

muse®

MAY/JUNE 2016

MAGAZINE ARTICLES

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Expository Nonfiction/Activity	880L
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Weather or Not	26
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Teacher's Guide for *Muse: Try This at Home*

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OVERVIEW

*In this magazine, readers will learn that much of the “magic” we perceive in our world has a mathematical and/or scientific foundation. **Muse:***

***Try This at Home** includes information about patterns and responses in nature, as well as scientific theorems that can help us clarify and understand our surroundings. Furthermore, this issue reveals practical memory strategies and magic tricks that are sure to mystify your friends and family!*

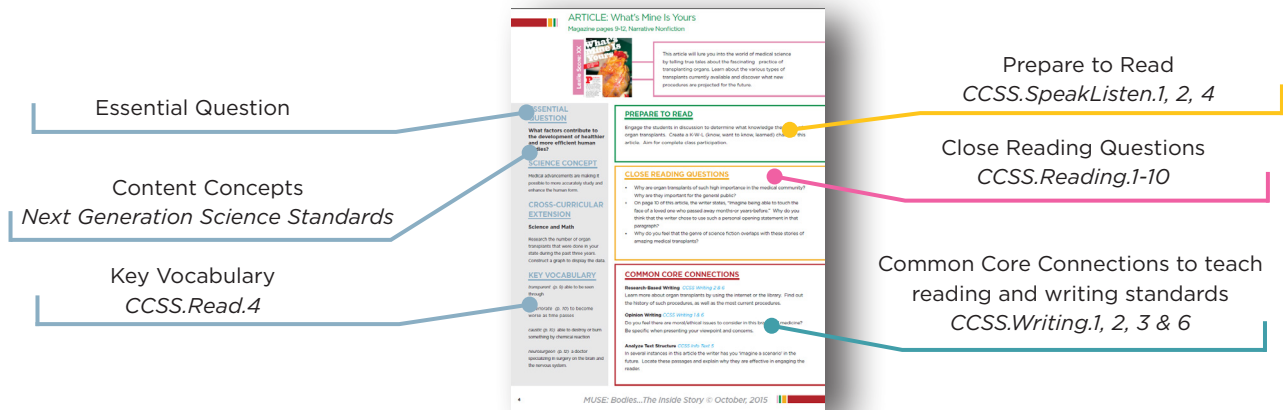
ESSENTIAL QUESTION:

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?

We invite you to use this magazine as a flexible teaching tool that is ideal for interdisciplinary learning of social studies and science content and 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 MULTIPLE ARTICLES PAGES 4 - 8

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

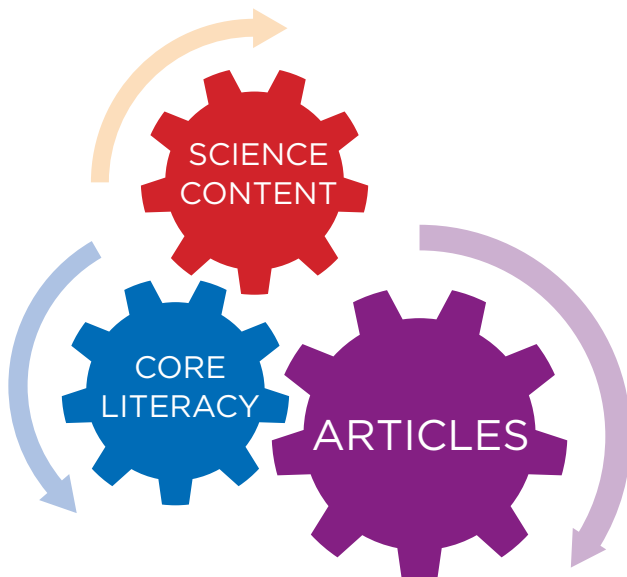


The diagram illustrates the layout of an article page with callouts to various sections:

- Essential Question**: Points to the "ESSENTIAL QUESTION" section.
- Content Concepts**: Points to the "SCIENCE CONCEPT" section.
- Next Generation Science Standards**: Points to the "CROSS-CURRICULAR EXTENSION" section.
- Key Vocabulary**: Points to the "KEY VOCABULARY" section.
- Prepare to Read**: Points to the "PREPARE TO READ" section.
- Close Reading Questions**: Points to the "CLOSE READING QUESTIONS" section.
- Common Core Connections to teach reading and writing standards**: Points to the "COMMON CORE CONNECTIONS" section.

