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. Energy is all around us. From biological processes keeping living organisms alive to plugging electronic devices into the wall, energy permeates our environment. Students should learn how energy moves about in all of its forms to better understand the importance of energy as a resource to utilize and manage and as a force present in the natural world.

Essential Questions:
- How do we use scientific tools and measurement during scientific investigations?
- In what ways can we design a scientific investigation to test a question? How do we make sure an experiment is a controlled experiment?
- How can collected data provide evidence to support or refute a hypothesis?
- How do we know that data is reliable?
- What is the best way to communicate the results of a scientific investigation?
- What is energy and what does it do?
- What are the advantages and disadvantages of different ways of meeting our energy needs?
- What are different sources of energy for our energy needs and what are the implications of using those different sources?

Academic Vocabulary:
- Renewable
- Nonrenewable
- Kinetic Energy
- Solar
- Potential Energy
- Wind
- Mechanical
- Turbines
- Thermal
- Biomass
- Radiant
- Fossil Fuels
- Sound
- Pollution
- Chemical
- Conservation
- Nuclear
- Stored Mechanical

Standards

<table>
<thead>
<tr>
<th>Highly-Leveraged Standards</th>
<th>Supporting Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strand 5: Physical Science (HLS – 31%)</strong></td>
<td><strong>Strand 2: History and Nature of Science</strong></td>
</tr>
<tr>
<td><strong>6.S5.C3 Transfer of Energy</strong>: Understand that energy can be stored and transferred.</td>
<td><strong>6.S2.C1 History of Science as a Human Endeavor</strong>: Identify individual, cultural, and technological contributions to scientific knowledge.</td>
</tr>
<tr>
<td>PO1. Identify various ways in which electrical energy is generated using renewable and nonrenewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).</td>
<td>PO1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).</td>
</tr>
<tr>
<td>PO2. Identify several ways in which energy may be stored.</td>
<td>PO2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).</td>
</tr>
<tr>
<td>PO3. Compare the following ways in which energy may be transformed:</td>
<td>PO3. Analyze the impact of a major scientific development occurring within the past decade.</td>
</tr>
<tr>
<td>- Mechanical to electrical</td>
<td>PO4. Describe the use of technology in science-related careers.</td>
</tr>
<tr>
<td>- Electrical to thermal</td>
<td></td>
</tr>
</tbody>
</table>

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


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 technological discovery that influences science.

Constant Standards

Strand 1: Inquiry Process (HLS – 35%)

6.S1.C1 Observations, Questions, and Hypotheses: Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.

PO1. Differentiate among a question, hypothesis, and prediction.

PO2. Formulate questions based on observations that lead to the development of a hypothesis.

PO3. Locate research information, not limited to a single source, for use in the design of a controlled investigation.


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 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.

6.1.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. Evaluate the observations and data reported by others.
PO4. Interpret simple tables and graphs produced by others.
PO5. Analyze the results from previous and/or similar investigations to verify the results of the current investigation.
PO6. Formulate new questions based on the results of a completed investigation.

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.
PO4. Create a list of instructions that others can follow in carrying out a procedure (without the use of personal pronouns).
PO5. Communicate the results and conclusion of the investigation.

### Science and Engineering Practices

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Crosscutting Concepts (CCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practices describe a robust process for how scientists investigate and build models and theories of the natural world or how engineers design and build systems.</td>
<td>Cross boundaries between science disciplines and provide an organizational framework to connect knowledge from various disciplines into a coherent and scientifically based view of the world.</td>
</tr>
<tr>
<td>• Ask questions and define problems</td>
<td>• Patterns</td>
</tr>
<tr>
<td>• Develop and use models</td>
<td>• Cause &amp; Effect</td>
</tr>
<tr>
<td>• Plan and carry out investigations</td>
<td>• Systems &amp; System Models</td>
</tr>
<tr>
<td>• Analyze and interpret data</td>
<td>• Energy &amp; Matter</td>
</tr>
<tr>
<td>• Use mathematics and computational thinking</td>
<td></td>
</tr>
<tr>
<td>• Construct explanations and design solutions</td>
<td></td>
</tr>
<tr>
<td>• Engage in argument from evidence</td>
<td></td>
</tr>
<tr>
<td>• Obtain, evaluate, and communicate information</td>
<td></td>
</tr>
</tbody>
</table>
### 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 16** – I am concerned about how people (including myself) are treated and feel for people when they are excluded or mistreated because of their identities. (AC.6-8.16)

