## Unifying Concept: Life Science Ecology

### Essential Questions:
- Why are the relationships among the parts of an ecosystem so complex?
- How are ecosystems affected by physical changes in the environment?
- How do living and non-living parts of an ecosystem interact?
- How are ecosystems affected by the introduction of non-native species?
- How can collected data provide evidence to support or refute a hypothesis?

### Academic Vocabulary
- Abiotic
- Biotic
- Species
- Population
- Niche
- Ecosystem
- Consumer
- Producer
- Decomposer
- Food Chain
- Food Web
- Invasive species
- Non-native species
- carrying capacity
- limiting factors
- predator
- prey
- ecology
- trade-offs
- habitat
- kingdom
- phylum
- mussel
- owl pellet
- photosynthesis

## Standards

### Highly-Leveraged Standards

#### Strand 4: Life Science (HLS – 14%)

**7.S4.C3 Populations of Organisms in an Ecosystem:** Analyze the relationships among various organisms and their environment.

**PO1.** Compare food chains in a specified ecosystem and their corresponding food web.

**PO2.** Explain how organisms obtain and use resources to develop and thrive in:
- Niches
- Predator/prey relationships

**PO3.** Analyze the interactions of living organisms with their ecosystems:
- Limiting factors
- Carrying capacity

**PO4.** Evaluate data related to problems associated with population growth (e.g., overgrazing, forest management, invasion of non-native species) and the possible solutions.

**PO5.** Predict how environmental factors (e.g., floods, droughts, temperature changes) affect survival rates in living organisms.

**PO6.** Create a model of the interactions of living organisms within an ecosystem.

### Supporting Standards

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

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

**PO1.** Analyze environmental risks (e.g., pollution, destruction of habitat) caused by human interaction with biological or geological systems.

**PO2.** Analyze environmental benefits of the following human interactions with biological or geological systems:
- Reforestation
- Habitat restoration
- Construction of dams

**PO3.** Propose possible solutions to address the environmental risks in biological and geological systems.

**7.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.
**Constant Standards**

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| **PO1.** Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry. |
| **PO2.** Design an investigation to test individual variables using scientific processes. |
| **PO3.** Conduct a controlled investigation, utilizing multiple traits, to test a hypothesis using scientific processes. |
| **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. |

| 7.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.** Analyze results of data collection in order to accept or reject the hypothesis. |
| **PO4.** Determine validity and reliability of results of an investigation. |
| **PO5.** Formulate a conclusion based on data analysis. |
| **PO6.** Refine hypotheses based on results from investigations. |
| **PO7.** Formulate new questions based on the results of a previous investigation. |

| 7.S1.C4 Communication: Communicate Results of Investigations. |
| **PO1.** Choose an appropriate graphic representation for collected data: |
|   - Line graph |
|   - Double bar graph |
|   - Stem and leaf plot |
|   - Histogram |
| **PO2.** Display data collected from a controlled investigation. |
| **PO3.** Communicate the results of an investigation with appropriate use of qualitative and quantitative information. |

**PO3.** Design and construct a solution to an identified need or problem using simple classroom materials.
PO4. Write clear, step-by-step instructions for following procedures (without the use of personal pronouns).

PO5. Communicate the results and conclusion of the investigation.

Strand 2: History and Nature of Science

7.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., Rachel Carson [scientist], supports Strand 4; Luis Alvarez [scientist] and Walter Alvarez [scientist], supports Strand 6; Percival Lowell [scientist], supports Strand 6; Copernicus [scientist], supports Strand 6).

PO2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., global positioning system, telescopes, seismographs, photography).

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

PO4. Analyze the use of technology in science-related careers.

7.S2.C2 Nature of Scientific Knowledge: Understand how science is a process for generating knowledge.

PO1. Describe how science is an ongoing process that changes in response to new information and discoveries.

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

PO3. 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

Strand 3: Science in Personal and Social Perspectives

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

PO4. Describe a scientific discovery that influences technology.

