Teacher's Guide

MAGAZINE ARTICLES

Contents

Teacher's Guide for *Dig: What's Up with Eclipses?*

OVERVIEW

In this magazine, readers will learn about solar eclipses, one of which will be visible from portions of the United States this summer.

Dig: What's Up with Eclipses? *includes information about scientific and archaeological discoveries related to eclipses as well as how to view an eclipse safely.*

ESSENTIAL QUESTION:

How has studying the sun impacted human development?

We invite you to use this magazine as a flexible teaching tool, ideal for providing interdisciplinary instruction of social studies and science content as well as core literacy concepts. Find practical advice for teaching individual articles or use a mini-unit that helps your students make cross-text connections as they integrate ideas and information.

READ INDIVIDUAL ARTICLES PAGES 4 – 13

Each article in this magazine is well-suited for teaching literacy concepts and content area knowledge. For each individual article in this guide, you'll find the following:

TEACH A MINI-UNIT PAGES 15 – 17

Magazine articles can easily be grouped to make cross-text connections and comparisons. Our Mini-Unit allows students to read and discuss multiple articles and integrate ideas and information (CCSS.Reading.9). Discussing multiple articles (CCSS.Reading.9) prepares students to write texts to share and publish in a variety of ways (CCSS.Writing.2).

Skills and Standards Overview

Essential Question: How has studying the sun impacted human development?

MAGAZINE ARTICLES	CORE CONTENT CONCEPT	LITERACY SKILLS	CORRESPONDING CCSS ANCHOR STANDARDS
Get Ready! Persuasive Essay	Historical events such as eclipses are an example of historical continuity.	• Close Reading • Visualize Imagery • Determine Author's Purpose • Write a Letter	*Reading 1, 2, 3, 4 & 6* *Writing 3*
The What and Why Expository Nonfiction	Historical events such as eclipses are an example of historical continuity.	• Close Reading • Analyze Text Features • Interpret Visual Information • Conduct an Interview	*Reading 1, 2, 3, 5 & 7* *Speaking & Listening 1 & 6*
The Saros Cycle Expository Nonfiction	Historical events such as eclipses are an example of historical continuity.	• Close Reading • Analyze Text Structure • Evaluate Evidence • Research and Write an Essay	*Reading 1, 2, 3, 5 & 8* *Writing 2, 7 & 8*
Onsite in the 7th Century B.C.E. Expository Nonfiction	People's perspectives influence the information available in the sources they create.	• Close Reading • Interpret Figurative Language • Compare Texts • Present a Monologue	*Reading 1, 2, 3, 4, 8 & 9* *Speaking & Listening 4 & 6*
The Power of Prediction Expository Nonfiction	People's perspectives influence the information available in the sources they create.	• Close Reading • Determine Author's Purpose • Evaluate Evidence • Write a Play	*Reading 1, 2, 3, 6 & 8* *Writing 3*
Determination Wins Expository Nonfiction	Individuals can shape significant historical change.	• Close Reading • Evaluate Word Choice • Interpret Visual Information • Give a Multimedia Presentation	*Reading 1, 2, 3, 4 & 7* *Speaking & Listening 4 & 5*
Up and Away! Expository Nonfiction	Individuals can shape significant historical change.	• Close Reading • Determine Author's Purpose • Evaluate Evidence • Write a News Article	*Reading 1, 2, 3, 6 & 8* *Writing 2*
Edison's Eclipse Adventure Expository Nonfiction	Individuals can shape significant historical change.	• Close Reading • Analyze Text Structure • Interpret Visual Information • Write an Argument	*Reading 1, 2, 3, 5 & 7* *Writing 1*
Einstein's Proof Expository Nonfiction	Historical events such as discoveries are an example of historical change.	• Close Reading • Analyze Text Features • Compare Texts • Write a Poem	*Reading 1, 2, 3, 5 & 9* *Writing 3*
Planning an Expedition Narrative Nonfiction	Individuals can shape significant historical change.	• Close Reading • Analyze Point of View • Interpret Visual Information • Write a Proposal	*Reading 1, 2, 3, 6 & 7* *Writing 3*

Comparing Texts: *Reading 9*

Mini-Unit: *Reading 1, 2, & 3; Writing 3*

ARTICLE: Get Ready!

