

Teacher's Guide

use

NOVEMBER/DECEMBER 2016

MAGAZINE ARTICLES

- The Old-Fashioned Dream Lab. 9
Expository Nonfiction 960L
- Movies in Our Minds 14
Expository Nonfiction 930L
- What Do Animals Dream About? 20
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- Dreams Gone Bad 28
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- Sleep Mode. 38
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Teacher's Guide for *Muse: The Science of Dreaming*

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OVERVIEW

In this magazine, readers will learn how dreams have piqued people's curiosity since ancient times.

Muse: The Science of Dreaming includes

information about the theories, methods, and technology scientists have used to help lift the cloud of mystery surrounding our sleeping state.

ESSENTIAL QUESTION:

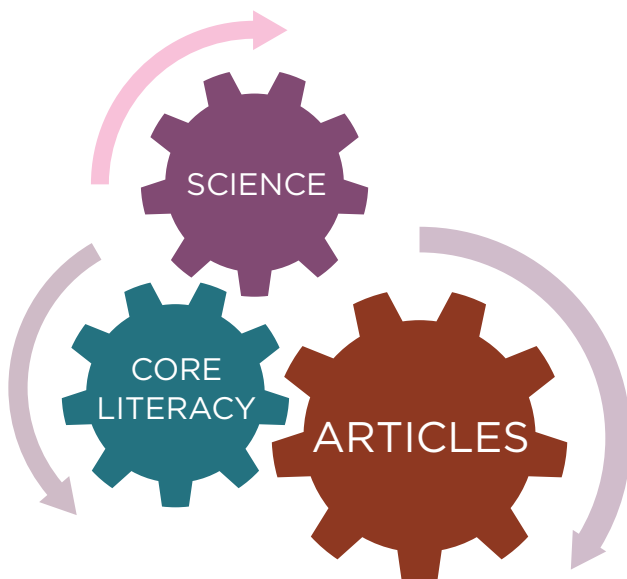
What role does science play in demystifying our dreams?



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 - 8

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 10-12

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).

Essential Question: What role does science play in demystifying our dreams?

MAGAZINE ARTICLES	CORE CONTENT CONCEPT	LITERACY SKILLS	CORRESPONDING CCSS ANCHOR STANDARDS
The Old-Fashioned Dream Lab Expository Nonfiction	Cause and effect relationships may be used to predict phenomena in natural or designed systems.	<ul style="list-style-type: none"> Close Reading Analyze Text Structure Analyze Relationships Write Arguments 	<i>Reading 1, 2, 3 & 5</i> <i>Writing 1</i>
Movies in Our Minds Expository Nonfiction	Sense receptors respond to inputs and transmit them to the brain as signals. The signals are processed by the brain, resulting in immediate behaviors or memories.	<ul style="list-style-type: none"> Close Reading Analyze Point of View Interpret Visual Information Debate a Topic 	<i>Reading 1, 2, 6 & 7</i> <i>Speaking & Listening 1 & 4</i>
What Do Animals Dream About? Expository Nonfiction	Cause and effect relationships may be used to predict phenomena in natural or designed systems.	<ul style="list-style-type: none"> Close Reading Evaluate Evidence Analyze Word Choice Write a Story 	<i>Reading 1, 2, 4 & 8</i> <i>Writing 3</i>
Dreams Gone Bad Expository Nonfiction	Sense receptors respond to inputs and transmit them to the brain as signals. The signals are processed by the brain, resulting in immediate behaviors or memories.	<ul style="list-style-type: none"> Close Reading Analyze Word Choice Evaluate Evidence Write a Letter 	<i>Reading 1, 2, 3, 4 & 8</i> <i>Writing 2</i>
Sleep Mode Expository Nonfiction	The uses of technologies and any limitations on their uses are driven by individual or societal needs, desires, and values.	<ul style="list-style-type: none"> Close Reading Analyze Text Structure Evaluate Evidence Write a Science Fiction Story 	<i>Reading 1, 2, 3, 5 & 8</i> <i>Writing 3</i>

Comparing Texts: *Reading 1, 2, 7 & 9; Writing 1, 2, 3, 8 & 9*

Mini-Unit: *Reading 1 & 2; Writing 2 & 5; Speaking and Listening 4*



Long before EEGs and fMRIs existed, French scholars Alfred Maury and Leon d'Hervey de Saint-Denys took an interest in dreams. While their theories and methods differed, their early work continues to play a significant role in how we study dreams today.