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<td>Plan and carry out investigations</td>
<td>Energy &amp; Matter</td>
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### 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)

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**Action 18** – I can respectfully tell someone when his or her words or actions are biased or hurtful. (AC.6-8.18)

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

### Adopted Texts and Materials

**Textbook:**
- TUSD Science Center Ecology module
- SEPUP Ecology materials
- 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)

### Science Module Supplemental Resources

**Instructional and Assessment Guides**

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

**Pre/Post Scientific method assessment for 7th grade on School City**

- AAAS Science Assessment (create free tests) [http://assessment.AAAS.org/pages/home](http://assessment.AAAS.org/pages/home)

**Pre/Post Unit Assessment:**
- [http://intranet/science/Kit_Asmts.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.

### Multicultural Inclusive Strategies

**Additional Instructional Resources**

- Science Spot Website – general science page [http://www.sciencespot.net/Pages/classgen.html](http://www.sciencespot.net/Pages/classgen.html)
- Mythbusters episodes to discuss scientific method hyperlink to site
- Southern Arizona Regional Science and Engineering Fair website has great resources to help create a science fair project [https://sarsef.org/](https://sarsef.org/)
- Triple Beam Balance Tutorial & Practice [https://www.ohaus.com/enus/tutorials/triple-beam](https://www.ohaus.com/enus/tutorials/triple-beam)
- Microscope use, quiz, labeling, PowerPoint [www.biologycorner.com/worksheets/microscope_use.html](http://www.biologycorner.com/worksheets/microscope_use.html)
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<td>Write an original procedure to conduct a controlled experiment (Blackworm activity).</td>
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<tr>
<td>Identify the parts of the scientific process within an episode of Mythbusters.</td>
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<td>Lab safety test [<a href="http://www.flinsci.com/resources/safety-reference/safety-contracts--exams">www.flinsci.com/resources/safety-reference/safety-contracts--exams</a>]</td>
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<td>Concept Map (pre and post to show student growth) Teacher provides list of ecology vocabulary words – students generate concept map based on current understandings of connections.</td>
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<td>PALS (examples of performance assessments) [<a href="http://pals.sri.com/">http://pals.sri.com/</a>]</td>
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<td>Quick writes (definitions and examples of characteristics of Phyla/Classes or trade-offs of invasive species, or changes to an ecosystem when a species disappears and drawings in notebooks (e.g. draw and label diagrams to illustrate Energy Pyramids, Food webs, Food chains, animal and plant cells, process of photosynthesis) using scientific vocabulary.</td>
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<td>Compare and contrast classification of Kingdoms (living organisms); compare and contrast characteristics of Phyla within Animal Kingdom.; Venn diagram to compare/contrast plant and animal cells.</td>
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<td>Construct and explain models of Ecosystems, Food webs, Food Chains, Carrying Capacity/Limiting Factors.</td>
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<td>Use a dichotomous key to identify various species within a particular Phylum or Class (e.g. arthropods, mammals)</td>
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<tr>
<td>Dissect an Owl Pellet, construct and identify major skeletal findings; construct food web/chain for the owl.</td>
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<tr>
<td>Make a pro/con claim about the role of decomposers and provide evidence to support your claim.</td>
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<tr>
<td>Compare and contrast the levels of organization of an ecosystem.</td>
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<tr>
<td>Graph a population over time (Kaibab Deer or Mussels), and analyze management options/limiting factors/carrying capacity, documenting evidence/claims that support Pros/Cons for each option.</td>
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<td>Buffelgrass and Introduced Species [<a href="http://www.buffelgrass.org">www.buffelgrass.org</a>] and [<a href="http://www.desertmuseum.org/invaders">www.desertmuseum.org/invaders</a>]</td>
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<td>Teacher Domain: Photosynthesis [<a href="http://www.teachersdomain.org/resource/tdc02.sci.life.stru.photosynth/">http://www.teachersdomain.org/resource/tdc02.sci.life.stru.photosynth/</a>]</td>
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<td>Sonoran Desert Species Game [<a href="http://tolweb.org/onlinecontributors/app?service=external/ViewTreehouse&amp;sp=12445">http://tolweb.org/onlinecontributors/app?service=external/ViewTreehouse&amp;sp=12445</a>]</td>
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• Research/Present an invasive species introduced to the Southwest describing introduction and effects/trade-offs on environment, ecosystem, populations (including humans); describe control management options/viable solutions (can structure as PBL).
### Reading Focus: Informational
### Writing Focus: Informative/Explanatory