Magazine pages 2 - 3, Persuasive Essay

Lexile Score: 1050

A total solar eclipse will be visible from 12 states on August 21, 2017. This means the moon will block our view of the sun so that only the sun's corona will be visible.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Historical events such as eclipses are an example of continuity.

CROSS-CURRICULAR EXTENSION

Science Learn how stars form and evolve. Classify our sun among the types of stars.

KEY VOCABULARY

magnificent (p. 2) very beautiful or impressive

perspective (p. 3) a way of thinking about and understanding something (such as a particular issue or life in general)

spectacle (p. 2) a very impressive show

totality (p. 3) the whole or entire amount of something

PREPARE TO READ

Use a globe, a flashlight and a ball to demonstrate a solar eclipse. The size of the ball you need will depend on the distance between the ball and flashlight and the size of your light.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- What can you conclude about the author's experience with solar eclipses? Locate details in the text that support your conclusions. *CCSS Reading 1*
- Identify the main idea of the article. Where is it located? Why might the author have placed the main idea there? *CCSS Reading 2*
- How does the author introduce the concept of an eclipse? What information does each section add? How does it lead into the conclusion? *CCSS Reading 3*

Craft and Structure

- **Visualize Imagery** How does the author encourage the reader to visualize elements of the article? Draw pictures of what you imagine and quote the text as captions. *CCSS Reading 4*
- **Determine Author's Purpose** Why did the author write this article? What specific words or phrases clue you in to the author's purpose? Is the article effective? *CCSS Reading 6*

WRITING

Write a Letter Write a letter to a friend or family member in the area of totality and ask if you can visit to view the eclipse. If you don't know anyone in the region, make someone up. Use details from the article to explain why you want to see the eclipse.

ARTICLE: The What and Why

Magazine pages 4 - 8, Expository Nonfiction

Lexile Score: 1180

A solar eclipse forms when the moon comes between the sun and Earth. The eclipse contains four contact points, but totality may not be visible everywhere. In fact it is rare. Space weather and lunar eclipses also impact us.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Historical events such as eclipses are an example of historical continuity.

CROSS-CURRICULAR EXTENSION

English Language Arts Look for other words in English that have "chromos" as part of their construction. What does each word mean?

KEY VOCABULARY

dramatic (p. 5) greatly affecting people's emotions

inject (p. 8) to add (something) to something

silhouette (p. 5) a dark shape in front of a light background

PREPARE TO READ

Show off your sunglasses. Explain that they aren't just a fashion piece. They protect your eyes from harmful radiation. Then explain that the sun's radiation can be harmful to more than just your eyes, but your eyes must be protected while watching an eclipse.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- When is viewing an eclipse dangerous? Cite examples from the text. What would happen if you didn't follow the safety rules? *CCSS Reading 1*
- What is the main theme of the text? How does the author establish and elaborate the theme? *CCSS Reading 2*
- Analyze the phases in a solar eclipse. Create a chart listing the name of each contact, what it looks like, whether you can view it directly, and the name associated with the visual effects. (See chart on page 19.) *CCSS Reading 3*

Craft and Structure

- **Analyze Text Features** How does each subtitle relate to the text that follows it? What is the purpose of the subtitles? *CCSS Reading 5*
- **Interpret Visual Information** Which images model information presented in the text? Cite the paragraph that each image helps to illustrate and explain the model in your own words. *CCSS Reading 7*

SPEAKING AND LISTENING

Conduct an Interview Locate someone who has witnessed a solar eclipse (full or partial) and interview them about the experience. Be sure to include their emotional responses as well as the physical details of the setting. Tape your interview.

ARTICLE: The Saros Cycle

Magazine pages 10 - 11, Expository Nonfiction

The saros cycle, named by Edmond Halley, is used to predict when eclipses will occur. It was first discovered by the Chaldeans.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Historical events such as eclipses are an example of historical continuity.

CROSS-CURRICULAR EXTENSION

Math Use the information in the article to calculate when the next eclipse will occur in each saros cycle mentioned.