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

---

### Textbook:

- **From Readworks** (http://www.readworks.org/)
  - Sign Up for free account to search articles:

#### ReadWorks Article A Day on Energy:
- “Everyday Energy” by Edward I. Maxwell
- “Energy for Life” by ReadWorks
- “Engineering and Natural Gas” by James Folta
- “Electricity &Energy: Circuits” by ReadWorks
- “Free Transfer” by ReadWorks
- “Houston Affects the Earth” by ReadWorks
- “Solar Absorbers and the Future of Electricity” by James Folta

---

### Adopted Texts and Materials

**Multicultural Books aligned with Energy & Environmental Science Resource Kit**

- **Luz Sees the Light (Graphic Novel)** (2011) *(Grades 3-7)* One minute, Luz and her friends are getting rides to the mall. The next, Luz’s mom can’t afford to gas or groceries, and the city is dimmed by blackouts. Luz sets her heart on transforming her fossil-fueled world.

- **Luz Makes a Splash (Graphic Novel)** (2012) *(Grades 3-7)* When the city restricts water usage, Luz, with her friends and neighbors, strive to conserve and reuse what little water they have access to and protest the new soda factory using the spring water at a nearby pond.

---

### Instructional and Assessment Guides

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

- **Kahoot!** – An online quiz game where you can either create your own or find related user created topics. It provides immediate feedback on student/class understanding. Requires free account creation.

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

---

### Additional Instructional Resources

- TUSD Science Center Energy and Environmental module (FOSS/AZ Project WET)
- TUSD Science Resources 6th Grade – [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** ([http://sciencespot.net/](http://sciencespot.net/)) – general science page that generates ideas, web quests, or slide show assessments provided by others.
- Bill Nye videos related to topic:
  - https://www.youtube.com/watch?v=8qmSzMwTkpk
  - https://www.youtube.com/watch?v=EtW2rrLHs08
  - https://www.youtube.com/watch?v=AdauM3AzqKw
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre/Post Unit Assessment:</td>
<td><a href="http://intranet/science/Kit_Asmts.html">http://intranet/science/Kit_Asmts.html</a></td>
</tr>
</tbody>
</table>

**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.
- Identify the parts of the scientific process.
- Google doc – Formative assessment examples: [https://docs.google.com/presentation/d/1nzhdnyMQmio5INT75ITB45rHyUI SHEEHZIHTWJRqLmQ/pub?slide=id.p#slide=id.p](https://docs.google.com/presentation/d/1nzhdnyMQmio5INT75ITB45rHyUI SHEEHZIHTWJRqLmQ/pub?slide=id.p#slide=id.p)
- Mr. Parr Science Parodies: [https://www.youtube.com/watch?v=mHw34osLy4Q](https://www.youtube.com/watch?v=mHw34osLy4Q)  [https://www.youtube.com/watch?v=k60jGjfV8oU](https://www.youtube.com/watch?v=k60jGjfV8oU)
- Energy Kids – Resources includes glossary, real life connections with curriculum, timelines of sources of energy, energy forms and examples of how it transfers. [https://www.eia.gov/kids/energy.cfm?page=3](https://www.eia.gov/kids/energy.cfm?page=3)
- TEP Educational Resources – Tucson Electric Power educational resources. Helps make real-life connections to the local community, how Tucson uses energy, and their goals for energy in the future. [http://tucson.energy/](http://tucson.energy/)
- Virtual Energy Lab – An interactive exploratory lab about how energy transforms from form to form in different systems. [http://www.glencoe.com/sites/common_assets/science/virtual_labs/E04/E04.html](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E04/E04.html)
- National Geographic – exploratory story about how energy travels from the power plant to the home. [https://www.nationalgeographic.org/activity/electrical-energy-source-destination/](https://www.nationalgeographic.org/activity/electrical-energy-source-destination/)
### Reading Focus: Informational
### Writing Focus: Informative/Explanatory

**Unifying Concept:** Earth and Space Science

**Weather and Water**

### 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. A large part of the natural world includes our weather and water. Weather affects ourselves and the world around us in often unnoticed ways. Our weather is connected to a much larger global system that includes the cycling of water through Earth’s systems. It is important to understand the reality behind the amount of potable water that we are able to access.