#### Unifying Concept: Earth and Space Science

**Astronomy**

#### 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. The Earth, Moon, and Sun interact in ways that affect our planet in fundamental ways. The relative positions of the Sun, Moon, and Earth create patterns observed in the phases, eclipses, tides, and seasons. The Earth is just one planet in our Solar System, in our galaxy, filled with billions of stars, in a universe filled with billions of other galaxies. A constellation is a region of the sky that appears to contain a patterns of stars.

#### Essential Questions:
- How is the universe organized?
- In what ways is a solar system organized?
- Why do we see differences in the appearance and movements of the Sun and Moon from Earth?
- In what ways do the Earth, Sun and Moon affect each other?
- How does the force of gravity affect all matter in the universe?
- How do stars appear to make patterns in the sky?

#### Academic Vocabulary

- Rotate (rotation)
- Revolve (revolution)
- Seasons
- Solstice
- Equinox
- Axis
- (Lunar) phases
- Eclipse
- Lunar eclipse
- Solar eclipse
- Star
- Tide
- Spring tide
- Neap tide
- Solar system
- Gravity
- Constellation
- Galaxy
- Latitude
- Orbit
- Universe

### Standards

#### Highly-Leveraged Standards

**Strand 6: Earth and Space Science (HLS – 20%)**

**7.56.C3 Earth in the Solar System:** Understand the relationships of the Earth and other objects in the solar system.

**PO1.** Explain the phases of the Moon in terms of the relative positions of the Earth, Sun, and Moon.

**PO2.** Construct a model for the relative positions of the Earth, Sun, and Moon as they relate to corresponding eclipses.

**PO3.** Explain the interrelationship between the Earth’s tides and the Moon.

**PO4.** Explain the seasons in the Northern and Southern Hemispheres in terms of the tilt of the Earth’s axis relative to the Earth’s revolution around the Sun.

**PO5.** Identify the following major constellations visible (seasonally) from the Northern Hemisphere:

- Orion
- Ursa Major (Great Bear)
- Cygnus
- Scorpius
- Cassiopeia

#### Supporting Standards

**Strand 2: History and Nature of Science**

**7.52.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., Rachel Carson [scientist], supports Strand 4; Luis Alvarez [scientist] and Walter Alvarez [scientist], supports Strand 6; Percival Lowell [scientist], supports Strand 6; Copernicus [scientist], supports Strand 6).

**PO2.** Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., global positioning system, telescopes, seismographs, photography).

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

**PO4.** Analyze the
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<th><strong>PO6.</strong> Explain the relationship among common objects in the solar system, galaxy, and the universe.</th>
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### Constant Standards³

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

**7.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.** Select appropriate resources for background information related to a question, for use in the design of a controlled investigation.

**PO3.** Explain the role of a hypothesis in a scientific inquiry.


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**Strand 2: History and Nature of Science**

**7.S2.C2 Nature of Scientific Knowledge:** Understand how science is a process for generating knowledge.

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**PO3.** Apply the following scientific processes to other problem solving or decision making situations:

- Observing
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- Generating hypotheses
- Identifying variables

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

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

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### Adopted Texts and Materials

**Textbook:**
- Prentice Hall Astronomy textbook
- Project Astro: Universe at Your Fingertips resource notebook
- Prentice Hall Astronomy Teaching Resources

### Instructional and Assessment Guides

**Culturally Responsive Practices** *(TUSD SPARKS, SPARKS Strategies)*

**Pre/Post Unit Assessment:**
Universe at your Fingertips Science module:
- [http://intranet/science/Kit_Asmts.html](http://intranet/science/Kit_Asmts.html)

