

# SUPER FOOD



This guide links the *Super Food* unit to the Texas Essential Knowledge and Skills (TEKS) for high school students. *Super Food* is a science unit that allows students to study nutrition and connect metabolic processes at the cellular level with wide-reaching global food issues such as hunger and obesity. *Super Food* also has interdisciplinary connections to English language arts and social studies disciplines. For example, students will compose persuasive texts, as outlined in the English Language Arts and Reading TEKS, and explain how specific needs result in scientific discoveries and technological innovations, as described in the Social Studies TEKS. The following document includes the applicable TEKS and the details of the *Super Food* unit. The final section of this document presents the applicable Texas College and Career Readiness Standards adopted by the Texas Higher Education Coordinating Board (THECB) on January 24, 2008.

## Description of Unit

In this task, students explore the concept of nutrition at both a micro and macro level—from understanding the process of metabolism in eukaryotic cells to examining the twin global issues of hunger and obesity. Students survey the financial ramifications of these issues and the role of nutritional education in impacting people’s choices and behaviors. Additionally, students gain awareness of how related global challenges such as climate change and the vanishing diversity of crops negatively impact the future food supply. Student learning culminates in an independent research project that allows him/her to study one of these topics at a deeper level. Student products may take the forms of

- public awareness campaigns,
- multimedia presentations,
- a recipe and marketing materials for a new nutritional supplement,
- policy briefs,
- business and programming plans for non-profit organizations, or
- technical papers presenting the findings of a controlled experiment.

### *Super Food* (High School)

## Goals

Students will meet these goals in their explorations:

- Describe the metabolic process of eukaryotic cells and the importance of nutrition to the overall health of the organism
- Gain awareness of the differences in brain development and structure in properly nourished children and children who are malnourished within the first 1,000 days of life
- Examine the complex topics of hunger and its converse, obesity, and understand how these issues share similar root causes
- Understand our world food supply and the climate impact on it
- Ask questions and explore theories
- Have opportunities to generate new ideas
- Create an original research proposal, gather qualitative and/or quantitative data, design and conduct experiments, analyze and synthesize results, and develop conclusions
- Develop the essential skills of communicating, creative problem solving, and logical thinking

Teacher Directions	Additional Teacher Preparation & Notes
<p><b>Elicit</b></p> <p>Ask students to consider the following metaphorical statement: “Food is fuel for the body.” What do people mean by this statement? How does food fuel a body? What happens to the body when you run out of fuel, put in too much fuel, or use the wrong kind of fuel? What happens to malnourished people?</p>	<p>Lead the class in an informal discussion about food and the body.</p>
<p><b>Engage</b></p> <p>Ask students to consider how nutrition functions on a cellular level, and how too little food, or the wrong kinds of food, can impact a multicellular organism at many levels of development. One possible source for introducing the twin problems of hunger and obesity is Ellen Gustafon’s TED talk, <a href="#">Obesity + Hunger = 1 Global Health Issue</a>. Another article linking both malnutrition and obesity to poverty can be found at <a href="http://www.bbc.co.uk/news/business-21216230">http://www.bbc.co.uk/news/business-21216230</a>.</p>	<p>You may wish to print images of the parts of a cell and review cellular metabolism.</p>
<p><b>Explain</b></p> <p>Review the metabolic processes in eukaryotic cells. Ask students to hypothesize what might be happening in the cells of both malnourished and obese individuals. What long-term health effects might these two conditions yield? A more recent health/fitness trend is to use supplements for adding all sorts of vitamins, minerals, amino acids, and trace metals to an individual’s diet. For example, the</p>	

