## Reading Focus: Literature

- **Writing Focus:** Narrative

## Unifying Concept: Life Science

**Our Genes/Evolution**

### Enduring Understandings:

The goal of science is to understand the natural world. Students must learn to use scientific practices and accumulated knowledge to better understand the world around them. All organisms reproduce either sexually or asexually by passing genes from parent to offspring. Both Heredity and environment play a role in determining the traits of an organism. Organisms adapt to their environment and natural selection is the process by which organisms favorably adapt and survive to reproduce. Difficult ethical issues can occur when using information obtained from biotechnology.

### Essential Questions:

- How do organisms reproduce?
- How are traits passed from one generation to the next?
- In what ways do both heredity and environment determine an organism’s trait?
- How does natural selection occur?
- Why must a specie be able to adapt to their environment?
- How can the processes of evolution be analyzed and described?
- What are the pros and cons of the use of biotechnology?

### Standards

#### Highly-Leveraged Standards

<table>
<thead>
<tr>
<th>Strand 4: Life Science (HLS - 14%)</th>
</tr>
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<tbody>
<tr>
<td><strong>8.S4.C2 Reproduction and Heredity:</strong> Understand the basic principles of heredity.</td>
</tr>
<tr>
<td><strong>PO1.</strong> Explain the purposes of cell division.</td>
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<tr>
<td>- Growth</td>
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<tr>
<td><strong>PO2.</strong> Explain the basic principles of heredity using the human examples of:</td>
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<tr>
<td>- Eye color</td>
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<td>- Widow’s peak</td>
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<tr>
<td>- Blood type</td>
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<td><strong>PO3.</strong> Distinguish between the nature of dominate and recessive traits in humans.</td>
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<td><strong>8.S4.C4 Diversity, Adaptation, and Behavior:</strong> Identify structural and behavioral adaptations.</td>
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<td><strong>PO1.</strong> Explain how an organism’s behavior allows it to survive in an environment.</td>
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<td><strong>PO2.</strong> Describe how an organism can maintain a stable internal environment while living in a constantly changing external environment.</td>
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| **8.S2.C1 History of Science as a Human Endeavor:** Identify individual, cultural and technological contributions to scientific knowledge. |
| **PO1.** Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson and Crick [scientists], supports Strand 4; Rosalind Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 4; Sir Frances Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5). |
| **PO2.** Evaluate the effects of the following major scientific milestones on society: |
| - Mendelian Genetics |
| - Newton’s Laws |
| **PO3.** Evaluate the impact of a major scientific development occurring within the past decade. |
| **PO4.** Evaluate career opportunities related to life and physical sciences. |
**2018-2019 Science Curriculum Map, Grade 8, Q1**

| **PO3.** Determine characteristics of organisms that could change over several generations. |
| **PO4.** Compare the symbiotic and competitive relationships in organisms within an ecosystem (e.g., lichen, mistletoe/tree, clownfish/sea anemone, native/non-native species). |
| **PO5.** Analyze the following behavioral cycles of organisms: |
| - Hibernation |
| - Migration |
| - Dormancy (plants) |
| **PO6.** Describe the following factors that allow the survival of living organisms: |
| - Protective coloration |
| - Beak design |
| - See dispersal |
| - Pollination |

**Strand 3: Science in Personal and Social Perspectives**

**8.S3.C2 Science and Technology in Society:** Develop viable solutions to a need or problem.

| **PO1.** Propose viable methods of responding to an identified need or problem. |
| **PO2.** Compare possible solutions to best address an identified need or problem. |
| **PO3.** Design and construct a solution to an identified need or problem using simple classroom materials. |
| **PO4.** Compare risks and benefits of the following technological advances: |
| - Radiation treatments |
| - Genetic engineering |
| - Airbags |

**Constant Standards**

**Strand 1: Inquiry Process (HLS – 35%)**

**8.S1.C1 Observations, Questions, and Hypotheses:** Formulate predictions, questions, or hypotheses based on observations.

| **PO1.** Formulate questions based on observations that lead to the development of a hypothesis. |
| **PO2.** Use appropriate research information, not limited to a single source, to use in the development of a testable hypothesis. |
| **PO3.** Generate a hypothesis that can be tested. |


| **PO1.** Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry. |
| **PO2.** Design a controlled investigation to support or reject a hypothesis. |
| **PO3.** Conduct a controlled investigation to support or reject a hypothesis. |
| **PO4.** Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers). |
| **PO5.** Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs. |

**8.S1.C3 Analysis and Conclusions:** Analyze and interpret data to explain correlations and results; formulate new questions.

| **PO1.** Analyze data obtained in a scientific investigation to identify trends. |
| **PO2.** Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events). |
| **PO3.** Interpret data that show a variety of possible relationships between two variables, including:
• Positive relationship
• Negative relationship
• No relationship

PO4. Formulate a future investigation based on the data collected.