AAAS Science Assessment (create free tests)
- [http://assessment.AAAS.org/pages/home](http://assessment.AAAS.org/pages/home)

Lunar Phase Quizzer:
- [http://astro.unl.edu/classaction/animations/lunarcycles/lunarphasequizzer.htm](http://astro.unl.edu/classaction/animations/lunarcycles/lunarphasequizzer.htm)

### Additional Instructional Resources

- TUSD Science Center Astronomy module
- 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)
- Science Spot Website – general science page
- [http://www.sciencespot.net/Pages/classgen.html](http://www.sciencespot.net/Pages/classgen.html)
- NASA
  - Space Games: [http://spaceplace.nasa.gov/menu/play/](http://spaceplace.nasa.gov/menu/play/)
### 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.
- Concept Map (pre and post to show student growth) teacher provides list of astronomy vocabulary words – students generate concept map based on current understandings of connections.
- Google doc - Formative assessment examples: [https://www.edutopia.org/groups/assessment/250941](https://www.edutopia.org/groups/assessment/250941)
- Quick writes (definitions and examples of characteristics of stars or effects of tides) and drawings in notebooks (e.g. draw and label diagrams to illustrate the seasons, phases of the moon, eclipses, tides, the life cycle of stars) using scientific vocabulary.
- Compare and contrast lunar and solar eclipses, solstice and equinox, high tide and low tide, revolve and rotate.
- Construct and explain models of eclipses, phases of the moon, seasons, tides, constellations.
- Construct a Moon Phases Banner.

### Additional Resources:

- Seasons and Ecliptic Simulator: [http://astro.unl.edu/classaction/animations/coordsmotion/eclipticsimulator.html](http://astro.unl.edu/classaction/animations/coordsmotion/eclipticsimulator.html)
- Daylight hours Explorer: [http://astro.unl.edu/classaction/animations/coordsmotion/daylighthoursexplorer.html](http://astro.unl.edu/classaction/animations/coordsmotion/daylighthoursexplorer.html)
- Moon Phases: [http://stardate.org/nightsky/moon](http://stardate.org/nightsky/moon)
- Bill Nye videos: [https://www.youtube.com/results?search_query=bill+nye](https://www.youtube.com/results?search_query=bill+nye)
- Brian Pop: [www.brainpop.com](http://www.brainpop.com) (subscription required)
- Tide Simulator: [http://aspire.cosmic-ray.org/Labs/Tides/tides_simulator.html](http://aspire.cosmic-ray.org/Labs/Tides/tides_simulator.html)
- Cool Cosmos: [http://coolcosmos.ipac.caltech.edu/](http://coolcosmos.ipac.caltech.edu/)
- Gizmo short video: Cosmic Classroom: [http://coolcosmos.ipac.caltech.edu/sitemap.html](http://coolcosmos.ipac.caltech.edu/sitemap.html)
- SOHO (Sun): [http://sohowww.nascom.nasa.gov/](http://sohowww.nascom.nasa.gov/)
- Ancient Models of the Sky: [http://nfo.edu/astro/models.htm](http://nfo.edu/astro/models.htm)
- Big Bang Musical: [http://www.youtube.com/watch?v=dlLtdorH0iE](http://www.youtube.com/watch?v=dlLtdorH0iE)
- Chandra telescope: [http://chandra.harvard.edu/about/](http://chandra.harvard.edu/about/)
- Geocentric/Heliocentric: [http://www.youtube.com/watch?v=UtOEnTiAZIU](http://www.youtube.com/watch?v=UtOEnTiAZIU)
- Imagine the Universe: [http://imagine.gsfc.nasa.gov/index.html](http://imagine.gsfc.nasa.gov/index.html)
- NASA/Hubblesite: [https://hubblesite.org](https://hubblesite.org)
- Power of 10 video: [http://www.youtube.com/watch?v=vRjGarlCal4](http://www.youtube.com/watch?v=vRjGarlCal4)

*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).*
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.
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. Earth is a geologically active planet. Huge amounts of energy are always acting on the surface of the Earth and in its interior. Observable evidence in the present gives information about processes and events that occurred in the past.