ESSENTIAL QUESTION

What role does science play in demystifying our dreams?

CORE CONTENT CONCEPT

Science Cause and effect relationships may be used to predict phenomena in natural or designed systems.

CROSS-CURRICULAR EXTENSION

Art Try your hand at Hervey's method of capturing dreams: sketch a dream you have had. Do you remember more details about the dream as you draw? Consider why or why not.

KEY VOCABULARY

stimuli (p. 11) things that cause a change or a reaction

hallucination (p. 12) something (such as an image, a sound, or a smell) that seems real but does not really exist

PREPARE TO READ

Invite students to share dreams they've had. Then discuss possible reasons why the study of dreams has such a long history. Tell students that the next article presents information on the history of dream research.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Use a Venn diagram (p. 14) to compare Maury's and Hervey's methods and theories. Cite details from the text in your diagram. *CCSS Reading 3*
- Summarize the three current theories about why we dream. Use details from the text to support your summary. *CCSS Reading 2*
- Infer whether or not the works of Maury and Hervey remain relevant. Cite evidence from the text to support your inference. *CCSS Reading 1*

Craft and Structure

- **Analyze Text Structure** How does the use of subheads help to visually organize the information in the article? Turn each subhead into a question. Read the section below it to find the answer. *CCSS Reading 5*
- **Analyze Relationships** French scholars in the mid 1800s were able to advance scientific research without technology. What can we learn from this? What role does technology play in dream research today? *CCSS Reading 3*

WRITING

Write Arguments The article states that "current research does not support Hervey's notion of a mental drawer stuffed full of memories." What do you think about why people dream? Write a short essay to argue your position on how and why we dream. Support your stance with details from the article.



Using technological tools ranging from fMRI imaging to YouTube, scientists are making strides toward being able to see people's dreams.

ESSENTIAL QUESTION

What role does science play in demystifying our dreams?

CORE CONTENT CONCEPT

Science Sense receptors respond to inputs and transmit them to the brain as signals. The signals are processed by the brain, resulting in immediate behaviors or memories.

CROSS-CURRICULAR EXTENSION

Language Arts Think of a dream you've had and write its contents and possible meaning as a poem, monologue, or play.

KEY VOCABULARY

neurons (p. 15) cells that carry messages between the brain and other parts of the body and that are the basic unit of the nervous system

montage (p. 16) a mixture of different things

conjure (p. 16) to make you think of something; evoke

PREPARE TO READ

Discuss with students whether dreams are meaningful or just mental nonsense. Then work with students to brainstorm a list of possible reasons we dream. Tell students they will learn more about current dream research in the next article.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Use details from the article to create a timeline showing dream theories beginning with ancient Greece and ending with present day. *CCSS Reading 2*
- How have the scientists in the article built on each others' knowledge? Use text details to support your response. *CCSS Reading 1*
- On page 15, find the simile that describes Jack Gallant. What point is the author making about Gallant? Support your answer with text details. *CCSS Reading 1*

Craft and Structure

- **Analyze Point of View** Imagine you are Gallant, Kamitani, or Mormann. State what your experiment was and how it revolutionized the study of dreams. Work with a partner to take turns role-playing. *CCSS Reading 6*
- **Interpret Visual Information** Use the accompanying photos and illustrations to explain the scientific advances and limitations presented in the article. How do the photos aid your understanding of the advances? *CCSS Reading 7*

SPEAKING AND LISTENING

Debate a Topic Do you feel that being able to "read people's minds," whether awake or asleep, is a good idea or an invasion of privacy? Work in two groups of classmates to debate this question. One group will argue that being able to read minds is a good idea. The other group will argue that it is an invasion of privacy. Groups should use their own ideas and evidence from the article to support their arguments.

ARTICLE: What Do Animals Dream About?

Magazine pages 20 - 23, Expository Nonfiction



Dream studies are not limited to humans. Scientists study cats, rats, birds, and even bees to unravel the mystery behind dreams.

ESSENTIAL QUESTION

What role does science play in demystifying our dreams?

CORE CONTENT CONCEPT

Science Cause and effect relationships may be used to predict phenomena in natural or designed systems.

CROSS-CURRICULAR EXTENSION

Health/Life Skills Sleep deprivation has serious consequences. Conduct online and library research to find out about these consequences and how they affect your health and well-being. Share your findings with the class.