PO5. Explain how evidence supports the validity and reliability of a conclusion.

PO6. Identify the potential investigational error that may occur (e.g., flawed investigational design, inaccurate measurement, computational errors, unethical reporting).

PO7. Critique scientific reports from periodicals, television, or other media.

PO8. Formulate new questions based on the results of a previous investigation.


PO1. Communicate the results of an investigation.

PO2. Choose an appropriate graphic representation for collected data:
   - Line graph
   - Double bar graph
   - Stem and leaf plot
   - Histogram

PO3. Present analyses and conclusions in clear, concise formats.

PO4. Write clear, step-by-step instructions for conducting investigations or operating equipment (without the use of personal pronouns).

PO5. Communicate the results and conclusion of the investigation.

Strand 2: History and Nature of Science


PO1. Apply the following scientific processes to other problem solving or decision making situations:
   - Observing
   - Questioning
   - Communicating
   - Comparing
   - Measuring
   - Classifying
   - Predicting
   - Organizing data
   - Inferring
   - Generating hypotheses
   - Identifying variables

PO2. Describe how scientific knowledge is subject to change as a new information and/or technology challenges prevailing theories.

PO3. Defend the principle that accurate record keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society.
PO4. Explain why scientific claims may be questionable if based on very small samples of data, biased samples, or samples for which there was no control.

Strand 3: Science in Personal and Social Perspectives
8.S3.C1 Changes in Environment: Describe the interactions between human populations, natural hazards, and the environment.

PO1. Analyze the risk factors associated with natural, human induced, and/or biological hazards, including:
   - Waste disposal of industrial chemicals
   - Greenhouse gases

PO2. Analyze possible solutions to address the environmental risks associated with chemicals and biological systems.

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| • Ask questions and define problems  
• Develop and use models  
• Plan and carry out investigations  
• Analyze and interpret data  
• Use mathematics and computational thinking  
• Construct explanations and design solutions  
• Engage in argument from evidence  
• Obtain, evaluate, and communicate information | • Cause & Effect  
• Patterns  
• Systems & System Models |

Social Justice Standards

Identity 3 – I know that overlapping identities combine to make me who I am and that none of my group identities on their own fully defines me or any other person. (ID.6-8.3)

Diversity 6 – I interact with people who are similar to and different from me, and I show respect to all people. (DI.6-8.6)

Diversity 9 – I know I am connected to other people and can relate to them even when we are different or when we disagree. (DI.6-8.9)

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Action 19 – I will speak up or take action when I see unfairness, even if those around me do not, and I will not let others convince me to go along with injustice. (AC.6-8.19)

Teaching Tolerance Anti-Bias Framework [https://www.tolerance.org/frameworks](https://www.tolerance.org/frameworks)

Adopted Texts and Materials

Textbook:
• SEPUP Our Genes, Ourselves
• SEPUP Evolution

Multicultural Book aligned with Our Genes, Ourselves/Evolution Science Resource Kit

The Evolution of Calpurnia Tate (2009) (IL:5-8 RL:5.3) In central Texas in 1899, eleven-year-old Callie Vee Tate learns about love from the older three of her six
### 2018-2019 Science Curriculum Map, Grade 8, Q1

Brothers and studies the natural world with her grandfather which leads to an important discovery.