Essential Questions:
- Why does the surface of the Earth change?
- How can we demonstrate that Earth is a geologically active planet?
- How do different sources of energy act on the Earth?
- How do the Earth’s different systems/processes interact?
- How does what we see today tell us about the Earth’s past?

Academic Vocabulary:
- Rock cycle
- Convection current
- Fault
- Transform
- Strike-slip
- Earthquake
- Seismic wave
- Epicenter
- Volcano
- Pangaea
- Rock
- Mineral
- Igneous
- Metamorphic
- Sedimentary
- Fossil
- Fossil record
- Geologic time
- Geologist
- Sediment

Standards

Highly-Leveraged Standards

7.6.C1 Structure of the Earth: Describe the composition and interactions between the structure of the Earth and its atmosphere.

PO1. Classify rocks and minerals by the following observable properties:
- Grain
- Color
- Texture
- Hardness

Supporting Standards

7.52.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., Rachel Carson [scientist], supports Strand 4; Luis Alvarez [scientist] and Walter Alvarez [scientist], supports Strand 6; Percival Lowell [scientist], supports Strand 6; Copernicus [scientist], supports Strand 6).
PO2. Describe the properties and the composition of the following major layers of the Earth:
- Crust
- Mantle
- Core

PO3. Explain the following processes involved in the formation of the Earth's structure:
- Erosion
- Deposition
- Plate tectonics
- Volcanism

PO4. Describe how the rock and fossil record show that environmental conditions have changed over geological and recent times.


PO1. Explain the rock cycle.

PO2. Distinguish the components and characteristics of the rock cycle for the following types of rocks:
- Igneous
- Metamorphic
- Sedimentary

PO3. Analyze the evidence that lithospheric plate movements occur.

PO4. Explain lithospheric plate movement as a result of convection.

PO5. Relate plate boundary movements to their resulting landforms, including:
- Mountains
- Faults
- Rift valleys
- Trenches
- Volcanoes

PO6. Describe how earthquakes are measured.

PO2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., global positioning system, telescopes, seismographs, photography).

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

PO4. Analyze the use of technology in science-related careers.

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

PO1. Analyze environmental risks (e.g., pollution, destruction of habitat) caused by human interaction with biological or geological systems.

PO2. Analyze environmental benefits of the following human interactions with biological or geological systems:
- Reforestation
- Habitat restoration
- Construction of dams

PO3. Propose possible solutions to address the environmental risks in biological and geological systems.
## Constant Standards

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

#### 7.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.** Select appropriate resources for background information related to a question, for use in the design of a controlled investigation.
- **PO3.** Explain the role of a hypothesis in a scientific inquiry.


- **PO1.** Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.
- **PO2.** Design an investigation to test individual variables using scientific processes.
- **PO3.** Conduct a controlled investigation, utilizing multiple traits, to test a hypothesis using scientific processes.
- **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.

#### 7.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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- **PO7.** Formulate new questions based on the results of a previous investigation.

#### 7.S1.C4 Communication: Communicate Results of Investigations.

- **PO1.** Choose an appropriate graphic representation for collected data:
  - Line graph
  - Double bar graph
  - Stem and leaf plot
  - Histogram
- **PO2.** Display data collected from a controlled investigation.
- **PO3.** Communicate the results of an investigation with appropriate use of qualitative and quantitative information.
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PO5. Communicate the results and conclusion of the investigation.

Strand 2: History and Nature of Science
7.S2.C2 Nature of Scientific Knowledge: Understand how science is a process for generating knowledge.
PO1. Describe how science is an ongoing process that changes in response to new information and discoveries.
PO2. Describe how scientific knowledge is subjected to change as a new information and/or technology challenges prevailing theories.
PO3. 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

Strand 3: Science in Personal and Social Perspectives
7.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. Describe a scientific discovery that influences technology.

