

Cobblestone™

ECLIPSE 2024!

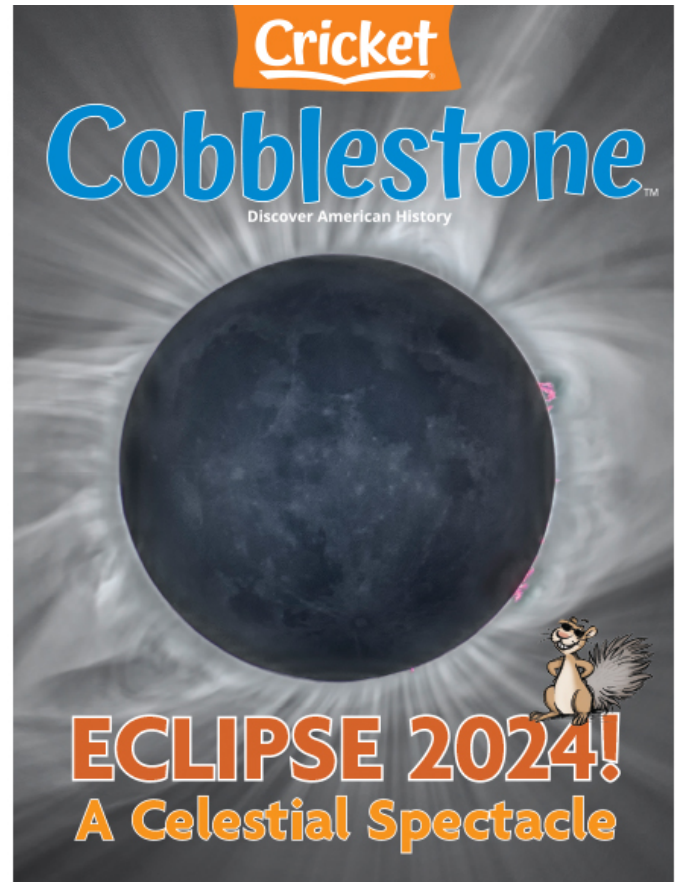
Use the articles, lessons, and activities in this Teacher Guide to learn about the solar eclipse occurring in April 2024.

CONVERSATION QUESTION

What do history and science teach us about what eclipses are, and what will occur during the 2024 solar eclipse?

TEACHING OBJECTIVES

- Students will learn about the Saros Cycle and the role of ancient Babylonian astronomers.
- Students will analyze how the ancient Babylonians influenced the understanding of solar eclipses.
- Students will generate questions about ancient eclipses.
- Students will write a narrative from the point of view of an ancient human who viewed an eclipse.
- Students will learn about Dr. Jay Pasachoff and his travels to see total eclipses.
- Students will compare the environmental conditions of locations.
- Students will create a timeline for preparing to scientifically view an eclipse.
- Students will evaluate the influence of Dr. Pasachoff's teaching methods.
- Students will evaluate the influence of Pasachoff's teaching.
- Students will create a poster.



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

- **The Saros Cycle**
Expository Nonfiction
- **Traveling to Totality**
Expository Nonfiction
- **Solar Eclipses' Biggest Fan**
Expository Nonfiction

The Saros Cycle

pp. 14–15, Expository Nonfiction

Use this article about the Saros Cycle to learn about how ancient Babylonians helped humans understand solar eclipses.



OBJECTIVES

- Students will learn about the Saros cycle and the role of ancient Babylonian astronomers.
- Students will analyze how the ancient Babylonians influenced the understanding of solar eclipses.
- Students will generate questions about ancient eclipses.
- Students will write a narrative from the point of view of an ancient human who viewed an eclipse.

KEY VOCABULARY

- **celestial** (p. 14) part of or in the sky or universe, such as planets or stars
- **derivation** (p. 15) the formation of a word from another word or word base
- **manuscript** (p. 15) a book, document, or piece of music written by hand rather than typed or printed

ENGAGE

Conversation Question: What do history and science teach us about what eclipses are, and what will occur during the 2024 solar eclipse?

Ask students if they know what an eclipse is, either *solar* or *lunar*. Have they ever seen one? Do they know that a solar eclipse will happen in April of 2024? Ask students to think about ancient people who had never seen an eclipse. What might they think it was? Would they be scared? Then introduce the ancient Babylonians, who first helped people understand what eclipses were and discovered a cycle for their occurrence.

INTRODUCE VOCABULARY

Define each word with students. Then arrange students in small groups and have them practice using two or even three of the words in a single sentence. Finally, tell students to look for these words as they read the story.

READ & DISCUSS

Have students read the article. Then use these questions for discussion:

1. What did ancient people do to begin to understand the cycle of eclipses?
2. Why did being able to predict eclipses help the Chaldean tribe?
3. Why are lunar eclipses easier to see than solar eclipses?
4. What was the pattern that the Chaldeans discovered for eclipses?
5. Where did the astronomer Edward Halley get the idea for naming the eclipse cycle? Was his naming correct?