<p>Livestrong site offers <i>Tips on Cellular Nutrition</i> at <a href="http://www.livestrong.com/article/356374-cellular-nutrition-tips/">http://www.livestrong.com/article/356374-cellular-nutrition-tips/</a>.</p>	
<p><b>Explore</b></p> <p>Ask students to take their journals with them the next time they are at a grocery store and select three “supplement” packages to study. Ask students to make a quick sketch of the bottle, packet, or box (or take a digital photo of it with a camera or cell phone), and note any claims that stand out on the packaging (e.g., “makes you more alert, increases stamina, helps circulation, relieves arthritis”). Also ask students to make note of the composition of the supplement (noting that some ingredients will not be listed). Supplements are not regulated like medicines by the <a href="#">U.S. Food and Drug Administration (FDA)</a>. It is the manufacturer’s responsibility to ensure the product is safe before it is marketed; the FDA only takes action on unsafe products after they reach the market. For some products, there are often not as many scientific studies done on the effects of the ingredients, as would be the case for a medicine. Also, the quality may vary considerably from product to product.</p>	<p>You may wish to modify this section of the task based upon how much time you have allocated for the Explore phase. For example, you may choose to ask students to do one of the following three Explore sections rather than guiding them through all three. Or you may ask each small group to engage in a different Explore activity, then reconvene and debrief each group’s findings at the conclusion.</p> <p>This first Explore activity focuses on the topic of herbal supplements and health food claims.</p>
<p><b>Explain</b></p> <p>Ask students to pick one of the products and describe how they might lead a team of scientists in studying the substance. What type of research and experimentation might be necessary to validate the claims on the package? For it to be considered scientifically valid, how many times would the experiment need to be repeated, for what duration, with what sorts of control variables, and with what populations of people? What studies have been conducted with the supplement? What were the findings? Who are the target audience for the supplement? Does the supplement make an impact on hunger or obesity?</p>	
<p><b>Explore</b></p> <p>Break students into small groups to research how malnutrition stunts young children’s brain growth. One possible source is Former United Nations World Food Programme director Josette Sheeran’s talk <a href="#">Ending Hunger Now</a>. Sheeran has a set of slides at 05:04 that compare the brain sizes and neuron formation of both healthy children and malnourished children. Sheeran notes that malnutrition</p>	<p>This second Explore activity focuses on the twin topics of childhood malnutrition and obesity.</p>

has major economic impacts —the stunting due to malnutrition that happens in the first 1,000 days of a child’s life cuts the child’s lifetime earning’s potential in half.

- What might be some of the possible causes for hunger in various populations around the globe?
- What points does Sheeran make that you agree or disagree with? Why?
- What points surprise you? Why? Were there any parts of her talk that you took issue with?

As small groups conclude their exploration of the topic of malnutrition, ask each to turn their attention to the twin issue of childhood obesity. Specifically, allow students time to examine the impact of obesity on young children. What might be some of the causes for obesity in U.S. children and/or children from other countries? Consider the use of a T chart or Venn diagram to facilitate the discussion.

Chef Jamie Oliver emphasizes several possible points in his presentation [Teach Children About Food](#). Working in small groups, use the Internet and library sources to examine his claims for what he believes are the causes of childhood obesity.

- What data might you find that either support or refute his claims?
- How might a scientist design an experiment to study these hypotheses?
- What might be some of the ethical implications in such a study?
- How might scientists address these concerns or find a different means of studying the phenomenon?

## Explain

Ask small groups to share their findings through an informal class discussion. Some guiding questions might include the following:

- What were some of the patterns you noticed when looking at the issues of malnutrition and obesity? In what ways were these two problems similar? How are they different?
- For each issue, you saw a TED talk that helped build awareness as well as suggest possible solutions to the problem. What are your opinions for the feasibility of the solutions? If you were to write and present your own talk, how might you share the facts and garner support for your point of view?

<p><b>Explore</b></p> <p>As with many interconnected global issues, climate change will impact world hunger and the corresponding rates of poverty. Divide students into small groups to research the impact of climate change on food prices. One source is the Oxfam America’s <a href="#">2012 Research Report: Extreme Weather, Extreme Prices</a>.</p> <p>At the 2013 World Economic Forum in Davos, Switzerland, world leaders seemed to agree that fostering “<a href="#">resilience</a>” is a major goal for international policy. Closely aligned to the concept of resiliency is biodiversity in stocks of seeds. With climate changes already impacting growth cycles, ensuring biodiversity might literally save humankind from global famine. For an overview on this interrelated issue, view Cary Fowler’s presentation <a href="#">One Seed at a Time: Protecting the Future of Food</a> on TED.</p>	<p>This third, and final, Explore activity focuses on how climate change impacts the food supply.</p>
<p><b>Explain</b></p> <p>Working together, what recommendations might students suggest to increase the resilience of the world’s food supply? How will these recommendations take into account the need for increased access to nutritional food by the most impoverished individuals?</p>	<p>Students might capture their ideas in a poster and present them to the class during a gallery walk.</p>
<p><b>Elaborate (Phase II)</b></p> <p><b>Research process</b></p> <ol style="list-style-type: none"> <li><b>Selecting a topic.</b> Depending on interest, students select one of the interrelated topics examined during Phase I of the <i>Super Food</i> task to explore at a deeper level through independent research. These topics include: <ul style="list-style-type: none"> <li>Hunger and malnutrition</li> <li>Obesity</li> <li>Nutritional supplements and cellular nutrition</li> <li>The financial impacts of hunger and obesity</li> <li>The impact of climate change and biodiversity on the world’s food supply</li> </ul> </li> <li><b>Asking guiding questions.</b> Depending upon the topic selected, students should develop 3-5 questions to guide their research proposals. Such questions might include: <ul style="list-style-type: none"> <li>What are the statistics in my city or neighborhood for hunger and/or obesity?</li> <li>What is the nutritional quality of the meals served at area schools?</li> </ul> </li> </ol>	