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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)
Justice 12 – I can recognize and describe unfairness and injustice in many forms including attitudes, speech, behaviors, practices and laws. (JU.6-8.12)
Action 18 – I can respectfully tell someone when his or her words or actions are biased or hurtful. (AC.6-8.18)

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

Adopted Texts and Materials

Textbook:
- Delta Earth History Textbook
- Teacher’s Manual for Earth History
- CD “Minerals in your World”
- “Weather and Erosion” video
- FOSS resources for Earth History science module

Science Module Supplemental Resources

Multicultural Inclusive Strategies

Instructional and Assessment Guides

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

AAAS Science Assessment (create free tests)
http://assessment.AAAS.org/pages/home

Pre/Post Unit Assessment:
- 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.
- Concept Map (pre and post to show student growth) teacher provides list of earth history vocabulary words – students generate concept map based on current understandings of connections.
- PALS (examples of performance assessments) http://pals.sri.com/
- Google doc - Formative assessment examples: www.edutopia.org/groups/assessment/250941

Additional Instructional Resources

- Science Module Supplemental Resources: http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum
- Science modules: materials for Earth History (FOSS) https://www.fossweb.com/
- Science Spot Website – general science page http://www.sciencespot.net/Pages/classgen.html
- The Pangaea Pop-up video http://ed.ted.com/lessons/the-pangaea-pop-up-michael-molina
- Continent’s Adrift video http://viewpure.com/HrKTuDierM
  o Granite vs Basalt Formation
  o The Grand Canyon - Uncovering layers of the Grand Canyon
  o The Grand Canyon - The Top Two Rock Layers (sedimentary)
  o Geology of Manhattan Skyline (metamorphic)
  o The Grand Canyon – Evidence of Earth’s Past
  o Rocks and Minerals/Science Trek
  o The Rock Cycle/Annenberg Learner
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<tr>
<th>Quick writes (definitions and examples of characteristics of minerals, or rocks) and drawings in notebooks (e.g. draw and label diagrams to illustrate the layers of the Earth, Fossil records, various minerals and rock types) using scientific vocabulary.</th>
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<td>Compare and contrast minerals and rocks, the 3 types of faults.</td>
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<td>Construct and explain models of geologic time, faults, rock cycle.</td>
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<td>Engage in arguments with evidence and reasoning (e.g. to support the processes of rock formation or Pangaea/Continental Drift).</td>
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<td>Plate Tectonics – videos and activities <a href="https://az.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp_platetectonics/#.Wx_m8viWznM">https://az.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp_platetectonics/#.Wx_m8viWznM</a></td>
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<td>PowerPoints on Igneous, Metamorphic, and Sedimentary Rock as well a Rock Cycle: <a href="http://www.powershow.com">www.powershow.com</a></td>
</tr>
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<td>Bill Nye videos - <a href="https://www.youtube.com/results?search_query=bill+nye">https://www.youtube.com/results?search_query=bill+nye</a></td>
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<td>Rocks and Minerals: The Hard Facts (video) <a href="https://www.youtube.com/watch?v=G5jxyrhsK7U">https://www.youtube.com/watch?v=G5jxyrhsK7U</a></td>
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<td>Geologist’s Notebook What Exactly are Minerals (video) <a href="https://www.youtube.com/watch?v=tWJZP17Bg6o">https://www.youtube.com/watch?v=tWJZP17Bg6o</a></td>
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<td>The geology of the earth video (and others): <a href="http://www.watchknowlearn.org">www.watchknowlearn.org</a></td>
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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.
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.

<table>
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<tr>
<th>Reading Focus: Informational</th>
<th>Unifying Concept: Inquiry Process</th>
<th>Quarter 4</th>
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<td>Writing Focus: Argumentative</td>
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**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.

**Essential Questions:**

How do you use the Inquiry Process to understand the world around you?

**Standards**

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<th>Highly-Leveraged Standards&lt;sup&gt;1&lt;/sup&gt;</th>
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**Strand 1: Inquiry Process (HLS – 35%)**

**7.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.
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- **PO5.** Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.