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<td>Additional Instructional Resources</td>
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**Formative/Performance Assessment Examples:**
- Complete a lab report that includes question, hypothesis, variables, procedure, table, graph, and conclusion.
- Write an original procedure to conduct a controlled experiment. (Black worm Activity)
- Identify the parts of the scientific process within an episode of Mythbusters. 
  [https://www.youtube.com/watch?v=wFFslAjUyj4&list=PL4D31A3C0BCA85C42](https://www.youtube.com/watch?v=wFFslAjUyj4&list=PL4D31A3C0BCA85C42)
- Identify independent and dependent variables given synopses of a scientific investigation.
- Draw Punnett squares to predict the possible genotypes of offspring from specific parent genotypes.
- Complete a mock crime scene investigation involving knowing how blood types are inherited.
- Draw an evolutionary tree to show how whales evolved from land animals.
- Use a model to simulate how natural selection works.
- [TUSD Science Module Supplemental Resources:](http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum)
- Science Spot Website – general science page [http://www.sciencespot.net/Pages/classgen.html](http://www.sciencespot.net/Pages/classgen.html)
- Bill Nye videos: [https://www.youtube.com/results?search_query=bill+nye](https://www.youtube.com/results?search_query=bill+nye)
- Mythbusters episodes to discuss scientific method hyperlink to site [https://www.youtube.com/watch?v=wFFslAjUyj4&list=PL4D31A3C0BCA85C42](https://www.youtube.com/watch?v=wFFslAjUyj4&list=PL4D31A3C0BCA85C42)
- Southern Arizona Regional Science and Engineering Fair website has great resources to help create a science fair project [https://sarsef.org/](https://sarsef.org/)
- The Great Fossil Find Activity to demonstrate the nature of science [http://www.indiana.edu/~ensiweb/lessons/gr.fs.fd.html](http://www.indiana.edu/~ensiweb/lessons/gr.fs.fd.html)
- Science Spot Website – Biology page [http://www.sciencespot.net/Pages/classbio.html](http://www.sciencespot.net/Pages/classbio.html)
- Brainpop (Subscription required) [www.brainpop.com](http://www.brainpop.com)
- Mendel Pea experiments simulation [http://www2.edc.org/weblabs/Mendel/MendelMenu.html](http://www2.edc.org/weblabs/Mendel/MendelMenu.html)
- Click-n-Clone mouse simulation [http://learn.genetics.utah.edu/content/cloning/clickandclone/](http://learn.genetics.utah.edu/content/cloning/clickandclone/)
- YouTube: Explore more / Genetic Engineering [https://www.youtube.com/watch?v=smFRgTdIlUQ](https://www.youtube.com/watch?v=smFRgTdIlUQ)
¹Highly-Leveraged Standards are essential for students to learn because they have endurance (knowledge and skills relevant throughout a student’s lifetime); leverage (knowledge and skills used across multiple content areas); and essentiality (knowledge and skills necessary for success in future courses or grade levels).*

²Supporting Standards are emphasized during the quarter as they are integral to achieve mastery of the Highly Leveraged Standards. Mastery of these standards are used measured using classroom assessments.

³Constant Standards are repeatedly addressed to reinforce grade-level mastery.

*This definition for Highly-Leveraged Standards was adapted from the “power standard” definition on the website of the Millis Public Schools, K-12, Massachusetts, USA, 2016.
# Reading Focus: Informational

## Writing Focus: Informative/Explanatory

## Enduring Understandings:
The goal of science is to understand the natural world. Students must learn to use scientific practices and accumulated knowledge to better understand the world around them. Everything in the universe is composed of matter and energy, which is in constant motion. There are laws that explain any motion of any object. Speed, velocity, and acceleration are ways to quantify and explain motion. Speed is the relationship between time and distance. Velocity is a vector to describe the direction of speed. Acceleration is any change in velocity. A force is a push or a pull that can result in a change in motion. Newton’s three laws of motion explain how all objects move and interact with each other throughout the universe. Energy cannot be created nor destroyed; it can only change form.

## Essential Questions:
- How can we explain that everything in the universe is in motion?
- What are specific ways we can describe an object’s motion and the change in motion?
- In what ways do forces occur?
- Where do we see examples of the laws of motion in our daily lives?
- Why does a body resist changes in its motion?
- How do mass and force determine acceleration?
- How is energy conserved within a system?

## Academic Vocabulary:
- Time
- Momentum
- Distance
- Energy
- Displacement
- Potential energy
- Acceleration
- Mass
- Force
- Inertia
- Kinetic energy
- Friction
- Gravity

## Standards

### Highly-Leveraged Standards¹

**8.S5.C2 Motion and Forces:** Understand the relationship between force and motion

**PO1.** Demonstrate velocity as the rate of change of position over time.

**PO2.** Identify the conditions under which an object will continue in its state of motion (Newton’s 1st Law of Motion).

**PO3.** Describe how the acceleration of a body is dependent on its mass and the net applied force (Newton’s 2nd Law of Motion).