<ul style="list-style-type: none"> <li>• What is the level of food/nutrition knowledge of parents in the local community?</li> <li>• What are some key ingredients in nutritional supplements that might benefit malnourished individuals?</li> <li>• What might be some policies you could design to help address the twin problems of hunger and obesity?</li> <li>• How would you develop a “resilient” nutritional supplement to combat hunger?</li> <li>• How might you investigate the biodiversity of major crops such as corn, wheat, and rice? What would you suggest doing to ensure that these crops remain diverse (e.g., de-incentivize monoculture farming practices of large agribusinesses; invest in small, organic farms; plant rooftop gardens; educate people about the different seeds and how to cook using them)?</li> <li>• What might be alternatives to the fast-food lifestyles that have been linked to obesity and to pre-packaged foods that might contain more sugar, fat, and chemicals than food (some possible sites to explore as starting points include <a href="#">Slow Food</a> and <a href="#">Just Food</a>)?</li> <li>• How many people in your local community might be considered locavores — people who eat only food grown in their geographic area? What are arguments for and against eating this way, both in terms of personal nutrition, and as a means for addressing problems with the food industry?</li> <li>• What conditions are necessary to grow certain food crops (e.g. what amounts of nutrients in the soil, water, and sunlight are required)?</li> </ul> <p><b>3. Creating a research proposal.</b> Students should create a research proposal identifying <u>one</u> of the major topics above and develop a research plan. Will the student need to conduct qualitative research such as interviews and focus groups? How will the student gain access to quantitative data such as statistics and financial information? Will the student need to design a controlled experiment (such as isolating nutrient needs, or examining temperature changes, by growing plants in a controlled environment such as in a greenhouse or through methods such as hydroponics)? Teachers will need to work with students individually to ensure that</p>	
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<p>the scope of the project remains within the timeframe of the class. Will students need a local mentor or a university research contact in order to clarify their research questions and goals?</p> <p><b>4. Conducting the research.</b> Students execute their research plans with guidance from mentors/specialists (if applicable), teachers, and librarians.</p>	
<p><b>Explain</b></p> <p>Students will individually present their findings during a “Super Food Symposium.” The audience for this event may include students from other classes, younger students, parents, dieticians, nutritionists, organic farmers, grocers, doctors, and/or community and business leaders. Additionally students should create 1-2 minute videos (much like the <a href="http://animoto.com/education">http://animoto.com/education</a> introduction) to describe their product via the World Wide Web.</p> <p><b>The product</b></p> <p>Depending upon the topic studied, students might communicate their conclusions through <b>one</b> of the following products:</p> <ul style="list-style-type: none"> <li>• A public-service announcement and corresponding persuasive literature aimed at educating an audience about the problem</li> <li>• A multi-media presentation describing the student’s scientific experiment and detailing the results</li> <li>• A presentation on the economic incentives to address the problem being studied (hunger or obesity) with corresponding analysis of economic statistics and indicators</li> <li>• A recipe for a new nutritional supplement or “power bar” that targets either malnourished or obese individuals, along with the scientific research supporting the student’s hypothesis for how the supplement would work, an educational brochure detailing the nutritional benefits of the substance and a plan for distribution to at-risk populations</li> <li>• A policy brief and presentation that describe a proposed plan for intervention and disruption of the problem situation or behavior</li> <li>• A business-plan for a new non-profit that will address one of these problems on the local level, along with a guide to the programs and services the organization will oversee</li> <li>• A new process for growing food crops that results in “resilient” and high-yield plants</li> </ul>	

