small drops or particles mixed with the air
- evaporates (p. 6)** changes from a liquid into a gas
- atmosphere (p. 11)** the whole mass of air that surrounds the Earth

ENGAGE

Conversation Question: How does science help us understand the sky?

Undoubtedly, the best way to learn about clouds is to head outdoors and look up! Arrange to take the class outside, if possible, or gather students by a large window to cloud gaze. Pose these questions: *What can you determine about the current weather by looking at the sky? What can you predict about the upcoming weather based on the clouds? How do clouds affect the temperature?*

INTRODUCE VOCABULARY

Post and discuss the key terms and the title of the article. Be sure that students understand the definitions before reading the article. As a post-reading activity, have students use the three vocabulary words to summarize the article in paragraph form.

READ & DISCUSS

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

- What are clouds made of?
- Where do clouds come from?
- Why are clouds heavy?
- How do clouds stay afloat?
- What kinds of things are found in clouds?
- How do clouds both cool and heat the earth?
- What are the four types of clouds?

SKILL FOCUS: Sequence and Explain

INSTRUCT: Review the article and guide students in discussing the process by which clouds are formed. Distribute the *Sequence a Process: Look Up* graphic organizer. Instruct students to condense the process into four main steps, from water molecules to cloud formation. Have students record their explanations on the worksheet.

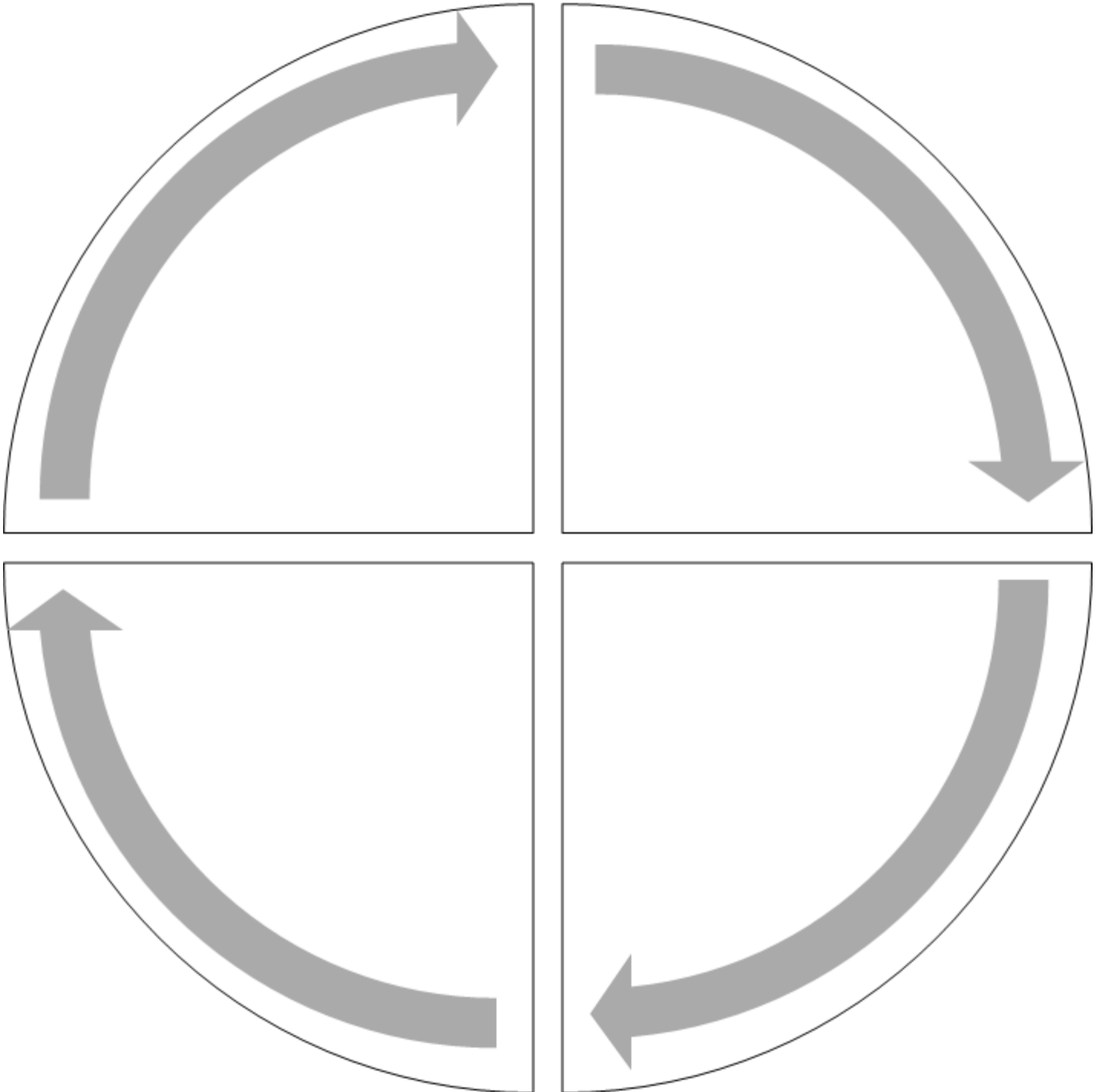
ASSESS: Circulate as students are working and have them retell the process in their own words. Collect charts and evaluate for accuracy.