**PO4.** Describe forces as interactions between bodies (Newton’s 3rd Law of Motion).

**PO5.** Create a graph devised from measurements of moving objects and their interactions, including:
  - position-time graphs
  - velocity-time graphs

### Supporting Standards²

**8.S2.C1 History of Science as a Human Endeavor:** Identify individual, cultural and technological contributions to scientific knowledge.

**PO1.** Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson ad Crick [scientists], supports Strand 4; Rosalind Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 5; Sir Frances Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5).

**PO2.** Evaluate the effects of the following major scientific milestones on society:
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Teaching Tolerance Anti-Bias Framework [https://www.tolerance.org/frameworks](https://www.tolerance.org/frameworks)

Adopted Texts and Materials

Textbook:
- Prentice Hall Motion, Forces and Energy textbook
- Prentice Hall Motion, Forces, and Energy Teaching Resources

Science Module Supplemental Resources

Instructional and Assessment Guides

Multicultural Inclusive Strategies

Culturally Responsive Practices ([TUSD SPARKS, SPARKS Strategies](#))

Pre/Post Scientific method assessment for 8th grade on School City

TUSD Science Module Supplemental Resources: [http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum](http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum)

Brain Pop [www.brainpop.com](http://www.brainpop.com) (subscription required)
### Pre/Post Unit Assessment:
- [http://intranet/science/Kit_Hsmts.html](http://intranet/science/Kit_Asmts.html)

### Formative/Performance Assessment Examples:
- Complete a lab report that includes question, hypothesis, variables, procedure, table, graph, and conclusion.
- Write an original procedure to conduct a controlled experiment.
- Students create a Venn diagram comparing/contrasting three laws of motion.
- Designing and building a mousetrap car and then explaining the motion using Newton’s three laws of motion.
- Calculate the speed of different classmates walking, skipping, hopping, etc.
- Students calculate their acceleration as they run 20 meters.
- Complete activities that demonstrate each of the three laws and explain how they demonstrate the specific law.
- Build a paper model of a roller coaster to demonstrate kinetic verses potential energy.
- Find real life examples of each of Newton’s Laws and explain how each example demonstrates the specific law.

### Resource Books:
- **Stop Faking It! – Companion Classroom Activities for Force and Motion**  
  Author – William C. Robertson
- **Take-Home Physics: 65 High-Impact, Low-Cost Labs**  
  Author – Michael Horton

---

1 **Highly-Leveraged Standards** are essential for students to learn because they have endurance (knowledge and skills relevant throughout a student’s lifetime); leverage (knowledge and skills used across multiple content areas); and essentiality (knowledge and skills necessary for success in future courses or grade levels).*

2 **Supporting Standards** are emphasized during the quarter as they are integral to achieve mastery of the Highly Leveraged Standards. Mastery of these standards are measured using classroom assessments.

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Reading Focus: Literature
Writing Focus: Argumentative

Unifying Concept: Physical Science
Chemical Building Blocks

Enduring Understandings:
The goal of science is to understand the natural world. Students must learn to use scientific practices and accumulated knowledge to better understand the world around them. Everything in the universe is composed of matter and energy. Matter can be identified based on the chemical and physical properties. Interactions between matter cause chemical changes that produce new substances with different chemical properties. Energy transfers affect the physical and chemical properties of matter. The smallest unit of matter is the atom. Different types of atoms (elements) are organized on the periodic table in a predictable manner. Knowing the placement of an element on the periodic table can give information on its chemical properties.

Essential Questions:
- What are characteristic properties and how do they help identify unknown substances?
- How do we measure physical and chemical properties?
- How do physical and chemical changes affect matter?
- How do we create models of something we can’t see?
- How does atomic structure determine interactions of matter?
- How is the organization of the Periodic Table of the Elements used to help us understand matter?
- Who was involved in creating the Periodic Table of Elements?

Academic Vocabulary:
- Solid
- Liquid
- Gas
- Melting
- Freezing
- Condensation
- Vaporization
- Boiling point
- Melting point
- Volume
- Mass
- Density
- Precipitate
- Mixture
- Solution
- Homogeneous
- Heterogeneous
- Compound
- Element
- Atom
- Molecule

Standards

Highly-Leveraged Standards

Strand 5: Physical Sciences (HLS – 31%)

PO1. Identify different kinds of matter based on the following physical properties:
   - States
   - Boiling point
   - Solubility
   - Density
   - Melting point

PO2. Identify different kinds of matter based on the following chemical properties:
   - Reactivity
   - pH
   - Oxidation (corrosion)

PO3. Identify the following types of evidence that a chemical reaction has occurred:
   - Formation of a precipitate
   - Generation of gas

Supporting Standards

Strand 2: History and Nature of Science
8.S2.C1 History of Science as a Human Endeavor: Identify individual, cultural and technological contributions to scientific knowledge.