TEACH A MINI-UNIT PAGES 10 - 12

Magazine articles can be easily grouped to make cross-text connections and comparisons. Our Common Core mini-unit guides students to read and discuss multiple articles and integrate ideas and information (CCSS.ReadingInfoText.9). Discussing multiple articles (CCSS.SpeakListen.1, 2, 4) prepares students to write informational texts to share and publish in a variety of ways (CCSS.Writing.2).



READING

Core literacy concepts, such as the ones found in the Common Core State Standards, help students access social studies and science content. Integration of both literacy thinking and content study offers students a great way to become experts in reading informational text and literature for content knowledge. This guide provides questions to cover many core literacy concepts.

Draw Inferences (CCSS.InfoText.1)

Describe Relationships (CCSS.InfoText.3)

Analyze Text Structure (CCSS.InfoText.5)

Interpret Visual Information (CCSS.InfoText.7)

Summarize (CCSS.InfoText.2)

Determine Word Meaning (CCSS.InfoText.4)

Understand Author's Point of View (CCSS.InfoText.6)

Explain Reasons and Evidence (CCSS.InfoText.8)

FOCUS STANDARD: CCSS.InfoText.9: Integrate Ideas and Information

Have students read multiple articles on the same topic from this magazine to build knowledge and make cross-text comparisons.

SPEAKING AND LISTENING

Use the articles in this magazine to spark meaningful discussions in person and online. Encourage deeper discussions where students can become topic experts (CCSS.SpeakListen.1, 2, 4).

DISCUSSION OPTIONS—IN CLASS OR ONLINE

Article Clubs: Form small reading groups of students reading the same article. Have students discuss the content, share ideas, and critically evaluate the text.

Jigsaw Clubs: Form small reading groups of students reading *different* articles. Invite students to share information and resources with each other.

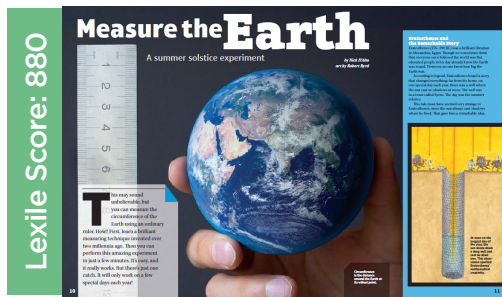
Whole Class: Launch with the essential question. Encourage students to find and share evidence from different articles to build a greater understanding of the question.

WRITING

Use the articles in this magazine to prompt **informative/explanatory writing** (CCSS.Writing.2). Have students use evidence from the texts to share information about social studies, language arts, or science content. See the **Mini-Unit** section of this guide (pgs. 10 – 12) as well as the **Article Pages** (pgs. 4 - 8) for ways to incorporate writing into your instruction.

ARTICLE: Measure the Earth

Magazine pages 10 - 13, Expository Nonfiction/Activity



Travel back in time 2,000 years to ancient Egypt and meet the brilliant librarian, Eratosthenes. Learn how he studied the sun's shadows to measure the circumference of the Earth. It is widely agreed by scholars that his amazing feat allowed primitive societies to calculate large distances and built the foundation for the mathematics of modern measurement.

ESSENTIAL QUESTION

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?

SCIENCE CONCEPT

Standard 4: Key Idea 1

The Earth and celestial phenomena can be described by principles of relative motion and perspective.

CROSS-CURRICULAR EXTENSION

Philosophy in History

Research the beliefs of philosophers in ancient Europe. What allowed their scientific/mathematical theories to become more widely accepted?