KEY VOCABULARY

apply (p. 11) to use (an idea, method, law, etc.) in a particular situation

geometry (p. 10) a branch of mathematics that deals with points, lines, angles, surfaces, and solids

speculate (p. 10) to think about something and make guesses about it

PREPARE TO READ

Show the students a class schedule, a train schedule, and a calendar. Ask what the items have in common. What are they used for and how do they help us? Lead into a discussion of why it may have been helpful for the Babylonians to be able to predict eclipses.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- In your own words, restate the method for determining when an eclipse will occur. *CCSS Reading 1*
- What is the main idea of each subsection of the article? How did you determine the main ideas? *CCSS Reading 2*
- How is Edmond Halley introduced in the text and what contribution did he make to the science of predicting eclipses? *CCSS Reading 3*

Craft and Structure

- **Analyze Text Structure** What is the overall structure of this text? Why do you think the author used this structure? Could another structure work as effectively? *CCSS Reading 5*
- **Evaluate Evidence** What evidence supports the idea that the Chaldeans discovered the means of predicting eclipses? Cite details from the text to support your answer and decide if the evidence is sufficient. *CCSS Reading 8*

WRITING

Research and Write an Essay Research the Babylonians and write an essay about their accomplishments in astronomy. How does their knowledge of astronomy compare to our understanding of it today?

ARTICLE: Onsite in the 7th Century B.C.E.

Magazine pages 12 - 13, Expository Nonfiction

Lexile Score: 1100

Archilochus wrote an eyewitness account of an eclipse during the 7th century.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies People's perspectives influence the information available in the sources they create.

CROSS-CURRICULAR EXTENSION

English Language Arts Write about an event you witnessed or participated in.

KEY VOCABULARY

disgrace (p. 12) something that you are or should be ashamed of

generality (p. 12) a statement that is not specific or detailed

impression (p. 12) the effect or influence that something or someone has on a person's thoughts or feelings

prominence (p. 12) the state of being important, well-known, or noticeable

PREPARE TO READ

Have the students imagine they are in ancient times when an eclipse occurs. What would they think is happening? How would they react? How would they feel as the eclipse ended?

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- What does the title suggest will be the content of the article? Write your predictions and note whether you were correct as you read. *CCSS Reading 1*
- Is the main idea that eclipses are awesome? Use details from the text to help you decide. Then write a paragraph explaining your conclusion. *CCSS Reading 2*
- How does the author differentiate facts we know about Archilochus from information that can't be confirmed? Why is this important? *CCSS Reading 3 & 8*

Craft and Structure

- **Interpret Figurative Language** Look for examples of imagery in the text and write a few sentences explaining what each means and whether you feel it is effective. *CCSS Reading 4*
- **Compare Texts** Compare the views of the author of the article and Archilochus. Cite their texts as part of your comparison. *CCSS Reading 9*

SPEAKING AND LISTENING

Present a Monologue Recall the class discussion as you prepared to read, and write a monologue presenting your account of viewing an eclipse. Present the monologue to the class. Use costumes and other visual aids where it makes sense.

ARTICLE: The Power of Prediction

Magazine pages 14 - 15, Expository Nonfiction

Lexile Score: 1430

An ancient text discovered in 2011 contains the key to the Maya's ability to predict eclipses, which helped the ruler retain power.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies People's perspectives influence the information available in the sources they create.

CROSS-CURRICULAR EXTENSION

Math Learn the differences between number systems in bases two, ten, and twenty. Then practice computations using each system.

KEY VOCABULARY

adornment (p. 15) something added to make a person or thing more attractive

codex (p. 15) a manuscript book, especially of Scripture, classics, or ancient annals

decipher (p. 15) to find the meaning of (something that is difficult to read or understand)

PREPARE TO READ

Explain that the ancient Maya could predict eclipses and have students complete the decoding activity that accompanies the text.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Use details in the text to draw conclusions about Mayan culture. Explain how each detail supports your conclusions. *CCSS Reading 1*
- Determine the main idea of each subsection of the article and then use them to write a summary. Include the main idea of the whole article. *CCSS Reading 2*
- What is the relationship between the Mayan religion and their scientific knowledge? How does the author establish that relationship? *CCSS Reading 3*

Craft and Structure

- **Determine Author's Purpose** What is the purpose of the opening section of the article? Does it accomplish that purpose? Is it the same as the purpose of the rest of the article? *CCSS Reading 6*
- **Evaluate Evidence** What evidence supports the information in the opening paragraph? Is all of the information supported? *CCSS Reading 8*

WRITING

Write a Play Write a scene depicting any moment mentioned in the article. These include the excavation and the writing of the original document as well as the events the evidence suggests. Consider the time period you are writing about carefully.