### Essential Questions:
- In what ways does energy from the Sun affect Earth?
- How is energy from the Sun related to the global system of weather on Earth?
- How is climate different from weather?
- How does water move around the hydrosphere?
- How does water affect weather, climate and life on earth?
- How does access to clean water affect quality of life?

### Academic Vocabulary:
- Air mass
- Meteorologist
- Air pressure
- Millibar
- Atmosphere
- Nitrogen
- Climate
- Oxygen
- Condensation
- Ozone
- Convection
- Permanent gas
- Density
- Temperature
- Energy
- Water cycle
- Evaporation
- Water vapor
- Front
- Weather
- Groundwater
- Wind
- Heat

### Standards

#### Highly-Leveraged Standards

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

- **6.S6.C1 Structure of the Earth:** Describe the composition and interactions between the structure of the Earth and its Atmosphere.
  - **PO1.** Describe the properties and the composition of the layers of the atmosphere.
  - **PO2.** Explain the composition, properties, and structure of the Earth’s lakes and rivers.
  - **PO3.** Explain the composition, properties, and structures of the ocean’s zones and layers.
  - **PO4.** Analyze the interactions between the Earth’s atmosphere and the Earth’s bodies of water (water cycle).
  - **PO5.** Describe ways scientists explore the Earth’s atmosphere and bodies of water.

- **6.S6.C2 Earth’s Processes and Systems:** Understand the processes acting on the Earth and their interactions with the Earth’s systems.
  - **PO1.** Explain how water is cycled in nature.
  - **PO2.** Identify the distribution of water within or among the following;

#### Supporting Standards

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

- **6.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., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).
  - **PO2.** Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).
  - **PO3.** Analyze the impact of a major scientific development occurring within the past decade.
  - **PO4.** Describe the use of technology in science-related careers.

- **6.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.
PO3. Analyze the effects that bodies of water have on the climate of a region.

PO4. Analyze the following factors that affect climate:
   - Ocean currents
   - Elevation
   - Location

PO5. Analyze the impact of large-scale weather systems on the local weather.

PO6. Create a weather system model that includes:
   - The Sun
   - The atmosphere
   - Bodies of water

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

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

PO1. Evaluate the effects of the following natural hazards:
   - Sandstorm
   - Hurricane
   - Tornado
   - Ultraviolet light
   - Lightning-caused fire

Strand 5: Physical Science (HLS – 31%)


PO1. Identify various ways in which electrical energy is generated using renewable and nonrenewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).

PO2. Identify several ways in which energy may be stored.

PO3. Compare the following ways in which energy may be transformed:
   - Mechanical to electrical
   - Electrical to thermal

PO4. Explain how thermal energy (heat energy) can be transferred by:
   - Conduction
   - Convection
<table>
<thead>
<tr>
<th>Strand 1: Inquiry Process (HLS – 35%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6.S1.C1 Observations, Questions, and Hypotheses</strong>: Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.</td>
</tr>
<tr>
<td><strong>PO1.</strong> Differentiate among a question, hypothesis, and prediction.</td>
</tr>
<tr>
<td><strong>PO2.</strong> Formulate questions based on observations that lead to the development of a hypothesis.</td>
</tr>
<tr>
<td><strong>PO3.</strong> Locate research information, not limited to a single source, for use in the design of a controlled investigation.</td>
</tr>
</tbody>
</table>

| **PO1.** Demonstrate safe behavior and appropriate procedures (i.e., 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 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. |

| **6.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.** Evaluate the observations and data reported by others. |
| **PO4.** Interpret simple tables and graphs produced by others. |
| **PO5.** Analyze the results from previous and/or similar investigations to verify the results of the current investigation. |
| **PO6.** Formulate new questions based on the results of a completed investigation. |

| **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. |
| **PO4.** Create a list of instructions that others can follow in carrying out a procedure (without the use of personal pronouns). |
| **PO5.** Communicate the results and conclusion of the investigation. |
### Strand 3: Science in Personal and Social Perspectives