KEY VOCABULARY

align (p. 13) to arrange things so that they are in proper order

caravan (p. 12) a group of animals journeying together

solstice (p. 11) one of the two times during the year when the sun is farthest north or south of the equator

PREPARE TO READ

Give the students various objects to measure without using modern or standard devices. Have the groups share the methods they used and discuss the accuracy. Challenge the class to brainstorm credible techniques that could be used to measure much larger objects. Pose the question: Why does it become harder to precisely measure larger distances and spaces?

CLOSE READING QUESTIONS

- Underline details from the text that explain how Eratosthenes was able to reasonably estimate the circumference of the Earth over 2,000 years ago.
- Why is it helpful that the author creates a list of steps to follow when attempting to measure the sun's angle at solar noon?
- Highlight information from the article that describes some of the errors that could alter the accuracy of measurements.

COMMON CORE CONNECTIONS

Interpret Visual Information *CCSS Info Text 7*

Examine the graphic features throughout the article, focusing on page 13. How are these features essential in understanding the main idea of the article?

Discuss Relationships *CCSS Info Text 3*

Study the relationship between specific conditions of the Earth and the ability to attain accurate measurements. Why do these correlations exist?

Explain Reasons and Evidence *CCSS Info Text 8*

The author begins the article by stating that it is possible to measure the circumference of the Earth using a standard ruler. Reread the text and generate a list of the evidence that supports this bold claim.



Read the article to discover techniques that can drastically boost your memory. “Master Memory” explores how various memory strategies can strengthen your recall abilities with little time and effort. Learn methods from the 2015 World Memory Champion and impress your friends and family!

ESSENTIAL QUESTION

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?

SCIENCE CONCEPT

Standard 1: Key Idea 3

Scientists gain new insights into phenomena by analyzing observations made while testing proposed explanations.

CROSS-CURRICULAR EXTENSION

Developmental Psychology

Conduct research to discover what factors affect memory. Explain the different facets of memory: encoding, storage and retrieval.

KEY VOCABULARY

complex (p. 17) not easy to understand

intimidating (p. 17) frightening

transforming (p. 16) completely changing

trigger (p. 16) something that causes something else to happen

PREPARE TO READ

Cultivate interest in this topic by preparing a variety of memory tasks for the students to complete. (Example: Give them a list of words/numbers to remember or quiz them about missing objects in a set.) Encourage students to try to beat their own best score after reading the article.

CLOSE READING QUESTIONS

- How does the author's first sentence (“Most people can barely remember their passwords”) make this article relatable?
- Why does the author assert that the 2015 World Memory Champion is NOT a genius? Underline details from the text that support your answer.
- Highlight some of the memory strategies discussed in this article that you can use with little practice.

COMMON CORE CONNECTIONS

Author's Point of View *CCSS Info Text 6*

What mood does the author express about the content? Which passages convey her excitement and interest?

Describe Relationships *CCSS Info Text 3*

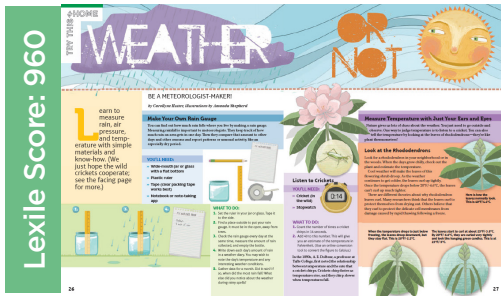
Reread the article and highlight sentences that connect magical outcomes with simple strategies. Do knowing these strategies make magic more entertaining or less entertaining for you?

Expository Writing *CCSS Writing 2, 6 & 7*

Research to learn more about Alex Mullen, World Memory Champion. Employ some of his strategies and track your success. Write a brief biography and try to make a connection through email or Twitter.

ARTICLE: Weather or Not

Magazine pages 26 - 28, Procedural/Activity



Put on your galoshes and gather a few simple materials and you can quickly become a junior meteorologist! Make your own rain gauge and learn how to use all of your senses to gather relevant information about the weather. Let nature guide your predictions and forecasts.

ESSENTIAL QUESTION

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?