### Super Food (High School)

<p><b>Communication</b></p> <p>Each student presents their research findings to an audience through the “Super Food Symposium.” This event may be organized like an exhibit hall, where students talk one-on-one with the public. Question and answer sessions should be informal so that students may present their research and defend their solutions. One way to ensure that students have the opportunity to see the works of their peers is to split the event into two sessions and have only half of the students present at a time. In other words, when the first group presents, students in the second group can review and assess the products. Then for the second session of the <i>Symposium</i>, the groups reverse roles. All students should finish their products prior to either group presenting so as not to introduce bias or unfair advantage to later presenters. Students should document their presentations through digital photos, videos, and/or audio recordings.</p>	
<p><b>Evaluate</b></p> <p>Use the TPSP High School/Exit Level Rubric to assess each student’s learning. Additionally, you may wish to develop self- or peer-assessments based on the rubric that students could use to evaluate their products.</p> <p><b>A completed project consists of:</b></p> <ol style="list-style-type: none"> <li>1. Topic proposal</li> <li>2. Research notes</li> <li>3. Final product plan, design, recipe, and/or presentation</li> <li>4. Documentation of the presentation during the <i>Super Food Symposium</i></li> <li>5. Video introductions for the web detailing the student’s product</li> </ol> <p>In what ways did the student:</p> <ul style="list-style-type: none"> <li>• Develop sophisticated, open-ended questions about the self-selected topic;</li> <li>• Use a variety of sources that access advanced content and include multiple perspectives;</li> <li>• Collect data using the tools of the discipline;</li> <li>• Analyze and interpret the data;</li> <li>• Capture and apply their analysis through an original product; and</li> <li>• Communicate his/her research findings, learning, and ideas to an audience using the language of the discipline.</li> </ul>	<p>The TPSP High School/Exit Level Rubric can be downloaded at <a href="http://www.texaspsp.org/highschool/high-school-assessment.php">http://www.texaspsp.org/highschool/high-school-assessment.php</a>.</p>



## Extend

*Super Food* provides students with opportunities for interdisciplinary research and product development. Additional extension activities include the following project ideas.

### Mathematics

Conduct a study on the economic impact of malnutrition in a specific geographic area. What are the costs of aid sent to address the problem? How does malnutrition impact the productivity of a population? What are some economic tools that communities can use to address the problem? Create a multimedia presentation to communicate your findings. Address your audience as if you were asking for investments or seed money for a new non-profit or global aid organization.

### Social Studies

Few issues shape history as sharply as a disturbance in the food supply caused by famine, drought, warfare, or natural disasters. Research a time period in the history of a culture of your choosing where a sudden change in the food supply altered the course of a society and directly impacted the way of life of the people. Depict the events preceding and after the incident causing the food shortage through a timeline. Develop a short historical play to communicate your findings to an audience. Your play may have as many or few characters as you wish, but should convey the historical facts as well as create a picture of what life was like during the time period studied.

### English language arts

The topic of hunger plays a role in a wide variety of literature from John Steinbeck's *The Grapes of Wrath* to contemporary works such as Jeanette Walls novel *The Glass Castle*. Select a work of literature, such as a novel, a play, or several short stories, and examine how hunger plays a role in the lives of the characters. Research the time period and geographic setting of each story. How might you rewrite a section of the story to try to address the hunger problem? What might happen to the characters and how would the plot change? Present your writing to the class through a formal reading.

## Internet Resources

<http://www.fda.gov/default.htm>

<http://www.uspto.gov/>

<http://www.wfp.org/nutrition>

[http://www.huffingtonpost.com/ertharin-cousin/global-food-security\\_b\\_2546075.html](http://www.huffingtonpost.com/ertharin-cousin/global-food-security_b_2546075.html)

<http://www.bbc.co.uk/news/business-21216230>

<http://www.ucmp.berkeley.edu/allife/eukaryota.html>

<http://www.slowfood.com>

<http://www.justfood.org/about-us>

<http://www.livestrong.com/article/356374-cellular-nutrition-tips/>

<http://www.oxfamamerica.org/publications/extreme-weather-extreme-prices>

<http://www.instructables.com/id/Hydroponics---at-Home-and-for-Beginners/>

[http://www.ted.com/talks/ellen\\_gustafson\\_obesity\\_hunger\\_1\\_global\\_food\\_issue.html](http://www.ted.com/talks/ellen_gustafson_obesity_hunger_1_global_food_issue.html)