**6.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 technological discovery that influences science.

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Crosscutting Concepts (CCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practices describe a robust process for how scientists investigate and build models and theories of the natural world or how engineers design and build systems.</td>
<td>Cross boundaries between science disciplines and provide an organizational framework to connect knowledge from various disciplines into a coherent and scientifically based view of the world.</td>
</tr>
<tr>
<td>- Ask questions and define problems</td>
<td>- Patterns</td>
</tr>
<tr>
<td>- Develop and use models</td>
<td>- Cause &amp; Effect</td>
</tr>
<tr>
<td>- Plan and carry out investigations</td>
<td>- Systems &amp; System Models</td>
</tr>
<tr>
<td>- Analyze and interpret data</td>
<td>- Energy &amp; Matter</td>
</tr>
<tr>
<td>- Use mathematics and computational thinking</td>
<td></td>
</tr>
<tr>
<td>- Construct explanations and design solutions</td>
<td></td>
</tr>
<tr>
<td>- Engage in argument from evidence</td>
<td></td>
</tr>
<tr>
<td>- Obtain, evaluate, and communicate information</td>
<td></td>
</tr>
</tbody>
</table>

### 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 16** – I am concerned about how people (including myself) are treated and feel for people when they are excluded or mistreated because of their identities. (AC.6-8.16)

### Teaching Tolerance Anti-Bias Framework

[https://www.tolerance.org/frameworks](https://www.tolerance.org/frameworks)

### Adopted Texts and Materials

**Textbook:**
From Readworks ([http://www.readworks.org/](http://www.readworks.org/))

- Sign Up for free account to search articles:
  - “Water is Everything!”
  - “Water, Water, Everywhere!”
  - “How Water Loss Affects Biodiversity”

**Multicultural Books aligned with Weather and Water Science Resource Kit**

**A Long Walk to Water: A Novel based on a True Story** (2010) *(IL:5-8  RL:5.0)*

When the Sudanese civil war reaches his village in 1985, eleven-year-old Salva becomes separated from his family and must walk through southern Sudan, Ethiopia, and Kenya. Based on the life of Salva Dut who began a project to dig water wells in Sudan.
“Forecasting Severe Weather to Communities Helps Them Prepare” by Alissa Fleck

From Newsela (https://newsela.com/):
Sign Up for free account to search articles:
- “Weather and Climate”
- “What is a Hurricane?”
- “What the Difference between Weather and Climate?”
- “Scientists say Colorado River Flow is Down because of Rising Temperatures”

- The Dust Bowl through the Lens: How Photography Revealed and Helped Remedy a National Disaster (2009) (5-up) Photographs capture the horrific conditions of this national disaster, the struggles of the people who stayed to save their land, and the sorrows of those who were forced to move as a result of this catastrophe.