ARTICLE: Determination Wins

Magazine pages 16 - 17, Expository Nonfiction

Lexile Score: 1020

Determination Wins

Samuel Williams, a professor at Harvard College, was the first to successfully make a scientific observation of a solar eclipse in North America. To do so, he had to be allowed passage into enemy territory in 1780.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Individuals can shape significant historical change.

CROSS-CURRICULAR EXTENSION

Science Learn how a quadrant works and practice using one to measure the altitude of celestial objects.

KEY VOCABULARY

determination (p. 17) a quality that makes you continue trying to do or achieve something that is difficult

expedition (p. 17) a journey, especially by a group of people for a specific purpose

PREPARE TO READ

Define determination. Have the students write journal entries about something they were determined to do and whether they succeeded or are still working toward the goal.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Why was it important for the British to agree to the expedition? What do you think would have happened if the British hadn't agreed? *CCSS Reading 1*
- Make a list of the ways in which "determination wins" in this article. *CCSS Reading 2*
- What support does Samuel Williams need to accomplish his task? Write a paragraph explaining how his relationships with others helped him. *CCSS Reading 3*

Craft and Structure

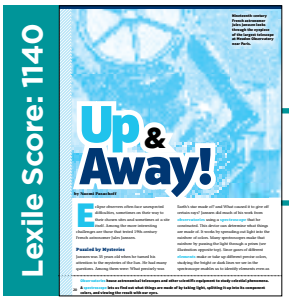
- **Evaluate Word Choice** The author names scientific instruments as well as some tools of the war. What is the effect of using these terms instead of more general terms, like boat? *CCSS Reading 4*
- **Interpret Visual Information** What information does the illustration provide? Does it add any details that aren't in the text? Record them. *CCSS Reading 7*

SPEAKING AND LISTENING

Give a Multimedia Presentation Which is more important, science or politics? Why? Make a two-minute presentation to explain your opinion. Use any multimedia components you feel will help you express your point.

ARTICLE: Up and Away

Magazine pages 20 - 21, Expository Nonfiction



Jules Janssen didn't let any obstacles, except weather, get in the way of observing eclipses. His observations opened up a new field of solar studies.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Individuals can shape significant historical change.

CROSS-CURRICULAR EXTENSION

Science Learn the wavelengths of light produced by the elements in the sun and the colors that you'd see in the spectrogram of those elements.

KEY VOCABULARY

enable (p. 21) to make (someone or something) able to do or to be something

forgo (p. 21) to give up the use or enjoyment of (something)

valiant (p. 21) having or showing courage

PREPARE TO READ

Demonstrate the use of a spectroscope and make homemade spectroscopes.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- What can you infer about Janssen's character based on his actions? Cite textual evidence to support your inferences. *CCSS Reading 1*
- Identify the main idea of the article. What is the relationship between the title and the main idea? *CCSS Reading 2*
- How does the author introduce the spectroscope and elaborate on its use during eclipses? Write a paragraph explaining its importance in the study of eclipses. *CCSS Reading 3*

Craft and Structure

- **Determine Author's Purpose** Locate an opinion presented by the author. What does this opinion suggest about the author's purpose in writing this text? *CCSS Reading 6*
- **Evaluate Evidence** Refer to the opinion noted in the question above. What evidence supports this opinion? Is it sufficient? *CCSS Reading 8*

WRITING

Write a News Article Research the history of hot air balloons and write a news article to explain how they were invented and how they have been used and adapted over time.

ARTICLE: Edison's Eclipse Adventure

Magazine pages 22 - 26, Expository Nonfiction

Thomas Edison was asked to invent a tool that would measure the heat of the corona of the sun. He brought his tasimeter to an eclipse site, but it wasn't up to the task.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Individuals can shape significant historical change.