EXTEND

Creative Arts: Teach students a new word: *pareidolia*. Explain to students that this is the scientific explanation for the ability to see shapes or make pictures out of randomness, imposing meaningful interpretation. Review the introductory activity of this guide and ask if any students saw images in the clouds. Tell students that they can experience pareidolia with the following project. Give each student a blue piece of paper and then have them come to the table, one by one, and use a spoon to splatter white paint onto their paper. Set papers aside to dry. The following day, have students use markers to create a scene around their “cloud object,” turning it into something new. Arrange an art walk so that students can enjoy the work of their peers. Invite a neighboring class to view the work.

Look Up

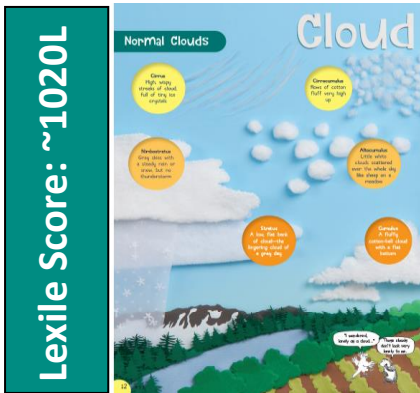
Sequencing a Process Reread the article and highlight sentences that detail the process of cloud formation. Condense the process into four steps. Number and explain each step in the diagram below.



Cloud Spotting

pp. 12–15, Expository Nonfiction

This article takes readers beyond simple rain clouds and snow clouds by supplying the scientific names for a variety of clouds. The photographs and straightforward text are great resources for students studying the weather.



RESOURCES

- Obtain Information: A Cloudy Outlook

OBJECTIVES

- Students will learn about the variety of clouds that fill our skies.
- Students will obtain information from a nonfiction text.
- Students will participate in a cloud formation science experiment.

KEY VOCABULARY

- updraft** (p. 15) a strong upward flow of air
- whirlpools** (p. 15) formed when layers of air spin so rapidly in a circle as to produce a depression in a body of water or water droplets

ENGAGE

Conversation Question: How does science help us understand the sky?

Acknowledge that the weather often plays a role in our daily life, in both good and bad ways. Give examples (a rained-out soccer game, a snow day) and have students add their own thoughts. Pose these questions: *Without using technology, how can you tell what weather is coming? What clues in nature can help you form your own prediction?* Introduce the article “Cloud Spotting.”

INTRODUCE VOCABULARY

Post the two key terms and review compound words (words that are formed when two smaller words are joined together to make a new word). Provide several examples: *thunderstorm*, *toothbrush*, *starfish*. Have students bisect the vocabulary words and define each part. Then post the meanings provided and compare definitions.

READ & DISCUSS

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

- Why do you think the article classifies some clouds as normal and some clouds as weird?
- What kinds of clouds look like “rows of fluff” very high up?
- Classify the clouds on pages 12–13 as low, middle, or high clouds.
- How does a funnel cloud form? What does it indicate?
- What usually causes hole-punch clouds?

SKILL FOCUS: Obtain Information

INSTRUCT: Guide students to obtain information from the text, captions, and photos in the article. Remind them that the article was written to teach readers about the characteristics of different clouds. Introduce the *Obtain Information: A Cloudy Outlook* worksheet. Instruct students to correctly match the descriptions on the right with the cloud names listed on the left.

ASSESS: Review graphic organizers with the class and discuss.

EXTEND

Science: Perform the “Cloud in a Jar” experiment with the class.

Materials: glass jar with a lid, aerosol hairspray, very hot water, ice cubes. **Procedure:** (1) Fill 1/3 of the jar with the hot water and swirl around to warm the sides of the jar. (2) Turn the lid upside down and place it on top of the jar, placing several ice cubes on the lid. Leave it as is for about 20 seconds. (3) Remove the lid quickly and spray a bit of hairspray into the jar. (4) Replace the upside-down lid with the ice cubes on top. (5) Watch the cloud form! **Explanation:** Adding hot water to the jar creates some water vapor due to the ice cubes on top. Water vapor condenses when it cools. It condenses onto the hairspray (in nature this would be dust, ash, etc.) and a cloud forms.