CONCEPT/SKILL FOCUS: Generating Questions

INSTRUCT: Divide students into small groups, and then instruct them to reread the first part of the article about the Chaldean tribes and their discoveries about eclipses. Using that information, have each group develop three questions that they, as members of the Chaldean tribe, might have asked their astronomers/priests about eclipses. What would they ask about the sudden occurrence of an eclipse? How would their questions change and what would they be like when they began to realize that this was a predictable event?

ASSESS: Have each group read their three questions to the class and discuss how the tribe members' understanding of eclipses might have evolved over time.

EXTEND

Language Arts: Invite students to write a creative narrative from the point of view of an ancient human who was viewing an eclipse without knowing what it was. How would they react? What might they think?

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Traveling to Totality

pp. 26–29, Expository Nonfiction

Use this article about Dr. Jay Pasachoff's travels following eclipses to learn about what is required for these scientific expeditions.



RESOURCES

Sequence of Events

OBJECTIVES

- Students will learn about Dr. Jay Pasachoff and his travels to see total eclipses.
- Students will compare the environmental conditions of locations.
- Students will create a timeline for preparing to scientifically view an eclipse.

KEY VOCABULARY

- **tripod** (p. 27) a three-legged stand for supporting a camera or other equipment
- **totality** (p. 27) the moment during an eclipse when the sun or moon is completely covered up
- **corona** (p. 27) the outmost part of the Sun's atmosphere, which can be seen during an eclipse

ENGAGE

Conversation Question: What do history and science teach us about what eclipses are, and what will occur during the 2024 solar eclipse?

Ask students what they think scientists do in order to study a solar eclipse. Have them consider the location of an eclipse, where the eclipse can best be seen, and what equipment might be needed. Why is it necessary for scientists to plan their scientific trips long before they happen? What kind of information might they try to collect and bring back with them? Then introduce Dr. Jay Pasachoff and his experience as a scientist before reading the article that was written by him in 2017. Ask students to think about all the things he does for a single eclipse viewing.

INTRODUCE VOCABULARY

Define each word with students. Then have each student choose one of the three words and create a drawing illustrating that word, and include a sentence using the word. Have students compare their drawings and sentences for accuracy.

READ & DISCUSS

Have students read the article. Then use these questions for discussion:

1. Why is it important for Dr. Pasachoff to plan his trips a year in advance?
2. What kinds of things is Dr. Pasachoff thinking about when he plans one of these trips?
3. Dr. Pasachoff describes three different eclipse-viewing trips he took. What are some of the obstacles he had to deal with at each location?
4. Why does he have to know in advance what his focus will be for each trip?

CONCEPT/SKILL FOCUS: Sequence of Events

INSTRUCT: Explain to students that this article describes what Dr. Pasachoff and his team do before and after a viewing trip. There are certain things that they do before, during, and afterwards. Using the *Sequence of Events* graphic organizer, have each student fill out a timeline for one of Dr. Pasachoff's expeditions.

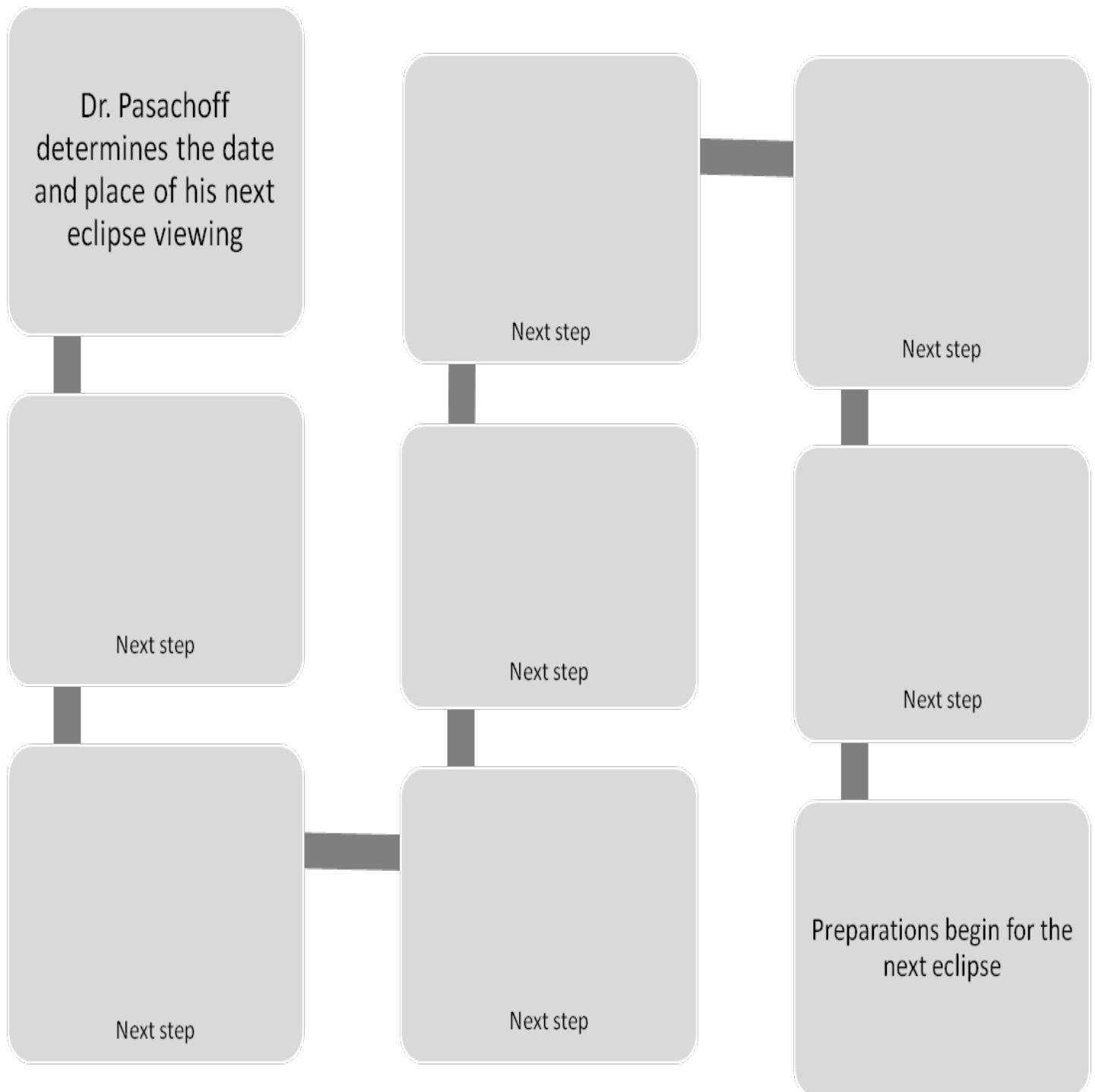
ASSESS: Have students compare their organizer with the rest of the class and discuss any differences, especially how each student classified the information.