CROSS-CURRICULAR EXTENSION

English Language Arts Locate newspaper articles from the time period and compare their accounts of the events.

KEY VOCABULARY

faulty (p. 25) having a mistake, fault, or weakness

muddle (p. 23) to cause confusion in (someone or someone's mind)

pioneering (p. 23) using new and better ideas for the first time

substantiate (p. 25) to prove the truth of (something)

PREPARE TO READ

Display images of many of Edison's inventions. Explain what each invention is and how it is used today. Explain that all of them were developed by the same person, Thomas Edison, and that Edison also invented a device to measure the heat of the sun's corona, but it failed.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Why was Edison's journey newsworthy? Use details from the text to support your answer. *CCSS Reading 1*
- What is the main theme of this text? Which details helped you identify the theme? *CCSS Reading 2*
- Trace the development of the idea of Edison as a failure. Note any areas in which he failed and how the author presents responses to his failures. *CCSS Reading 3*

Craft and Structure

- **Analyze Text Structure** How does each section help the author build the picture of Edison's character? Use information in the text to support your answer. *CCSS Reading 5*
- **Interpret Visual Information** Write one or two sentences to explain how each image illustrates the text and aids your understanding of it. *CCSS Reading 7*

WRITING

Write an Argument Are there benefits to failure? What role does failure play in the development of scientific knowledge? Write an argument presenting your position on these questions. Remember to include a discussion of any counterarguments in your argument.

ARTICLE: Einstein's Proof

Magazine pages 30 - 32, Expository Nonfiction

Einstein's Theory of Relativity predicted that the sun's gravitational field bent light coming from other stars. This theory was tested during the eclipse of May 29, 1919 by comparing photographic plates of stars taken during the eclipse with those taken at other times. It proved accurate.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Historical events such as discoveries are an example of historical change.

CROSS-CURRICULAR EXTENSION

Math Practice using the equation $E=mc^2$.

KEY VOCABULARY

dash (p. 31) to destroy or ruin (something, such as a hope or an expectation)

spacetime (p. 30) a system of one temporal and three spatial coordinates by which any physical object or event can be located

theory (p. 30) an idea or set of ideas that is intended to explain facts or events

PREPARE TO READ

Complete the K and W sections of a KWL chart about Albert Einstein with the class.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Complete the L section of the KWL chart you began as you prepared to read. *CCSS Reading 1*
- What is the main idea of the article? What is the main theme? Write a paragraph explaining how the two are related in the text. *CCSS Reading 2*
- Outline the key elements of the experiment done to determine if Einstein's theory was correct. Use the steps in the scientific method to help you. *CCSS Reading 3*

Craft and Structure

- **Analyze Text Features** How do the section titles affect the reader? How do they add to the development of the ideas in the text? *CCSS Reading 5*
- **Compare Texts** Compare the text in the accompanying diagram on page 32 with the account in the main article. How does each present similar information? Which is most effective? *CCSS Reading 9*

WRITING

Write a Poem Imagine you are Erwin Finlay-Freundlich and write a poem expressing your frustration at not being able to test Einstein's theory yourself. Use details from the text and figurative language.

ARTICLE: Planning an Expedition

Magazine pages 33 - 35, Narrative Nonfiction

Lexile Score: 1200

It takes a lot of planning to carry out an expedition to view a solar eclipse. You'll need to get funding, scope out the local area, and plan for transportation for you and your equipment. Afterwards, you'll have to review your data and possibly publish your findings.

ESSENTIAL QUESTION

How has studying the sun impacted human development?

CORE CONTENT CONCEPT

Social Studies Individuals can shape significant historical change.

CROSS-CURRICULAR EXTENSION

Health Research what humans need to do to survive in cold climates. What temperature is too low and why? What fabrics are best to wear in the cold? In what other ways have humans adapted to cold climates?