A Cloudy Outlook

Obtain Information Match the description of the cloud on the right with its correct name on the left. Refer to the article for accuracy.

- | | |
|------------------------|---|
| 1. _____ Cirrus | A. clumpy clouds that form a sheet |
| 2. _____ Nimbostratus | B. little white clouds scattered over the whole sky |
| 3. _____ Noctilucent | C. disk-shaped clouds that form as wet air flows up and over |
| 4. _____ Stratocumulus | D. gray skies with rain or snow but no thunderstorm |
| 5. _____ Stratus | E. a huge thunderstorm cloud with a flat top |
| 6. _____ Roll Cloud | F. a fluffy cotton-ball cloud with a flat bottom |
| 7. _____ Altocumulus | G. long, tube-shaped clouds that form when damp air rolls over cool air |
| 8. _____ Cirrostratus | H. high, wispy streaks full of tiny ice crystals |
| 9. _____ Lenticular | I. waves form where two layers of air move at different speeds |
| 10. _____ Cumulus | J. low, flat bank of clouds; a lingering gray |
| 11. _____ Cumulonimbus | K. thin, gauzy veil of cloud sometimes forming a halo around the sun |
| 12. _____ Wave Cloud | L. thin, icy clouds that catch light from the sun; “night shining” |



Why Is the Sky Blue?

pp. 16–17, Realistic Nonfiction

It seems people have asked the question “Why is the sky blue?” since the beginning of time. Students will learn how John Tyndall answered that question in 1859 for theologians and toddlers alike.



RESOURCES

- Construct Explanations: Why, Oh Why?

OBJECTIVES

- Students will learn the scientific reason that the sky is blue.
- Students will construct explanations and questions.
- Students will conduct research to satisfy a science-based question.

KEY VOCABULARY

- reflecting** (p. 16) the act of casting back light, heat, or sound
- particles** (p. 17) very tiny fragments invisible to the human eye
- pesky** (p. 17) annoying or irritating

ENGAGE

Conversation Question: How does science help us understand the sky?

Define *curiosity* for the class as “a strong desire to know or learn something.” Invite students to share a time when they were curious about something and describe how they satisfied their curiosity. Pose these questions: *Is curiosity always a good thing? Why or why not?* Introduce the article “Why Is the Sky Blue?”

INTRODUCE VOCABULARY

Post and discuss the key vocabulary words and definitions on the board. Then display the following cloze sentences for students to complete:

- In spring, pollen ____ cause many people to sneeze and feel tired.
- Some people use tea tree oil to repel ____ mosquitos.
- I love to watch the pond ____ the blue sky on a clear day.

READ & DISCUSS

As a post-reading activity, discuss the following questions:

- Why does the article refer to John Tyndall as an “irritating child”?
- Why is science a good field for someone who is curious? What other fields might be a good fit for someone displaying John’s traits?
- What did John notice when experimenting with light beams?
- How did John Tyndall explain why the sky is blue?
- How did Tyndall’s discovery help future scientists?

SKILL FOCUS: Construct Explanations & Questions

INSTRUCT: Students will construct explanations for early, incorrect answers to the question of why the sky is blue. Then they will explain John Tyndall’s correct scientific explanation. Distribute the *Construct Explanations: Why, Oh Why?* graphic organizer. Instruct students to reread the article and underline relevant content. Then have students work with a partner to complete the top half of the worksheet.

Next, point out that there are many age-old questions that have been pondered for thousands of years. Have partners list a few of these questions in the space provided on the bottom half of their worksheets. Questions should be answerable now due to scientific advancements.

ASSESS: Review the worksheet as a whole class. Then work with students to compile a master list of students’ age-old questions. Display the list.

EXTEND

Research: Have students work in groups of four to further investigate and answer one of the age-old questions. Be sure to group students with like interests. Group responses should include the following: the question, clearly stated; at least two early and incorrect answers to the question; the correct answer; an explanation of who, when, and how the question was answered. Have groups present their research to the class. Discuss the importance of asking questions and staying curious.

Why, Oh Why?

Construct Explanations Refer to the article and locate information about early responses to the question posed. Then explain how John Tyndall was able to arrive at the correct explanation.

Early Explanations	John Tyndall's Scientific Explanation
<i>Why is the sky blue?</i> 1. 2. 3.	<i>Why is the sky blue?</i>

Construct Questions Work with a partner to list other age-old questions that have been answered due to advancements in science and technology. See the example below.

1. Example: If the earth is spinning, why don't we fall off?

2. _____

3. _____

4. _____

5. _____