<table>
<thead>
<tr>
<th>Scholastic Leveled Readers aligned with Weather &amp; Water Science Kit</th>
<th>Multicultural Inclusive Strategies</th>
<th>Science Module Supplemental Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional and Assessment Guides</strong></td>
<td></td>
<td><strong>Additional Instructional Resources</strong></td>
</tr>
<tr>
<td>Culturally Responsive Practices (TUSD SPARKS, SPARKS Strategies)</td>
<td></td>
<td>TUSD Science Center Weather and Water FOSS Kit</td>
</tr>
<tr>
<td>Kahoot! – An online quiz game where you can either create your own or find related user created topics. It provides immediate feedback on student/class understanding. Requires free account creation.</td>
<td></td>
<td>Science Spot Website (<a href="http://www.sciencespot.net">http://www.sciencespot.net</a>) – general science page, good for generating ideas, web quests, or slide show assessments provided by other users.</td>
</tr>
<tr>
<td>AAAS Science Assessment (create free tests) <a href="http://assessment.AAAS.org/pages/home">http://assessment.AAAS.org/pages/home</a></td>
<td></td>
<td>TUSD Science Resources 6th Grade: <a href="http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum">http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum</a></td>
</tr>
<tr>
<td>Formative/Performance Assessment Examples</td>
<td></td>
<td>Mr. Parr Science Parodies (Scientifically accurate parodies based on popular songs with science lyrics): <a href="https://www.youtube.com/watch?v=o3BVa7PH_JE">https://www.youtube.com/watch?v=o3BVa7PH_JE</a> <a href="https://www.youtube.com/watch?v=g4O9z_R52Sc&amp;list=PL6B82CA6C8466C529">https://www.youtube.com/watch?v=g4O9z_R52Sc&amp;list=PL6B82CA6C8466C529</a></td>
</tr>
<tr>
<td>- Complete a lab report that includes question, hypothesis, variables, procedure, table, graph, and conclusion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Write an original procedure to conduct a controlled experiment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Identify the parts of the scientific process.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- PALS (examples of performance assessments): <a href="http://pals.sri.com/">http://pals.sri.com/</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Google doc – Formative assessment Examples: <a href="https://docs.google.com/presentation/d/1nzhdnyMQmio5INT75TJB45rHyLISHEH2IHTWJrLmQ/pub?slide=id.p#slide=id.p">https://docs.google.com/presentation/d/1nzhdnyMQmio5INT75TJB45rHyLISHEH2IHTWJrLmQ/pub?slide=id.p#slide=id.p</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 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. In Diversity of Life, students will explore the basics of biology by establishing and building knowledge of living things. They will explore life by looking at individuals cells to organisms and understanding the relationships between structures and functions in these living things.

### Essential Questions:
- How does life result from cellular structure and function?
- How are plant and animal cells alike/different?
- What must all living things do or have in order to survive?
- How can we learn more about living things?
- How does structure relate to function in living things?

### Academic Vocabulary:
- Cell
- Organism
- Cell membrane
- Photosynthesis
- Cell wall
- Prokaryotic
- Chlorophyll
- Root
- Chloroplast
- Root hair
- Cytoplasm
- Seed
- Nucleus
- Transpiration
- Organelle
- Vacuole
- Eukaryotic
- Xylem

### Standards

#### Highly-Leveraged Standards ¹

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

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO1.</strong> Explain the importance of water to organisms.</td>
<td></td>
</tr>
<tr>
<td><strong>PO2.</strong> Describe the basic structure of a cell, including:</td>
<td></td>
</tr>
<tr>
<td>• Cell wall</td>
<td></td>
</tr>
<tr>
<td>• Cell membrane</td>
<td></td>
</tr>
<tr>
<td>• Nucleus</td>
<td></td>
</tr>
<tr>
<td><strong>PO3.</strong> Describe the function of each of the following cell parts:</td>
<td></td>
</tr>
<tr>
<td>• Cell wall</td>
<td></td>
</tr>
<tr>
<td>• Cell membrane</td>
<td></td>
</tr>
<tr>
<td>• Nucleus</td>
<td></td>
</tr>
<tr>
<td><strong>PO4.</strong> Differentiate between plant and animal cells.</td>
<td></td>
</tr>
<tr>
<td><strong>PO5.</strong> Explain the hierarchy of cells, tissues, organs, and systems.</td>
<td></td>
</tr>
<tr>
<td><strong>PO6.</strong> Relate the following structures of living organisms to their functions:</td>
<td></td>
</tr>
<tr>
<td>Animals:</td>
<td></td>
</tr>
<tr>
<td>• Respiration – gills, lungs</td>
<td></td>
</tr>
<tr>
<td>• Digestion – stomach, intestines</td>
<td></td>
</tr>
</tbody>
</table>