PO1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson ad Crick [scientists], supports Strand 4; Rosalind Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 5; Sir Francis Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5).

PO2. Evaluate the effects of the following major scientific milestones on society:
   - Mendelian Genetics
   - Newton’s Laws

PO3. Evaluate the impact of a major scientific development occurring within the past decade.

PO4. Evaluate career opportunities related to life and physical sciences.

Strand 3: Science in Personal and Social Perspectives
• color change
• absorption or release of heat

PO4. Classify matter in terms of elements, compounds, or mixtures.
PO5. Classify mixtures as being homogeneous or heterogeneous.
PO6. Explain the systematic organization of the periodic table.
PO7. Investigate how the transfer of energy can affect the physical and chemical properties of matter.

8.S3.C1 Changes in Environment: Describe the interactions between human populations, natural hazards, and the environment.
PO1. Analyze the risk factors associated with natural, human induced, and/or biological hazards, including:
  • Waste disposal of industrial chemicals
  • Greenhouse gases
PO2. Analyze possible solutions to address the environmental risks associated with chemicals and biological systems.

PO1. Propose viable methods of responding to an identified need or problem.
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PO3. Design and construct a solution to an identified need or problem using simple classroom materials.
PO4. Compare risks and benefits of the following technological advances:
  • Radiation treatments
  • Genetic engineering
  • Airbags

Constant Standards

Strand 1: Inquiry Process (HLS – 35%)
8.S1.C1 Observations, Questions, and Hypotheses: Formulate predictions, questions, or hypotheses based on observations.
PO1. Formulate questions based on observations that lead to the development of a hypothesis.
PO2. Use appropriate research information, not limited to a single source, to use in the development of a testable hypothesis.
PO3. Generate a hypothesis that can be tested.

PO1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.
PO2. Design a controlled investigation to support or reject a hypothesis.
PO3. Conduct a controlled investigation to support or reject a hypothesis.
PO4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).
PO5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.

8.S1.C3 Analysis and Conclusions: Analyze and interpret data to explain correlations and results; formulate new questions.
PO1. Analyze data obtained in a scientific investigation to identify trends.

PO2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).

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Strand 2: History and Nature of Science


PO1. Apply the following scientific processes to other problem solving or decision making situations:
   - Observing
   - Questioning
   - Communicating
   - Comparing
   - Measuring
   - Predicting
   - Organizing data
   - Inferring
   - Generating hypotheses
   - Identifying variables
Classifying

PO2. Describe how scientific knowledge is subject to change as a new information and/or technology challenges prevailing theories.

PO3. Defend the principle that accurate record keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society.

PO4. Explain why scientific claims may be questionable if based on very small samples of data, biased samples, or samples for which there was no control.

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Social Justice Standards

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Action 19 – I will speak up or take action when I see unfairness, even if those around me do not, and I will not let others convince me to go along with injustice. (AC.6-8.19)

Teaching Tolerance Anti-Bias Framework  https://www.tolerance.org/frameworks

Adopted Texts and Materials

Textbook:
• Prentice Hall Chemical Building Blocks text book and teaching resource book

Science Module Supplemental Resources

Instructional and Assessment Guides

Culturally Responsive Practices (TUSD SPARKS, SPARKS Strategies)

Multicultural Inclusive Strategies

Additional Instructional Resources

Pre/Post Unit Assessment:
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<th>Formative/Performance Assessment Examples:</th>
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<td>• Measure the mass and volume of different samples of the same substances to determine the densities.</td>
</tr>
<tr>
<td>• Complete multiple tests on unknown substances to determine their characteristic properties in order to identify them.</td>
</tr>
<tr>
<td>• Complete a variety of changes and determine whether each change is chemical or physical.</td>
</tr>
<tr>
<td>• Test the pH of a variety of household chemicals and arrange them from most acidic to most basic.</td>
</tr>
<tr>
<td>• Create an element advertisement that describes a specific element and discusses its uses.</td>
</tr>
<tr>
<td>• Use the periodic table to play bingo.</td>
</tr>
<tr>
<td>• Create a brochure providing information about climate change, hazardous wastes, or chemical spills.</td>
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<tr>
<td>• Draw diagrams of the greenhouse effect and explain how humans have influenced the effect.</td>
</tr>
</tbody>
</table>