KEY VOCABULARY

hippocampus (p. 22) a part of the brain that is involved in forming, storing, and processing memory

stimulus (p. 23) something that causes a change or a reaction

PREPARE TO READ

Have students look at the photo on page 21 and explain what the cat is doing. Ask students to hypothesize why animals, such as a kitten, dream. Invite students to guess what kittens dream about. Then explain that students will learn about animal dreams in the next article.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Think of two animals *not* mentioned in the article and infer what they dream about. Use details from the text to support your inferences. *CCSS Reading 1*
- How are the senses involved in dreaming? Support your answer with details from the text. *CCSS Reading 1*
- Summarize the cat experiment and what scientists learned from it. Cite details from the text to support your response. *CCSS Reading 2*

Craft and Structure

- **Evaluate Evidence** The title of the article poses a question. Evaluate the evidence presented in the article to answer the question. Is the evidence sufficient? Explain why or why not. *CCSS Reading 8*
- **Analyze Word Choice** The closing paragraph states, "We can say with reasonable certainty that other animals dream." Why did the author use the words "reasonable certainty"? What meaning is implied? *CCSS Reading 4*

WRITING

Write a Story Put yourself in your pet's "shoes" for a day. Write about a typical (or not-so-typical) day from your pet's perspective. Include details about your dreams. What would your animal dreams be about? Why?



Explanations for nightmares, night terrors, and sleep paralysis are discussed in this article. Sleep is so important that lack of sleep or even glitches in sleep patterns have scary consequences.

ESSENTIAL QUESTION

What role does science play in demystifying our dreams?

CORE CONTENT CONCEPT

Science Sense receptors respond to inputs and transmit them to the brain as signals. The signals are processed by the brain, resulting in immediate behaviors or memories.

CROSS-CURRICULAR EXTENSION

History/Social Studies Using information learned in this article, take another look at the Salem witch trials of 1692-1693. Form a new hypothesis about what might have helped create that terrible situation.

KEY VOCABULARY

paranormal (p. 29) very strange and not able to be explained by what scientists know about nature and the world

levitation (p. 31) to rise or make something rise into the air in a way that appears to be magical

PREPARE TO READ

Invite students to share nightmares they've experienced. Then ask them to explain what makes nightmares so scary and how they recover after experiencing one. Discuss why people have nightmares and brainstorm a list of reasons. Then explain that the next article is all about nightmares.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- What is the main idea of this article? Use information from the text to support your response. *CCSS Reading 2*
- Describe Eugene Aserinsky's personality and the impact of his scientific discovery. Support your response with evidence from the text. *CCSS Reading 3*
- Describe the relationship between misfiring sleep patterns and alien abductions. Use details from the text to support your answer. *CCSS Reading 3*

Craft and Structure

- **Analyze Word Choice** Find sentences in the article that are shocking or attention-grabbing. What effect do the sentences have on you? What mood or feeling do they create? *CCSS Reading 4*
- **Evaluate Evidence** The author believes that misfiring sleep patterns cause the negative effects described in the article. What evidence presented in the article supports this stance? Is the evidence sufficient? *CCSS Reading 8*

WRITING

Write a Letter Write a letter to your future self about your own real-life experiences with sleepwalking, nightmares, or sleep paralysis. Describe the experience to your future self. Include details about what you saw and how you felt. Offer tips on how to avoid more episodes as you age.



By comparing computers and people, the author examines the definition and purpose of sleep mode. The contrast between sleeping computers and sleeping people is stark...and when people tend to act like the computers they use, there can be negative consequences.

ESSENTIAL QUESTION

What role does science play in demystifying our dreams?

CORE CONTENT CONCEPT

Science The uses of technologies and any limitations on their uses are driven by individual or societal needs, desires, and values.

CROSS-CURRICULAR EXTENSION

Language Arts Make a list of computer terms we have absorbed into our spoken language, such as “enter data,” “hacked,” and “power down.” Then create a dictionary page to define their usage in today’s culture.

KEY VOCABULARY

mode (p. 38) the state in which a machine does a particular function

suspend (p. 38) to stop something, usually for a short period of time

idle (p. 40) not working, active, or being used

PREPARE TO READ

Discuss how much time students spend on their phones, computers, or tablets. Then ask how they feel about their devices—can devices be friends or are they just tools? Explain that the next article explores how humans connect with their devices.