[http://www.ted.com/talks/jamie\\_oliver.html](http://www.ted.com/talks/jamie_oliver.html)

[http://www.ted.com/talks/cary\\_fowler\\_one\\_seed\\_at\\_a\\_time\\_protecting\\_the\\_future\\_of\\_food.html](http://www.ted.com/talks/cary_fowler_one_seed_at_a_time_protecting_the_future_of_food.html)

[http://www.ted.com/talks/josette\\_sheeran\\_ending\\_hunger\\_now.html](http://www.ted.com/talks/josette_sheeran_ending_hunger_now.html)

<http://www.cdc.gov/obesity/data/adult.html>

<http://www.who.int/mediacentre/factsheets/fs311/en/index.html>

<http://www.who.int/topics/obesity/en/>

<http://www.who.int/childgrowth/en/index.html>

<http://news.bbc.co.uk/2/hi/health/7151813.stm>

## Texas Essential Knowledge and Skills

The unit may address the following TEKS:

### English Language Arts and Reading:

#### *English I*

- I.7 Understands, makes inferences and draws conclusions about how an author's sensory language creates imagery in literary text and provides evidence from text to support their understanding
- I.8 Analyzes, makes inferences and draws conclusions about the author's purpose in cultural, historical, and contemporary contexts and provides evidence from the text to support their understanding
- I.11 Understands how to glean and use information in procedural texts and documents
- I.12 Uses comprehension skills to analyze how words, images, graphics, and sounds work together in various forms to impact meaning
- I.15 Writes expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes
- I.17 Understands the function of and uses the conventions of academic language when speaking and writing
- I.20 Asks open-ended research questions and develop a plan for answering them

- I.21 Determines, locates, and explores the full range of relevant sources addressing a research question and systematically records the information they gather
- I.22 Clarifies research questions and evaluates and synthesizes collected information
- I.23 Organizes and presents their ideas and information according to the purpose of the research and their audience
- I.24 Uses comprehension skills to listen attentively to others in formal and informal settings
- I.25 Speaks clearly and to the point, using the conventions of language

**English II**

- II.8 Analyzes, makes inferences and draws conclusions about the author's purpose in cultural, historical, and contemporary contexts and provides evidence from the text to support their understanding
- II.9 Analyzes, makes inferences and draws conclusions about expository text and provides evidence from text to support their understanding
- II.11 Understands how to glean and use information in procedural texts and documents
- II.12 Uses comprehension skills to analyze how words, images, graphics, and sounds work together in various forms to impact meaning
- II.15 Writes expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes
- II.17 Understands the function of and uses the conventions of academic language when speaking and writing
- II.20 Asks open-ended research questions and develops a plan for answering them
- II.21 Determines, locates, and explores the full range of relevant sources addressing a research question and systematically record the information they gather
- II.22 Clarifies research questions and evaluates and synthesizes collected information
- II.23 Organizes and presents their ideas and information according to the purpose of the research and their audience
- II.24 Uses comprehension skills to listen attentively to others in formal and informal settings
- II.25 Speaks clearly and to the point, using the conventions of language

**Science:****Biology**

- BIO.1 Conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices
- BIO.2 Uses scientific methods and equipment during laboratory and field investigations
- BIO.3 Uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom
- BIO.4 Knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells
- BIO.5 Knows how an organism grows and the importance of cell differentiation
- BIO.6 knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics

- BIO.7 Knows evolutionary theory is a scientific explanation for the unity and diversity of life
- BIO.9 Knows the significance of various molecules involved in metabolic processes and energy conversions that occur in living organisms
- BIO.10 Knows that biological systems are composed of multiple levels
- BIO.11 Knows that biological systems work to achieve and maintain balance
- BIO.12 Knows that interdependence and interactions occur within an environmental system

**Environmental Systems**

- SES.3 Uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom
- SES.5 Knows the interrelationships among the resources within the local environmental system
- SES.9 Knows the impact of human activities on the environment