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<th>Resource Books:</th>
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<tbody>
<tr>
<td>• The Elements: A visual Exploration of Every Known Atom in the Universe</td>
</tr>
<tr>
<td>Author: Theodore Gray</td>
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</tbody>
</table>

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¹**Highly-Leveraged Standards** are essential for students to learn because they have endurance (knowledge and skills relevant throughout a student’s lifetime); leverage (knowledge and skills used across multiple content areas); and essentiality (knowledge and skills necessary for success in future courses or grade levels).*

²**Supporting Standards** are emphasized during the quarter as they are integral to achieve mastery of the Highly Leveraged Standards. Mastery of these standards are used measured using classroom assessments.

³**Constant Standards** are repeatedly addressed to reinforce grade-level mastery.

*This definition for Highly-Leveraged Standards was adapted from the “power standard” definition on the website of the Millis Public Schools, K-12, Massachusetts, USA, 2016.*
This quarter is an enrichment and enhancement quarter to engage your students in inquiry based projects. You may choose to use this time to extend material from previous quarters or provide inquiry based learning opportunities for your students. Quarter 4 map provides optional resources for enrichment activities.

### Reading Focus: Literature

### Writing Focus: Argumentative

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<th>Enduring Understandings:</th>
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<td>The goal of science is to understand the natural world. Students must learn to use scientific practices and accumulated knowledge to better understand the world around them.</td>
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</tbody>
</table>

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<th>Essential Questions:</th>
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<td>How do you use the inquiry process to understand the world around you?</td>
</tr>
</tbody>
</table>

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<th>Academic Vocabulary:</th>
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<td>Analysis</td>
</tr>
<tr>
<td>Controlled investigation</td>
</tr>
<tr>
<td>Positive relationship</td>
</tr>
<tr>
<td>Negative relationship</td>
</tr>
<tr>
<td>No relationship</td>
</tr>
<tr>
<td>Independent variable</td>
</tr>
<tr>
<td>Dependent variable</td>
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<tr>
<td>Controlled variable</td>
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### Standards

#### Highly-Leveraged Standards

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<th>Strand 4: Life Science (HLS - 14%)</th>
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<tr>
<td><strong>8.S4.C2 Reproduction and Heredity:</strong> Understand the basic principles of heredity.</td>
</tr>
<tr>
<td><strong>PO1.</strong> Explain the purposes of cell division.</td>
</tr>
<tr>
<td>• Growth</td>
</tr>
<tr>
<td>• Reproduction</td>
</tr>
<tr>
<td><strong>PO2.</strong> Explain the basic principles of heredity using the human examples of:</td>
</tr>
<tr>
<td>• Eye color</td>
</tr>
<tr>
<td>• Widow’s peak</td>
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<tr>
<td>• Blood type</td>
</tr>
<tr>
<td><strong>PO3.</strong> Distinguish between the nature of dominant and recessive traits in humans.</td>
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<td><strong>8.S4.C4 Diversity, Adaptation, and Behavior:</strong> Identify structural and behavioral adaptations.</td>
</tr>
<tr>
<td><strong>PO1.</strong> Explain how an organism’s behavior allows it to survive in an environment.</td>
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<tr>
<td><strong>PO2.</strong> Describe how an organism can maintain a stable internal environment while living in a constantly changing external environment.</td>
</tr>
<tr>
<td><strong>PO3.</strong> Determine characteristics of organisms that could change over several generations.</td>
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**PO5.** Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.

**8.S1.C3 Analysis and Conclusions:** Analyze and interpret data to explain correlations and results; formulate new questions.

**PO1.** Analyze data obtained in a scientific investigation to identify trends.

**PO2.** Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).

**PO3.** Interpret data that show a variety of possible relationships between two variables, including:
- Positive relationship
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**PO4.** Formulate a future investigation based on the data collected.

**PO5.** Explain how evidence supports the validity and reliability of a conclusion.

**PO6.** Identify the potential investigational error that may occur (e.g., flawed investigational design, inaccurate measurement, computational errors, unethical reporting).