CLOSE READING AND TEXT ANALYSIS

Key Ideas

- Where did the term “sleep mode” originate? Use details from the article to trace its beginnings and support your answer. *CCSS Reading 1*
- Compare the relationship between sleep mode in a computer and a human’s need for sleep. Cite text details to support your response. *CCSS Reading 3*
- Determine the main idea of this article and tell how it is connected to the magazine’s topic, *The Science of Dreaming*. Support your response with text details. *CCSS Reading 2*

Craft and Structure

- **Analyze Text Structure** Why did the author use a compare and contrast text structure? What makes it a good choice for this article? *CCSS Reading 5*
- **Evaluate Evidence** Locate two claims or statements the author makes. What evidence does the author use to support these claims? Do you feel this evidence is sufficient? Explain your response. *CCSS Reading 8*

WRITING

Write a Science Fiction Story Imagine that the author’s description of a dystopian future becomes reality. Write a story in which you predict what happens when our devices control our lives and our ability to shut them off is gone. Who or what controls the universe? What hope remains for society? Share your finished story with the class.



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).

- Whether good or bad, we all know dreams can be powerful. Compare information in “Dreams Gone Bad,” “The Old-Fashioned Dream Lab,” and any other magazine text to see how dreams affect everything from our daily lives to cultural traditions. Take the information gathered to create a poem or illustration entitled “The Power of Dreams.”
- When analyzing scientific sources, credibility, accuracy, and possible bias are key factors in determining the validity of a source. Gather information from multiple texts to complete the Source Validity graphic organizer on page 15.
- Investigative Reporting: Assume you are interviewing someone who claims they’ve experienced an alien abduction. Read “Dreams Gone Bad” and “Sleep Mode” for background information. Then build a list of interview questions that may help reveal the source or cause of the abduction.
- What does the future hold for our dreams and dream study? Read “Consolidating Dad,” “What Do Animals Dream?” and “Movies in Our Minds” to make some predictions about our dreamy future. Write your predictions on a piece of paper. Cut them out and pass them out to classmates like fortunes found in fortune cookies.
- From sleep pods to white noise machines, the sleep industry equals big business. Read “Sleep Mode” and “Dreams Gone Bad” to compile a list of problems associated with sleep deficiency. Then design a business that could solve one of the problems.



**EXPLORATORY LEARNING - FLEXIBLE MINI-UNIT DESIGN****ENGAGE****READ FOR A
PURPOSE****APPLY**

In this mini-unit, students will work in groups to learn about the history and latest advances in the study of dreams. Then, using this knowledge, each group will design and perform its own original dream experiment. Finally, students will present their findings to the class.

ENGAGE: Engage students in the topic of dreams by focusing on the Essential Question: **What role does science play in demystifying our dreams?** Ask students to scan the magazine texts to find information about sleep and dream experiments. Then guide students in completing a chart like the one below. Explain to students that they will be creating posters that highlight information about sleep and dream research.

Articles	Sleep and Dream Experiments
"The Old-Fashioned Dream Lab"	Maury experimented with sensory experiences and dreams—tickling with feathers, holding a hot iron close to the skin, making vibrations near the ear, and waving perfume under the nose. Hervey sketched his dreams as soon as he woke up.
"Movies in Our Minds"	
"What Do Animals Dream About?"	French scientists removed cells from a cat's brainstem and the cat could sleep-walk during REM sleep.
"Dreams Gone Bad"	
"Sleep Mode"	



**READ FOR A PURPOSE**

INTRODUCE THE ACTIVITY: EXPERIMENT POSTERS Explain to students that in this activity, they will create posters that highlight an experiment in one of the articles. They will use words and illustrations to convey information about the experiment and the results. Have students choose the article they will focus on now.

RETURN TO THE TEXT Explain to students that before they can outline and create their posters, they must gather information about important experiments related to sleep and dreams. Have students use a graphic organizer like the one below to record information from the articles they chose. (See Elements of an Experiment graphic organizer on page 13.) Tell students to choose one or two experiments to add to the chart. When students have finished, explain that they will be referring to these notes to create their posters.

Article Title:		
Scientist's Hypothesis or Question	Experiment	Results, Conclusions, Misconceptions





APPLY: EXPERIMENT POSTERS Now that students have gathered information from the articles, they are ready to begin designing and creating their posters. Students can work independently, in pairs, or in groups to complete this activity.

Materials

- completed Elements of an Experiment organizers
- large sheets of drawing paper
- colored pencils and markers

Step 1: Build Background Remind students that they will be using the information they gathered in the Return to the Text activity to create a poster about one of the experiments in their chosen articles.