SCIENCE CONCEPT

Standard 6: Key Idea 6

Plants and animals depend on each other and their physical environment.

CROSS-CURRICULAR EXTENSION

Meteorology

When and why did humans first begin tracking the weather? How has modern technology increased accuracy and saved lives?

KEY VOCABULARY

gauge (p. 26) an instrument used to measure or judge

membranes (p. 27) a thin sheet or layer

PREPARE TO READ

Engage the students in discussion to determine what prior knowledge they have regarding forecasting the weather. Have them consider modern techniques as well as methods from long ago. Create a K-W-L for this article. Aim for complete class participation.

CLOSE READING QUESTIONS

- Underline details from the text that explain the changes in weather that can be predicted from observing nature.
- How does the author empower the reader to become a junior meteorologist? Highlight details from the text that support your answer.
- How is the format of this article conducive to creating your own weather gauges and connecting with the topic?

COMMON CORE CONNECTIONS

Analyze Text Structure *CCSS Info Text 6*

Do you think that the author's use of step-by-step instructions throughout the article is ideal? Why/why not?

Drawing Inferences *CCSS Info Text 1*

Highlight the sentences in the text that were written to teach the reader how to draw inferences about weather from nature. Brainstorm with your classmates to add more weather clues that you have personally observed in your environment.

Research-Based Writing *CCSS Writing 2 & 6*

Choose to research the response of either plants or animals as a predictor in weather events and changes. Collaborate with other students and publish a class "Weather Manual" with the findings.

ARTICLE: Random Walk

Magazine pages 30 - 35, Expository Nonfiction/Activity



Take a “Random Walk” through this article and learn how the pathway of molecules often determines what you see, hear and smell. Modern scientists rely upon research done in an earlier era to understand diffusion, as well as to study probability and the concept of randomness.

ESSENTIAL QUESTION

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?

SCIENCE CONCEPT

Standard 4: Key Idea 3

Matter is made up of particles, the properties of which determine the observable characteristics of matter and its reactivity.

CROSS-CURRICULAR EXTENSION

Probability in Mathematics

Delve into probability and study the inherent predictability of randomness. What are the variables and constants that help to determine the most likely outcome of a series of events?

KEY VOCABULARY

foraging (p. 31) to search for something (food/supplies)

rationale (p. 34) reason or explanation for something

variant (p. 31) different in some way from others of the same kind

PREPARE TO READ

Generate interest in this content by using visual devices. For example, ask the class if they can predict the pathway of the color cloud if a drop of food coloring is placed in a cup of water. (Conduct demonstration.) What can students ascertain about the flip of a coin or a roll of the dice? Create a list of prior knowledge.

CLOSE READING QUESTIONS

- Underline scientific and mathematical concepts discussed in this article.
- Locate and highlight sentences in the article in which the author attempts to connect science and philosophy. How does this technique contribute to the tone of the text?
- Why do you think the author uses the ordinary tasks of flipping a coin and rolling a die to explain probability and randomness? Use details from the text to support your answer.

COMMON CORE CONNECTIONS

Narrative Writing *CCSS Writing 3 & 6*

Choose one of the concepts (random walk, probability, random number generators) discussed in this article and write about your real-world connection to it. How do you experience it in your environment and what has it taught you?

Summarize Main Ideas *CCSS Info Text 2*

What are the main ideas of the article? Summarize the information, rewriting it so that you can share it with a younger audience.

Explain Reasons and Evidence *CCSS Info Text 8*

The author ends the first paragraph with a question. What information does she provide as an answer to that question? Find other sections of the text where the author asks a question or makes a statement and then provides evidence.



Abracadabra! This article will introduce the reader to the science behind the magic. Learn how stage magicians have been depending on scientific and mathematic principles to entertain and mystify audiences for hundreds of years. Be prepared to perform a few tricks of your own.

ESSENTIAL QUESTION

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?

SCIENCE CONCEPT

Standard 4: Key Idea 7.1c

In all environments, organisms interact with one another in many ways.

CROSS-CURRICULAR EXTENSION

Mathematics

Research how mathematics is essential to magic. What branches of math are most commonly used?