EXTEND

Engineering: Invite students to brainstorm and invent a possible new tool or device to use for safely viewing the next solar eclipse in 2042. Have them sketch their invention in detail and explain it with text.

Sequence of Events

Understanding the sequence of events helps us see how scientists like Dr. Pasachoff planned their scientific expeditions to view eclipses and how it determined their goals. Using the information from the article, create the sequence of events before, during, and after an expedition to view an eclipse.

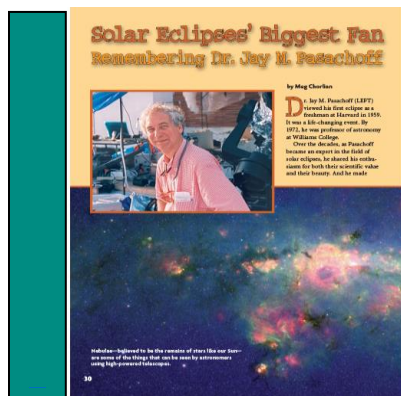


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Solar Eclipses' Biggest Fan

pp. 30–35, Expository Nonfiction

Use this interview with two of Dr. Pasachoff's students to learn about his teaching and his legacy.



OBJECTIVES

- Students will learn about Dr. Pasachoff's students and the way he taught them.
- Students will evaluate the influence of Pasachoff's teaching.
- Students will create a poster.

KEY VOCABULARY

- **observatory** (p. 31) a building from which scientists can watch the planets, the stars, and the weather
- **infectious** (p. 32) likely to spread or influence other people quickly
- **optics** (p. 33) the study of light or the use of light in technical instruments

ENGAGE

Conversation Question: What do history and science teach us about what eclipses are, and what will occur during the 2024 solar eclipse?

Ask students to think about some of the best classes or teachers they've ever had (without using specific names). These should be classes where they learned a lot or became excited about the topic. What made the learning so exciting? What did they do in that class? Did they spend a lot of time reading, or a lot of time doing hands-on activities?

Then introduce the interview with two of Dr. Pasachoff's students. What kinds of things did they do that made them want to be astronomers like their teacher?

INTRODUCE VOCABULARY

Define each word with students. Then arrange students in small groups and have them create a sentence for each word *that does not use the word itself*. For example, "His father is going to take us to a special place where we can see the planets clearly." Then have groups trade sentences and see if they can match them to the right word.

READ & DISCUSS

Have students read the article. Then use these questions for discussion:

1. What did Dr. Pasachoff do with his students that helped them become astronomers?
2. Did these two students go to college intending to study astronomy? If not, what made them decide to?
3. What did Dr. Pasachoff consider to be "the power of eclipses"?
4. Why was Dr. Pasachoff's ability to talk about science to people "in their own language" so important?

CONCEPT/SKILL FOCUS: Evaluate Influence

INSTRUCT: Explain to students that this article describes Dr. Pasachoff in the words of his former students in their own words. These students were able to receive special attention from their professor, in a way that all students wouldn't have. Then have each student write a one-paragraph evaluation of Dr. Pasachoff as if he was their teacher, specifically saying if they did or did not like his style of teaching and why or why not.

ASSESS: Have students read their paragraph to the rest of the class and discuss their point of view, especially how each student felt about how they thought they might like or not like the class.

EXTEND

Art: Invite students to use print and digital sources to research safety rules for viewing an eclipse. Then have them create a poster to tell other students the DOs and DON'Ts of viewing the solar eclipse.