**Social Studies:****Psychology**

- PSY.3 Understands the relationship between biology and behavior
- PSY.4 Understands how sensations and perceptions influence cognition and behavior
- PSY.5 Understands that development is a life-long process
- PSY.6 Understands behavioral and social learning theories
- PSY.7 Understands the principles of motivation and emotion
- PSY.11 Understands basic elements of cognition
- PSY.13 Understands the influence of society and culture on behavior and cognition
- PSY.17 Develops long-term and short-term goal-setting skills for individual and community problem solving
- PSY.18 Understands the relationship of changes in technology to personal growth and development

**Sociology**

- SOC.1 Understands the theoretical perspectives of the historical interpretations of human social development
- SOC.2 Understands how society evolves and cause and effect of social and institutional change
- SOC.6 Understands the process of socialization
- SOC.7 Understands the concept of adolescence and its characteristics
- SOC.8 Understands the life stage of adulthood and its characteristics
- SOC.10 Understands the nature of social stratification in society
- SOC.12 Understands changing societal views on gender, age, and health
- SOC.13 Identifies the basic social institution of the family and explains its influences on society
- SOC.15 Identifies the basic social institutions of education and religion and explains their influence on society
- SOC.16 Understands the basic social institutions of science and the mass media and their influence on society
- SOC.17 Understands how population and urbanization contribute to a changing social world

- SOC.18 Understands how collective behavior, social movements, and modernization contribute to a changing social world
- SOC.19 Applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology
- SOC.21 Uses problem-solving and decision-making skills, working independently and with others, in a variety of settings

### ***Social Studies Research Methods***

- RM.1 Understands the need for an organizing framework to identify an area of interest and collect information
- RM.2 Applies a process approach to a research topic, applying the ideas, theories, and modes of inquiry drawn from the social sciences in the examination of persistent issues and social questions
- RM.3 Employs the processes of critical social science inquiry to understand an issue, topic, or area of interest using a variety of sources, checking their credibility, validating and weighing evidence for claims, and searching for causality
- RM.6 Understands the principles and requirements of the scientific method

## **Health Education:**

### ***Health***

- H.1 Analyzes health information and applies strategies for enhancing and maintaining personal health throughout the life span
- H.4 Investigates and evaluates the impact of media and technology on individual, family, community, and world health
- H.5 Understands how to evaluate health information for appropriateness
- H.6 Assesses the relationship between body structure and function and personal health throughout the life span
- H.7 Analyzes the relationship between unsafe behaviors and personal health and develops strategies to promote resiliency throughout the life span
- H.8 Analyzes the effect of relationships on health behaviors
- H.9 Differentiates between positive and negative family influences
- H.10 Evaluates the effect of a variety of environmental factors on community and world health
- H.11 Understands how to access school and community health services for people of all ages
- H.12 Understands situations in which people of all ages require professional health services
- H.13 Analyzes, designs, and evaluates communication skills for building and maintaining healthy relationships throughout the life span
- H.16 Synthesizes information and applies critical-thinking, decision-making, and problem-solving skills for making health-promoting decisions throughout the life span
- H.17 Applies strategies for advocating and evaluating outcomes for health issues

**Physical Education:****Foundations in Personal Fitness**

- FIT.2 Develops positive self-management and social skills needed to work independently and with others
- FIT.4 Applies fitness principles during a personal fitness program
- FIT.5 Comprehends practices that impact daily performance, physical activity, and health

**Texas College and Career Readiness Standards**

This unit may address the following Texas College and Career Readiness Standards:

**English Language Arts:**

- I.A.1 Determines effective approaches, forms, and rhetorical techniques that demonstrate understanding of the writer's purpose and audience
- I.A.2 Generates ideas and gathers information relevant to the topic and purpose, keeping careful records of outside sources
- I.A.3 Evaluates relevance, quality, sufficiency, and depth of preliminary ideas and information, organizes material generated, and formulates thesis
- II.A.1 Uses effective reading strategies to determine a written work's purpose and intended audience
- II.A.2 Uses text features and graphics to form an overview of informational texts and to determine where to locate information
- II.A.3 Identifies explicit and implicit textual information including main ideas and author's purpose
- II.A.4 Draws and supports complex inferences from text to summarize, draw conclusions, and distinguish facts from simple assertions and opinions
- II.A.5 Analyzes the presentation of information and the strength and quality of evidence used by the author, and judges the coherence and logic of the presentation and the credibility of an argument
- II.D.1 Describes insights gained about oneself, others, or the world from reading specific texts
- III.A.1 Understands how style and content of spoken language varies in different contexts and influences the listener's understanding
- III.A.2 Adjusts presentation (delivery, vocabulary, length) to particular audiences and purposes
- III.B.1 Participates actively and effectively in one-on-one oral communication situations
- III.B.2 Participates actively and effectively in group discussions
- III.B.3 Plans and delivers focused and coherent presentations that convey clear and distinct perspectives and demonstrates solid reasoning
- IV.A.1 Analyzes and evaluates the effectiveness of a public presentation
- IV.A.2 Interprets a speaker's message; identifies the position taken and the evidence in support of that position