KEY VOCABULARY

captivate (p. 42) to attract or hold the attention of someone

diagnostic (p. 43) a tool used to help identify a disease, illness, or problem

renowned (p. 43) known or admired by many people for a special quality or achievement

PREPARE TO READ

Claim that you have the power to influence the mind and select a volunteer to assist you with the “Color Your Thinking” activity on page 43. Can students discern why this activity may be more challenging than it seems at first glance? Continue reading to learn new ways to captivate your family and friends!

CLOSE READING QUESTIONS

- How is stage magic based largely on scientific and mathematical principles? Use details from the text to support your answer.
- Highlight details from the text that show how the author invites the reader to become a magician that can mystify an audience.
- Highlight details from the text that signify it is informational text.

COMMON CORE CONNECTIONS

Analyze Text Structures *CCSS Info Text 5*

Do you think that the format the author chose for this article contributes or distracts from your understanding and interest? Explain.

Describe Relationships *CCSS Info Text 3*

How does the author decompose simple magic tricks into scientific or mathematical principles? List the connections discussed in this article.

Opinion Writing *CCSS Writing 1 & 6*

Do you think it is possible to be a great magician without a strong background knowledge of math or science? Write a short essay using details to support your opinion. Share essays with the class.

CROSS-TEXT CONNECTIONS WITH MULTIPLE ARTICLES

COMPARE ARTICLES

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

- The articles “Master Memory” and “You’re the Magician” both provide the reader with simple “magical” feats that can be performed to impress family and friends. Explore the human attraction to the mysterious and why we often choose to believe what we are seeing is real.
- Which of the feature articles are written in a formal scholastic style and which are written with a more casual tone? How does using a variety of writing techniques help the reader to connect with the material being studied?
- Gather information across the texts within this issue that supports the title *Try This at Home*. Generate a list of specific procedures and experiments that are provided within the magazine. Give each a rating for ease of performing, interest level, and learning benefits. Divide the class into small groups to choose activities to complete.
- Reread the feature articles and highlight sections that contain mathematical and scientific concepts. Examine the interconnectedness of mathematics and the sciences. List the reasons that this information overlaps. Additionally, are there other fields of study represented in this issue of *Muse*?
- Refer to two or more of the articles that demonstrate how an increase in scientific and mathematical knowledge alters our perception of reality. How does this increase affect our sense of magic, as well as provide entertainment opportunities?

EXPLORATORY LEARNING - FLEXIBLE MINI-UNIT DESIGN

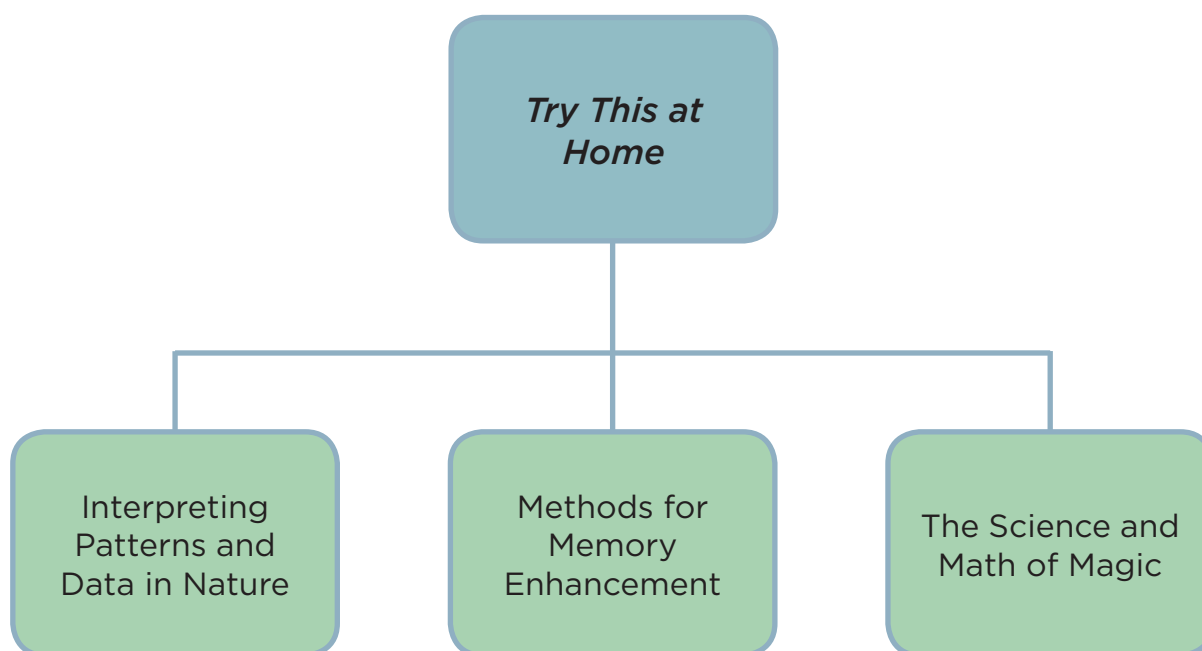
This mini-unit is designed as a flexible teaching tool that can be taught in any order. It lends itself well to the articles mentioned within or you may choose to substitute your own selection of articles. It would be beneficial to gauge the interest level of your students when determining your focus.