KEY VOCABULARY

contrast (p. 35) the difference between the dark and light parts of a painting or photograph

credential (p. 34) a quality, skill, or experience that makes a person suited to do a job

marauding (p. 33) traveling from place to place to attack others

resolution (p. 35) the ability of a device to show an image clearly and with a lot of detail

PREPARE TO READ

Ask the students to imagine they are going to view an upcoming solar eclipse. What would they bring? How would they get to the location? How would they fund the trip? Point out how the eclipse's location on Earth and the season during which it occurs might impact their planning.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Why is it important to plan an expedition to an eclipse far in advance? Use details from the text to support your answer. *CCSS Reading 1*
- Identify the main idea of each section and determine how it supports the overall main idea of the article. *CCSS Reading 2*
- What is the relationship between the scientist and the scientific community? How does the author present this relationship? *CCSS Reading 3*

Craft and Structure

- **Analyze Point of View** The author addresses the reader. What does this suggest about the author's perspective? How does this influence what you learned from the text? Would another style be effective? *CCSS Reading 6*
- **Interpret Visual Information** The article contains a map, photographs, and a diagram. How does each image relate to the text? Why might all three formats have been chosen to illustrate the article? *CCSS Reading 7*

WRITING

Write a Proposal Pretend you're planning a trip to the 2017 eclipse. Create a proposal for your travels. Include the equipment you'll bring, your packing list, and the scientific purpose of your expedition. Create fictional credentials for yourself. Remember that you'll need to win a grant in order to fund your expedition.

CROSS-TEXT CONNECTIONS

SYNTHESIZE: Guide students to compare articles they read. Help students find the connections between pieces of information in multiple articles. Use prompts, such as the following examples, to have students work together to **Integrate Ideas and Information** *(CCSS.Reading.9)*.

- Make a timeline showing the scientific and archaeological discoveries related to eclipses that are mentioned in this issue.
- Refer to a variety of articles to learn about difficulties that had to be overcome to observe an eclipse. List them. Decide which observer showed the most determination and write a paragraph to support your opinion.
- Use information from "The Saros Cycle," "The Power of Prediction," and "Einstein's Proof" to write an essay about how mathematics has been used to explore scientific phenomena.
- Read many articles to learn about the technology that has been used to observe solar eclipses. Make a chart showing what each item does. (See Eclipse Technology chart on page 20.)
- Compare the descriptions of the experience of viewing an eclipse found in many of the articles. Do all of the authors agree? How do they differ?
- Describe the sun as it appears during an eclipse. Include all phases. Use images that accompany "The What and Why," "Determination Wins," and "Edison's Eclipse Adventure" as well as details from the text to help you.
- Why are precautions necessary when viewing an eclipse? Cite warnings in a number of articles to help you formulate your answer.

EXPLORATORY LEARNING - FLEXIBLE MINI-UNIT DESIGN

This issue takes place at the intersection between science and history. In this Mini-Unit, students will explore that intersection by creating newspaper-style cartoons about events depicted in the issue. They will also discuss how real events can be mined for humor. But first, they will look more closely at that intersection as it relates to studying the sun.

ENGAGE | **READ FOR A PURPOSE** | **APPLY**

ENGAGE: Engage students in the topic of eclipses by asking students to consider how studying the sun has impacted human development. Show the students the images below and explain what each is. Explain how each is related to studies of the sun and describe how it was used and who invented it. Guide students as they consider the impact each had on humanity.

READ FOR A PURPOSE

INTRODUCE THE ACTIVITY: Eclipse Funnies Share samples of cartoons that depict real life experiences with humor. These could be political cartoons or strips that run in your local paper. Discuss what makes each funny. Often it's an element of the unexpected or a twist on the emotion. Exaggeration can also be funny. Some authors use puns or other wordplay. Some use parody. It will help students more if the cartoons you've selected show a variety of means of creating humor. Consider opening the discussion of what makes something funny to include other formats for humor, such as sitcoms and stand up.

Tell students that they will be creating their own cartoons based on events depicted in *Dig: What's Up with Eclipses?* Remind them that there can be a fine line between mean and funny. Set limits about the use of stereotypes and anything else that is against your school's conduct code. Also set a minimum and maximum number of frames that you'll accept for the assignment. It may be helpful to revisit this with each student as they begin the planning phase in order to see what will work best for the arc of their piece.

Introduce terminology appropriate to cartooning to facilitate discussions and remind them to keep this issue's essential question in mind.