Step 2: Present Criteria Tell students to include the following elements in their posters:

- A title
- Three information sections: (1) details about the scientist's questions or hypothesis, (2) details about the experiment, (3) the results and conclusions
- Words and illustrations to explain information in the three sections
- A statement about whether the ideas are considered relevant today

Step 3: Plan Tell students to use the back of their Elements of an Experiment organizers or another sheet of paper to figure out how they will organize their posters. Remind them to plan for text and illustrations. Allow 10 minutes for this activity.

Step 4: Write and Draw

Distribute colored pencils, markers, and large sheets of paper and have students create their posters. Remind students to double-check that they have included all the necessary criteria.

Step 5: Present Posters Have students take turns presenting their posters to the class. Allow time for questions after each presenter has finished. After all students have presented, discuss questions students have about sleep and dreams that they might like to research someday.



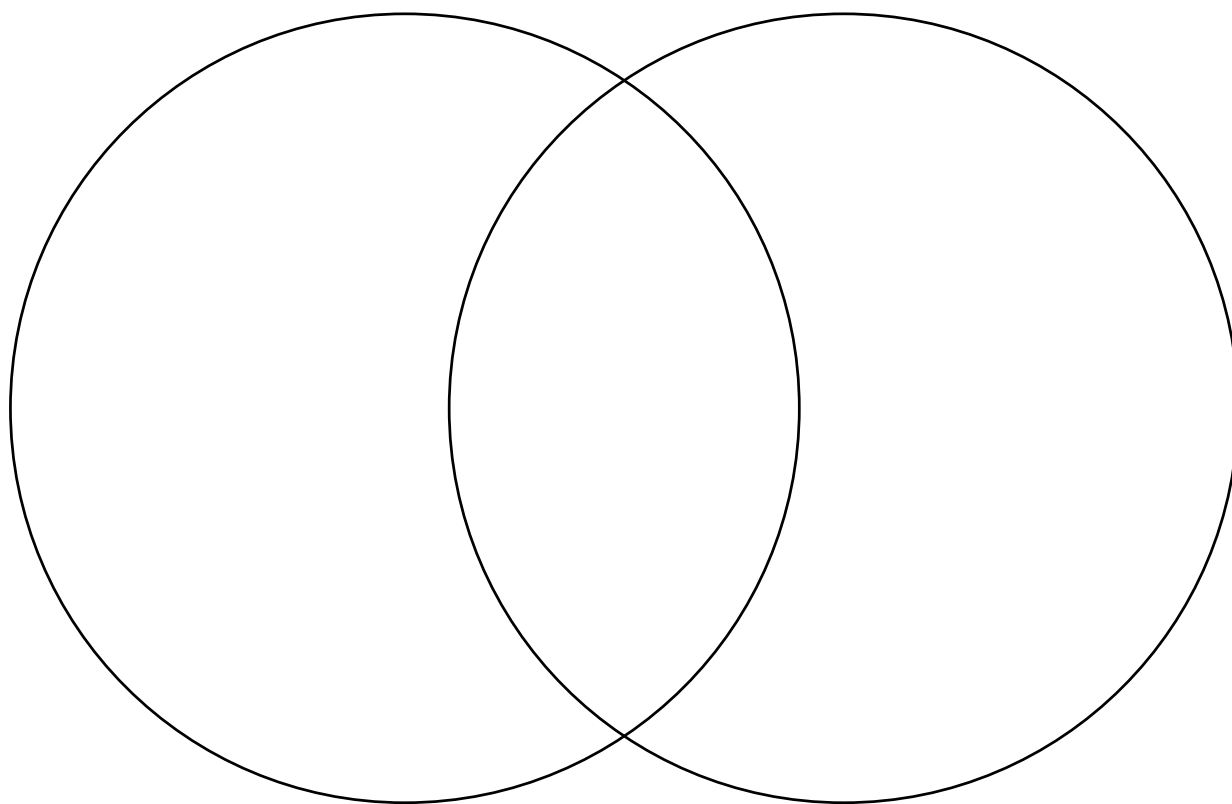
NAME: _____

ELEMENTS OF AN EXPERIMENT

Article Title:		
Scientist's Hypothesis or Question	Experiment	Results, Conclusions, Misconceptions

NAME: _____

VENN DIAGRAM



NAME: _____

SOURCE VALIDITY

	Article:	Article:	Article:
Source			
Credibility			
Accuracy			
Bias?			



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
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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