ENGAGE

READ AND
COMPARE

APPLY

ENGAGE: Engage the class in the topic of magic and mystery. Have students page through the magazine looking at graphic features and reading article titles to spark a readiness to read. Discuss the interconnectedness of science, math and magic. Create a concept web to display prior knowledge.



Share the essential question:

How can comprehension of scientific and mathematical processes contribute to your understanding of the world?



READ AND COMPARE ARTICLES: Begin with a focus article as a base for building content knowledge and model how to work through the text.

1) READ ALOUD: Use “Measure the Earth” (pgs. 10-13) as a focus article, or choose a different article that works well for your teaching goals. Share the article summary on page 4 of this guide. Students can read their own copies of the article and use sticky notes to mark places they find interesting or have questions about.

2) DISCUSS THE ARTICLE: After reading “Measure the Earth,” guide students to talk about the article. See the Article Pages for Close Reading Questions to enhance the material.

3) READ NEW ARTICLES: Help students choose additional articles to read based on their inquiry questions or what they find interesting. Refer to the Article Pages for summaries of each article within *Muse: Try This at Home*.

4) COMPARE ARTICLES: After students have read multiple articles, guide them to make cross-text connections. Refer to page 9 to compare articles using prompts that help students integrate ideas and information.

CHOOSE A PURPOSE FOR READING

CLOSE READ *CCSS Reading Info Text 1* Mark the text, noting important details and highlighting what interests, surprises, or confuses you.

UNDERSTAND MAIN IDEAS TO DEVELOP EXPERTISE *CCSS Reading Info Text 2* Record the main ideas in a second article. Note how these main ideas build on the main ideas from the focus article. How is your topic knowledge growing?

REVIEW GRAPHIC FEATURES *CCSS Reading Info Text 7* Examine graphic features within this issue and describe how the images, charts, and photographs enhance your understanding of the content.



APPLY: THE MAGIC IN OUR REALITY

Divide the class into different groups to discuss, debate and study different facets of magic vs. reality. Use the activities below to further immerse your students in the material presented in this issue of *Muse*.



- Group One:** Have students reread the feature articles from *Muse: Try This at Home* and highlight any passages that relate to probability and theories of randomness. Instruct students to explain how these concepts are used to create “magic” and perform some simple coin tossing and die rolling activities with their group to prove them. Next, ask students to discuss with their group how these principles are relevant to their everyday lives, and how they could divide events into categories such as Not Likely, Likely and Very Likely to occur. Ask them to provide evidence. Share with the class.



- Group Two:** Using the Concept Chart from the Printables section of this guide, ask students to demonstrate how reading multiple articles in this issue of *Muse* developed their understanding of the essential question. After this group completes the graphic organizer, have the students convert the information into essay form. Pose the following questions to students: Why is it beneficial to read several articles with varying focuses on the same topic? How does it help to expand your general knowledge of the subject matter? Share with the class.