**PO7.** Critique scientific reports from periodicals, television, or other media.

**PO8.** Formulate new questions based on the results of a previous investigation.

**8.S1.C4 Communication:** Communicate Results of Investigations.

**PO1.** Communicate the results of an investigation.

**PO2.** Choose an appropriate graphic representation for collected data:
- Line graph
- Double bar graph
- Stem and leaf plot
- Histogram

**PO3.** Present analyses and conclusions in clear, concise formats.

**PO4.** Write clear, step-by-step instructions for conducting investigations or operating equipment (without the use of personal pronouns).

**PO5.** Communicate the results and conclusion of the investigation.

**PO4.** Compare the symbiotic and competitive relationships in organisms within an ecosystem (e.g., lichen, mistletoe/tree, clownfish/sea anemone, native/non-native species).

**PO5.** Analyze the following behavioral cycles of organisms:
- Hibernation
- Migration
- Dormancy (plants)

**PO6.** Describe the following factors that allow the survival of living organisms:
- Protective coloration
- Beak design
- See dispersal
- Pollination

**Strand 5: Physical Science (HLS – 31%)**

**8.S5.C1 Properties and Changes of Properties in Matter:** Understand physical and chemical properties of matter.

**PO1.** Identify different kinds of matter based on the following physical properties:
- States
- Boiling point
- Solubility
- Density
- Melting point
- Reactivity
- pH
- Oxidation (corrosion)

**PO2.** Identify different kinds of matter based on the following chemical properties:
- States
- Boiling point
- Solubility
- Density
- Melting point

**PO3.** Identify the following types of evidence that a chemical reaction has occurred:
- Formation of a precipitate
- Generation of gas
- Color change
- Absorption or release of heat

**PO4.** Classify matter in terms of elements, compounds, or mixtures.

**PO5.** Classify mixtures as being homogeneous or heterogeneous.

**PO6.** Explain the systematic organization of the periodic table.
PO7. Investigate how the transfer of energy can affect the physical and chemical properties of matter.

8.S5.C2 Motion and Forces: Understand the relationship between force and motion

PO1. Demonstrate velocity as the rate of change of position over time.

PO2. Identify the conditions under which an object will continue in its state of motion (Newton’s 1st Law of Motion).

PO3. Describe how the acceleration of a body is dependent on its mass and the net applied force (Newton’s 2nd Law of Motion).

PO4. Describe forces as interactions between bodies (Newton’s 3rd Law of Motion).

PO5. Create a graph devised from measurements of moving objects and their interactions, including:
- position-time graphs
- velocity-time graphs

Strand 2: History and Nature of Science

8.S2.C1 History of Science as a Human Endeavor: Identify individual, cultural and technological contributions to scientific knowledge.

PO1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson ad Crick [scientists], supports Strand 4; Rosalind Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 5; Sir Frances Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5).

PO2. Evaluate the effects of the following major scientific milestones on society:
- Mendelian Genetics
- Newton’s Laws

PO3. Evaluate the impact of a major scientific development occurring within the past decade.

PO4. Evaluate career opportunities related to life and physical sciences.


PO1. Apply the following scientific processes to other problem solving or decision making situations:
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- Questioning
- Communicating
- Comparing
- Measuring
- Predicting
- Organizing data
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- Generating hypotheses
- Identifying variables
Classifying

PO2. Describe how scientific knowledge is subject to change as a new information and/or technology challenges prevailing theories.

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Strand 3: Science in Personal and Social Perspectives

8.S3.C1 Changes in Environment: Describe the interactions between human populations, natural hazards, and the environment.

PO1. Analyze the risk factors associated with natural, human induced, and/or biological hazards, including:
   - Waste disposal of industrial chemicals
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Teaching Tolerance Anti-Bias Framework  https://www.tolerance.org/frameworks

Culturally Responsive Practices (TUSD SPARKS, SPARKS Strategies)

### Instructional Resources

#### Genetics Enrichment:
- Teenage Mutant Hero Project (Varies):  [https://www.hightechhigh.org/htmma/project/teenage-mutant-hero-project/](https://www.hightechhigh.org/htmma/project/teenage-mutant-hero-project/)

#### Chemistry Enrichment:
- Design It Clean (15-30 days):  [http://pblu.org/projects/design-it-clean](http://pblu.org/projects/design-it-clean)

#### Motion & Forces Enrichment:
- Up, Up and Away (11 days):  [http://daytonregionalstemcenter.org/curriculum/up-up-and-away/](http://daytonregionalstemcenter.org/curriculum/up-up-and-away/)

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