- IV.A.3 Uses a variety of strategies to enhance listening comprehension
- IV.B.1 Listens critically and responds appropriately to presentations
- IV.B.2 Listens actively and effectively in one-on-one communication situations
- V.A.1 Formulates research questions
- V.A.2 Explores a research topic
- V.A.3 Refines research topic and devises a timeline for completing work
- V.B.1 Gathers relevant sources
- V.B.2 Evaluates the validity and reliability of sources
- V.B.3 Synthesizes and organizes information effectively
- V.C.1 Designs and presents an effective product
- V.C.2 Uses source material ethically

### Mathematics:

- VI.A.1 Plans a study
- VI.B.1 Determines types of data
- VI.B.2 Selects and applies appropriate visual representations of data
- VI.B.3 Computes and describes summary statistics of data
- VI.C.1 Makes predictions and draws inferences using summary statistics
- VI.C.2 Analyzes data sets using graphs and summary statistics
- VI.C.3 Analyzes relationships between paired data using spreadsheets, graphing calculators, or statistical software
- VI.C.4 Recognizes reliability of statistical results
- VIII.A.1 Analyzes given information
- VIII.A.2 Formulates a plan or strategy
- VIII.A.3 Determines a solution
- VIII.A.4 Justifies the solution
- VIII.A.5 Evaluates the problem-solving process
- VIII.B.1 Develops and evaluates convincing arguments
- VIII.B.2 Uses various types of reasoning
- VIII.C.1 Formulates a solution to a real world situation based on the solution to a mathematic problem
- VIII.C.2 Uses a function to model a real-world situation
- IX.A.3 Uses mathematics as a language for reasoning, problem solving, making connections, and generalizing
- IX.B.1 Models and interprets mathematical ideas and concepts using multiple representations
- IX.B.2 Summarizes and interprets mathematical information provided orally, visually, or in written form within the given context
- IX.C.1 Communicates mathematical ideas, reasoning, and their implications using symbols, diagrams, graphs, and words

IX.C.2	Creates and uses representations to organize, record, and communicate mathematical ideas
X.B.1	Uses multiple representations to demonstrate links between mathematical and real-world situations
X.B.2	Understands and uses appropriate mathematical models in the natural, physical, and social sciences
X.B.3	Knows and understands the use of mathematics in a variety of careers and professions

**Science:**

I.E.1	Uses several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic
I.E.2	Uses essential vocabulary of the discipline being studied
IV.C.1	Understands the historical development of major theories in science
IV.C.2	Recognizes the role of people in important contributions to scientific knowledge
VI.A.1	Knows that although all cells share basic features, cells differentiate to carry out specialized functions
VI.A.4	Describes the major features of mitosis and relates this process to growth and asexual reproduction
VI.A.5	Understands the process of cytokinesis in plant and animal cells and how this process is related to growth
VI.B.1	Understands the major categories of biological molecules: lipids, carbohydrates, proteins, and nucleic acids
VI.B.2	Describes the structure and function of enzymes
VI.B.6	Understands coupled reaction processes and describes the role of ATP in energy coupling and transfer
VI.C.1	Knows multiple categories of evidence for evolutionary change and how this evidence is used to infer evolutionary relationships among organisms
VI.C.2	Recognizes variations in population sizes, including extinction, and describe mechanisms and conditions that produce these variations
VI.D.1	Understands Mendel's laws of inheritance
VI.D.2	Knows modifications to Mendel's laws
VI.D.5	Describes the major features of meiosis and relates this process to Mendel's laws of inheritance
VI.E.1	Knows ways in which living things can be classified based on each organism's internal and external structure, development, and relatedness of DNA sequences
VI.F.1	Knows that organisms possess various structures and processes (feedback loops) that maintain steady internal conditions
X.B.1	Understands energy transformations
X.B.2	Knows the various sources of energy for humans and other biological systems
X.C.1	Recognizes variations in population sizes, including human population and extinction, and describe mechanisms and conditions that produce these variations