- Group Three:** Discuss the interconnectedness of science and mathematics. Pose the following questions to students: How are math and science an integral part of our daily lives? Consider the effect that advancing technologies have on these fields. Do you think that these advancements are making it harder or easier for us to distinguish between fantasy and reality? Have students use the Venn diagram in the Printables section to help them organize their ideas. Then, have students write a short essay on their findings using information from the feature articles, as well as including their own opinions. Share with the class.

NAME: _____

CONCEPT CHART

Magic vs. Reality: Show how reading multiple articles developed your understanding of the essential question or your own inquiry question.

ESSENTIAL QUESTION OR INQUIRY QUESTION:

ARTICLE 1:

ARTICLE 2:

ARTICLE 3:

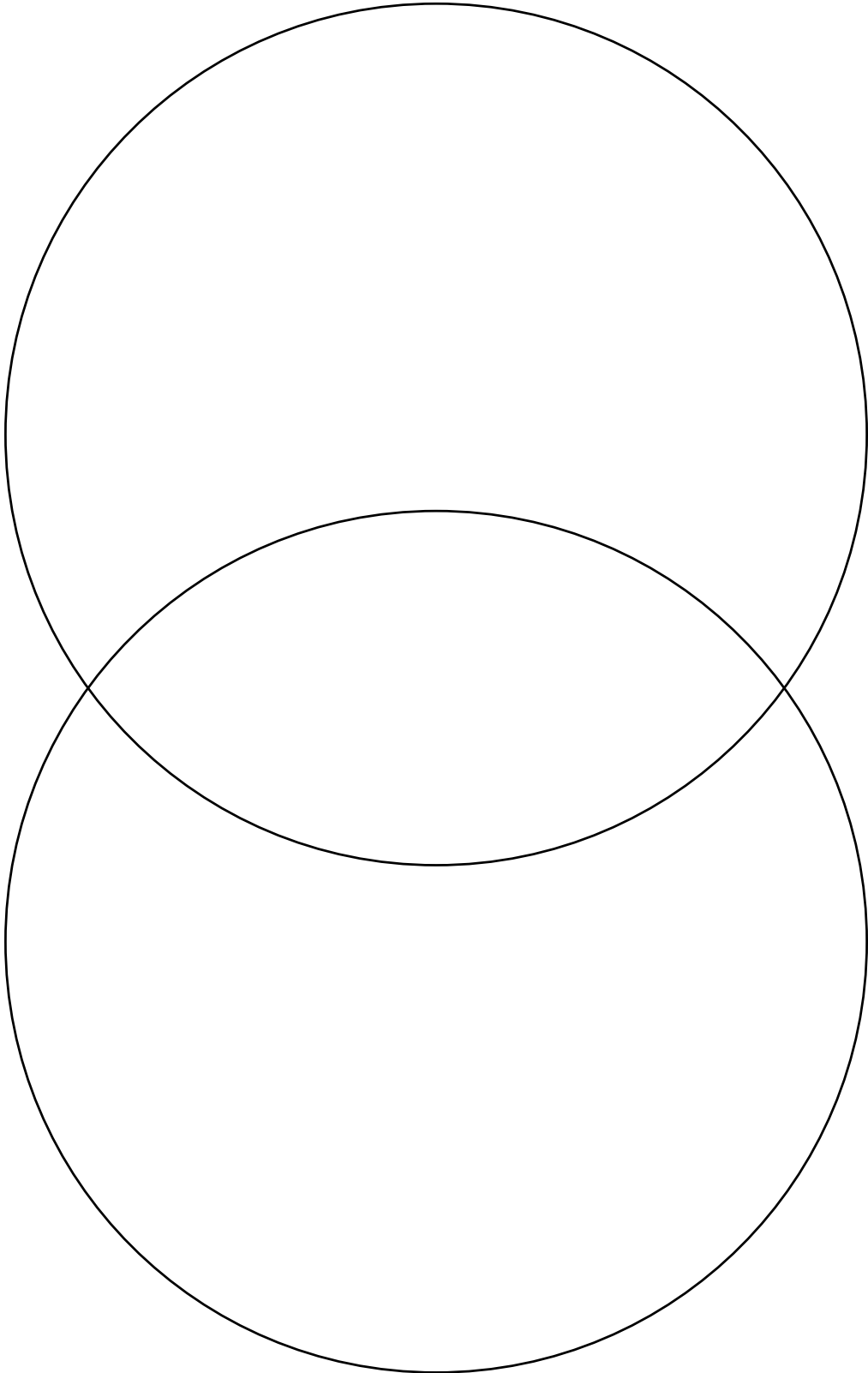
Venn Diagram

SCIENCE

MATHEMATICS

Mini-Unit Graphic Organizer

NAME: _____



NAME: _____

ANALYZE GRAPHIC FEATURES

GRAPHIC FEATURE	PAGE LOCATION	HOW THIS FEATURE HELPED YOUR UNDERSTANDING

align to arrange things so that they are in proper order

*This experiment works only when our planet is perfectly **aligned** to the incoming sunshine. (p. 13)*

captivate to attract or hold the attention of someone

*Prepare to **captivate** and confuse your friends and family. (p. 42)*

caravan a group of animals traveling together on a long journey

*At the time, people often estimated distances by timing how fast camel **caravans** traveled from one place to another. (p. 12)*

complex not easy to understand or explain

*In memory competitions, mental athletes use a more **complex** strategy called the Major System. (p. 17)*

diagnostic a tool used to help identify a disease, illness, or problem

*The Stroop Effect provides an important **diagnostic** tool. (p. 43)*

gauge an instrument used to measure or judge

*You can find out how much rain falls where you live by making a rain **gauge**. (p. 26)*

intimidating frightening

*To memorize **intimidating** strings of numbers, break them into meaningful units. (p. 17)*

membranes a thin sheet or layer