**Strand 6: Earth and Space Science (HLS – 20%)**

**7.S6.C1 Structure of the Earth:** Describe the composition and interactions between the structure of the Earth and its atmosphere.

- **PO1.** Classify rocks and minerals by the following observable properties:
  - Grain
  - Color
  - Texture
  - Hardness
- **PO2.** Describe the properties and the composition of the following major layers of the Earth:
  - Crust
  - Mantle
  - Core
- **PO3.** Explain the following processes involved in the formation of the Earth’s structure:
  - Erosion
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7.S1.C4 **Communication:** Communicate Results of Investigations.

- **PO1.** Choose an appropriate graphic representation for collected data:
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- **PO2.** Display data collected from a controlled investigation.
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- **PO4.** Write clear, step-by-step instructions for following procedures (without the use of personal pronouns).
- **PO5.** Communicate the results and conclusion of the investigation.

7.S6.C2 **Earth’s Processes and Systems:** Understand the processes acting on the Earth and their interaction with the Earth system.

- **PO1.** Explain the rock cycle.
- **PO2.** Distinguish the components and characteristics of the rock cycle for the following types of rocks:
  - Igneous
  - Metamorphic
  - Sedimentary
- **PO3.** Analyze the evidence that lithospheric plate movements occur.
- **PO4.** Explain lithospheric plate movement as a result of convection.
- **PO5.** Relate plate boundary movements to their resulting landforms, including:
  - Mountains
  - Faults
  - Rift valleys
  - Trenches
  - Volcanoes
- **PO6.** Describe how earthquakes are measured.

**Strand 6: Earth and Space Science (HLS – 20%)**

7.S6.C3 **Earth in the Solar System:** Understand the relationships of the Earth and other objects in the solar system.

- **PO1.** Explain the phases of the Moon in terms of the relative positions of the Earth, Sun, and Moon.
- **PO2.** Construct a model for the relative positions of the Earth, Sun, and Moon as they relate to corresponding eclipses.
- **PO3.** Explain the interrelationship between the Earth’s tides and the Moon.
- **PO4.** Explain the seasons in the Northern and Southern Hemispheres in terms of the tilt of the Earth’s axis relative to the Earth’s revolution around the Sun.
- **PO5.** Identify the following major constellations visible (seasonally) from the Northern Hemisphere:
  - Orion
  - Ursa Major (Great Bear)
  - Cygnus
PO6. Explain the relationship among common objects in the solar system, galaxy, and the universe. **Strand 4: Life Science (HLS – 14%)**

**7.S4.C3 Populations of Organisms in an Ecosystem:** Analyze the relationships among various organisms and their environment.

PO1. Compare food chains in a specified ecosystem and their corresponding food web.

PO2. Explain how organisms obtain and use resources to develop and thrive in:

- Niches
- Predator/prey relationships

PO3. Analyze the interactions of living organisms with their ecosystems:

- Limiting factors
- Carrying capacity

PO4. Evaluate data related to problems associated with population growth (e.g., overgrazing, forest management, invasion of non-native species) and the possible solutions.

PO5. Predict how environmental factors (e.g., floods, droughts, temperature changes) affect survival rates in living organisms.

PO6. Create a model of the interactions of living organisms within an ecosystem.

### Constant Standards

**Strand 2: History and Nature of Science**

**7.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., Rachel Carson [scientist], supports Strand 4; Luis Alvarez [scientist] and Walter Alvarez [scientist], supports Strand 6; Percival Lowell [scientist], supports Strand 6; Copernicus [scientist], supports Strand 6).

PO2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., global positioning system, telescopes, seismographs, photography).

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

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PO1. Describe how science is an ongoing process that changes in response to new information and discoveries.

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PO3. 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

Strand 3: Science in Personal and Social Perspectives

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

PO1. Analyze environmental risks (e.g., pollution, destruction of habitat) caused by human interaction with biological or geological systems.

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7-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.

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