RETURN TO THE TEXT: Explain to students that before they can work on their cartoons they must gather information that will help keep their work grounded in reality. Instruct the students to read the entire issue. They should take notes on any thoughts or ideas that come to them as they read. Answering the questions on the article pages in this teacher's guide might help. Their goal is to come up with a way to find humor in the facts like the artists who created the cartoons you shared. Inform the students that they will have to explain how their piece relates to the facts and what they did to create the humor. They'll do this by writing a paragraph that only you will see, so they don't ruin the joke for everyone.

APPLY: ECLIPSE FUNNIES

STEP 1: Plan

Have students work with partners to brainstorm ideas. They can use their notes and run ideas by each other until each has settled on a topic. Students can use the Toon Planner on the next page to sketch their potential ideas. Remind them to focus on this issue's essential question and to include text as well as images. Give them as many copies of the planner as they need to come up with a functional design.

STEP 2: Rough Draft

Once students have finalized their rough designs, give them paper or time on a computer to create a complete draft. Students who cannot draw may use clip art images or a web-based cartoon program like ToonDooSpaces. Verify that the program is appropriate for your students and setting before allowing them to use it.

Go over rough drafts with each student.

STEP 3: Final Copy

Have students revise and create a final copy. Allow the students to add color to any cartoons that were hand drawn.

Look for:

Story arc	**Grammar and spelling**	**Layout and design**
Use of humor	**Accuracy**	**Relationship to EQ**

STEP 4: Paragraph

Students complete the paragraph, revise on their own, and turn it in.

STEP 5: Publish

Post the final cartoons to a bulletin board or create your own newspaper-style comics section.

TOON PLANNER

NAME: _____

ECLIPSE PHASES

Name	Description	Viewing	Other Names

NAME: _____

ECLIPSE TECHNOLOGY

Item	Description

Appendix

Meeting State and National Standards: Core Instructional Concepts

The articles in this magazine provide a wealth of opportunities for meeting state and national instructional standards. The following pages contain charts listing Core Instructional Concepts for each of three curricular areas: English Language Arts, Science, and Social Studies.

USING THE STANDARDS CHARTS

ELA

Corresponding CCSS anchor standards have been listed next to each item on the Core Instructional Concepts chart. To customize the chart, add your own grade, state, or district standards in the last column. Match the concepts and standards from the chart to the activities on each page of the Teacher's Guide to complete your lesson plans.

SOCIAL STUDIES

Content Concepts in each Article Guide are based on Dimension 2 of the CS Framework for Social Studies: Applying Disciplinary Concepts and Tools. Use the last column in the accompanying chart to correlate these concepts to your state or district standards.

SCIENCE

Content Concepts in each Article Guide are drawn from the Three Dimensions of the Next Generation Science Standards. You will also find connections to these concepts within individual close-reading questions.

MATH

Content Opportunities for math activities are provided in the Cross-Curricular extensions on each Article Guide page.

CORE INSTRUCTIONAL CONCEPTS: READING, LITERATURE, AND LANGUAGE ARTS

SKILLS AND CONCEPTS	CCSS ANCHOR STANDARD	CORRESPONDING STANDARD
KEY IDEAS AND DETAILS		
Read closely to determine what a text says explicitly.	Reading 1	
Make logical inferences to determine what the text communicates implicitly.	Reading 1	
Cite specific textual evidence to support conclusions drawn from the text.	Reading 1	
Determine central ideas or themes of a text and analyze their development.	Reading 2	
Summarize key supporting details and ideas.	Reading 2	
Analyze how **individuals, events, and ideas develop and interact** over the course of a text.	Reading 3	
CRAFT AND STRUCTURE		
Interpret words and phrases as they are used in a text.	Reading 4	
Determine technical, connotative, and figurative meanings.	Reading 4	
Analyze how specific **word choices** shape meaning or tone.	Reading 4	
Analyze the **structure of texts** (sequence, cause/effect, compare/contrast, problem/solution)	Reading 5	
Recognize the **genre**, **key elements, and characteristics** of literary texts.	Reading 5	
Assess how **point of view or purpose** shapes the content and style of a text.	Reading 6	
Analyze how an **author's style and tone** affects meaning.	Reading 6	
INTEGRATION OF KNOWLEDGE AND IDEAS		
Integrate and evaluate content presented in diverse media and formats.	Reading 7	
Identify and evaluate the argument and claims in a text.	Reading 8	
Analyze how two or more texts address similar themes or topics.	Reading 9	
WRITING		
Write **arguments** to support claims, using valid reasoning and relevant and sufficient evidence.	Writing 1	
Write **informative/explanatory texts** to examine and convey complex ideas and information clearly and accurately.	Writing 2	
Write **narratives** to develop real or imagined experiences or events.	Writing 3	
Draw evidence from literary or informational texts to support analysis, reflection, and research.	Writing 9	
Conduct short as well as more sustained **research projects.**	Writing 10	