*Others believe that they curl to protect the delicate cell **membranes** from damage caused by rapid thawing following a freeze. (p. 27)*

rationale reason or explanation for something

*Okay, so you've figured out the **rationale** for the Random Number Generator. (p. 34)*

renowned known or admired by many people for a special quality or achievement

*"I enjoyed your show," the **renowned** physicist began, "but how did you do that last trick with the numbers?" (p. 43)*

solstice one of the two times during the year when the sun is farthest north or south of the equator

*The day was the one we call the summer **solstice**. (p. 11)*

transforming changing something completely

*So sidestep working memory limits by **transforming** lists into mental movies. (p. 16)*

trigger something that causes something else to happen

*First, keep lists in order by matching list numbers with rhyming memory **triggers**. (p. 16)*

variant different in some way from others of the same kind

***Variants** of the random walk even help social media companies like Facebook and Twitter make suggestions about new friends or people to follow. (p. 31)*

“Measure the Earth”

- http://www.coopertoons.com/education/eratosthenes/eratosthenes_earth.html

Learn more about Eratosthenes’ calculation of the Earth’s circumference.

“Master Memory”

- <http://masterofmemory.com/how/>

Read an article stressing three specific areas for improving memory: energy, mnemonics and retention.

“Weather or Not”

- <http://pbskids.org/dragonflytv/show/forecasting.html>

Learn simple methods to notice changes in nature and predict the weather.

- <http://www.education.noaa.gov/teachers.html>

Review suggestions on how to teach a comprehensive weather unit.

“A Random Walk”

- <http://www.bing.com/videos/search?q=diffusion+random+walk+simple&&view=detail&mid=6175B9F3D96758508C256175B9F3D96758508C25&FORM=VRD GAR>

Watch a video that explains diffusion, random walk and number generators in a simple, and then more complex manner.

“You’re the Magician”

- <http://magic.about.com/od/science-magic-tricks/tp/Science-Magic-Tricks.htm>
- http://www.educationworld.com/a_curr/mathchat/mathchat012.shtml

Learn how math and science principles are used to help create magic.