**Social Studies:**

- I.E.1 Identifies different social groups and examines how they form and how and why they sustain themselves
- I.E.2 Defines the concept of socialization and analyzes the role socialization plays in human development and behavior
- I.E.3 Analyzes how social institutions function and meet the needs of society
- I.F.1 Uses a variety of research and analytical tools to explore questions or issues thoroughly and fairly
- I.F.2 Analyzes ethical issues in historical, cultural, and social contexts
- II.B.5 Explains the concepts of socioeconomic status and stratification
- II.B.6 Analyzes how individual and group identities are established and change over time
- III.A.1 Distinguishes spatial patterns of human communities that exist between or within contemporary political boundaries
- III.A.2 Connects regional or local developments to global ones
- III.A.3 Analyzes how and why diverse communities interact and become dependent on each other
- III.B.1 Applies social science methodologies to compare societies and cultures
- IV.A.1 Identifies and analyzes the main idea(s) and point(s) of view in sources
- IV.A.2 Situates an informational source in its appropriate contexts
- IV.A.3 Evaluates sources from multiple perspectives
- IV.A.6 Reads research data critically
- IV.B.1 Uses established research methodologies
- IV.B.3 Gathers, organizes, and displays the results of data and research
- IV.B.4 Identifies and collects sources
- IV.C.1 Understands/interprets presentations critically
- IV.D.1 Constructs a thesis that is supported by evidence
- IV.D.2 Recognizes and evaluates counter-arguments
- V.A.1 Uses appropriate oral communication techniques depending on the context or nature of the interaction
- V.A.2 Uses conventions of standard written English
- V.B.1 Attributes ideas and information to source materials and authors

**Cross-Disciplinary Standards:**

- I.A.1 Engages in scholarly inquiry and dialogue
- I.A.2 Accepts constructive criticism and revises personal views when valid evidence warrants
- I.B.1 Considers arguments and conclusions of self and others
- I.C.2 Develops and applies multiple strategies to solving a problem
- I.C.3 Collects evidence and data systematically and directly related to solving a problem
- I.D.1 Self-monitors learning needs and seeks assistance when needed
- I.D.2 Uses study habits necessary to manage academic pursuits and requirements

- I.D.3 Strives for accuracy and precision
- I.D.4 Perseveres to complete and master tasks
- I.E.1 Works independently
- I.E.2 Works collaboratively
- I.F.1 Attributes ideas and information to source materials and people
- I.F.2 Evaluates sources for quality of content, validity, credibility, and relevance
- II.A.2 Uses a variety of strategies to understand the meanings of new words
- II.A.3 Identifies the intended purpose and audience of the text
- II.A.4 Identifies the key information and supporting details
- II.A.5 Analyzes textual information critically
- II.A.6 Annotates, summarizes, paraphrases, and outlines texts when appropriate
- II.B.1 Writes clearly and coherently using standard writing conventions
- II.B.2 Writes in a variety of forms for various audiences and purposes
- II.B.3 Composes and revises drafts
- II.C.1 Understands which topics or questions are to be investigated
- II.C.2 Explores a research topic
- II.C.3 Refines research topic based on preliminary research and devises a timeline for completing work
- II.C.4 Evaluates the validity and reliability of sources
- II.C.5 Synthesizes and organizes information effectively
- II.C.6 Designs and presents an effective product
- II.C.7 Integrates source material
- II.C.8 Presents final product
- II.D.1 Identifies patterns or departures from patterns among data
- II.D.2 Uses statistical and probabilistic skills necessary for planning an investigation, and collecting, analyzing, and interpreting data
- II.D.3 Presents analyzed data and communicates findings in a variety of formats
- II.E.1 Uses technology to gather information
- II.E.2 Uses technology to organize, manage, and analyze information
- II.E.3 Uses technology to communicate and display findings in a clear and coherent manner
- II.E.4 Uses technology appropriately