CORE INSTRUCTIONAL CONCEPTS: SOCIAL STUDIES

C3 INQUIRY ARC DIMENSION 2: APPLYING DISCIPLINARY CONCEPTS AND TOOLS	STATE OR DISTRICT STANDARD
CIVICS	
Analyze the **origins, functions, and structure of different governments** and the **origins and purposes of laws** and key constitutional provisions.	
Summarize core **civic virtues and democratic principles.**	
Evaluate **policies** intended to address social issues.	
ECONOMICS	
Evaluate the **benefits and costs of individual economic choices.**	
Analyze **economic incentives,** including those that cause people and businesses to specialize and trade.	
Explain the **importance of resources** (i.e. labor, human capital, physical capital, natural resources) in **methods of economic production.**	
Explain the **functions of money** in a market economy.	
Explain the importance of **competition** in a market economy.	
Apply economic concepts (i.e. interest rate, inflation, supply and demand) and theories of **how individual and government actions affect the production of goods and services.**	
Analyze economic patterns, including activity and interactions between and within nations.	
GEOGRAPHY	
Construct and use maps and other graphic representations (i.e. images, photographs, etc.) of different places.	
Explain cultural influences on the way people live and modify and adapt to their environments.	
Analyze places, including their physical, cultural and environmental characteristics and how they change over time.	
Analyze **movement of people, goods, and ideas.**	
Analyze regions, including how they relate to one another and the world as a whole from a political, economic, historical, and geographic perspective.	
HISTORY	
Interpret historical context to **understand relationships among historical events or developments.**	
Evaluate historical events and developments to identify them as **examples of historical change and/or continuity.**	
Analyze perspectives, including factors that influence why and how individuals and groups develop different ones.	
Evaluate historical sources, including their reliability, relevancy, utility, and limitations.	
Analyze causes and effects, both intended and unintended, of historical developments.	

CORE INSTRUCTIONAL CONCEPTS: SCIENCE

DIMENSION 1: SCIENTIFIC AND ENGINEERING PRACTICES

Dimension 1 focuses on the practice of science, and how knowledge is continually adapted based on new findings. The eight practices of the K-12 Science and Engineering Curriculum are as follows:

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

DIMENSION 2: CROSSCUTTING CONCEPTS

Dimension 2 provides an organizational schema for integrating and interrelating knowledge from different science domains. The eight NGSS Crosscutting Concepts are as follows:

- Patterns
- Similarity and Diversity
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter
- Structure and Function
- Stability and Change

DIMENSION 3: DIMENSIONS AND DISCIPLINARY CORE IDEAS

Dimension 3 presents a contained set of Disciplinary Core Ideas to support deeper understanding and application of content. The following chart details Core Ideas for curriculum, instructional content, and assessments within four domains.

LIFE SCIENCE

- Structure and Function of Living Things
- Life Cycles and Stages
- Reproduction & Inherited Traits
- Animals
- Plants

PHYSICAL SCIENCE

- Forces and Interactions
- Energy
- Light
- Sound
- Electricity/ Magnetism
- Matter
- Waves
- Heat
- Chemistry
- Information Processing

EARTH SCIENCE

- Weather
- Climate
- Rocks & Soil
- Erosion and Weathering
- Landforms
- Water
- Oceans
- History of Earth
- Plate Tectonics
- Volcanoes, Earthquakes, and Tsunamis

SPACE SYSTEMS

- Solar System
- Planets
- Moon
- Sun