#### Supporting Standards ²

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

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO1.</strong> Identify various ways in which electrical energy is generated using renewable and nonrenewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).</td>
<td></td>
</tr>
<tr>
<td><strong>PO2.</strong> Identify several ways in which energy may be stored.</td>
<td></td>
</tr>
<tr>
<td><strong>PO3.</strong> Compare the following ways in which energy may be transformed:</td>
<td></td>
</tr>
<tr>
<td>Mechanical to electrical</td>
<td></td>
</tr>
<tr>
<td>Electrical to thermal</td>
<td></td>
</tr>
<tr>
<td><strong>PO4.</strong> Explain how thermal energy (heat energy) can be transferred by:</td>
<td></td>
</tr>
<tr>
<td>• Conduction</td>
<td></td>
</tr>
<tr>
<td>• Convection</td>
<td></td>
</tr>
<tr>
<td>• Radiation</td>
<td></td>
</tr>
</tbody>
</table>

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

- Circulation – heart, veins, arteries, capillaries
- Plants:
  - Transpiration – stomata, roots, xylem, phloem
  - Absorption – roots, xylem, phloem
  - Response to stimulus (phototropism, hydrotropism, geotropism) - roots, xylem, phloem

PO7. Describe how the various systems of living organisms work together to perform a vital function:
- Respiratory and circulatory
- Muscular and skeletal
- Digestive and excretory


PO1. Explain that sunlight is the major source of energy for most ecosystems.
PO2. Describe how the following environmental conditions affect the quality of life:
- Water quality
- Climate
- Population density
- Smog

Constant Standards

Strand 1: Inquiry Process (HLS – 35%)

6.S1.C1 Observations, Questions, and Hypotheses: Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.
PO1. Differentiate among a question, hypothesis, and prediction.
PO2. Formulate questions based on observations that lead to the development of a hypothesis.
PO3. Locate research information, not limited to a single source, for use in the design of a controlled investigation.

- **PO1.** Demonstrate safe behavior and appropriate procedures (3.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 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.

**6.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.** Evaluate the observations and data reported by others.
- **PO4.** Interpret simple tables and graphs produced by others.
- **PO5.** Analyze the results from previous and/or similar investigations to verify the results of the current investigation.
- **PO6.** Formulate new questions based on the results of a completed investigation.

**6.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.
- **PO4.** Create a list of instructions that others can follow in carrying out a procedure (without the use of personal pronouns).
- **PO5.** Communicate the results and conclusion of the investigation.

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

**6.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., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).
- **PO2.** Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).
- **PO3.** Analyze the impact of a major scientific development occurring within the past decade.
PO4. Describe the use of technology in science-related careers.


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


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 technological discovery that influences science.

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Crosscutting Concepts (CCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practices describe a robust process for how scientists investigate and build models and theories of the natural world or how engineers design and build systems.</td>
<td>Cross boundaries between science disciplines and provide an organizational framework to connect knowledge from various disciplines into a coherent and scientifically based view of the world.</td>
</tr>
<tr>
<td>• Ask questions and define problems</td>
<td>• Patterns</td>
</tr>
<tr>
<td>• Develop and use models</td>
<td>• Structure &amp; Function</td>
</tr>
<tr>
<td>• Plan and carry out investigations</td>
<td>• Stability &amp; Change</td>
</tr>
<tr>
<td>• Analyze and interpret data</td>
<td>• Systems &amp; System Models</td>
</tr>
<tr>
<td>• Use mathematics and computational thinking</td>
<td></td>
</tr>
<tr>
<td>• Construct explanations and design solutions</td>
<td></td>
</tr>
<tr>
<td>• Engage in argument from evidence</td>
<td></td>
</tr>
<tr>
<td>• Obtain, evaluate, and communicate information</td>
<td></td>
</tr>
</tbody>
</table>

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 16
I am concerned about how people (including myself) are treated and feel for people when they are excluded or mistreated because of their identities. (AC.6-8.16)

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

#### Adopted Texts and Materials

<table>
<thead>
<tr>
<th>Textbook: From Readworks (<a href="http://www.readworks.org/">http://www.readworks.org/</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign Up for free account to search articles:</td>
</tr>
<tr>
<td>• Article-A-Day – “How Our Bodies Work”</td>
</tr>
<tr>
<td>• “The Cells That Make Us”</td>
</tr>
<tr>
<td>• “Famous Scientists Robert Hooke”</td>
</tr>
<tr>
<td>• “Human Microbiome: The Role of Microbes in Human Health” by The American Museum of Natural History</td>
</tr>
<tr>
<td>• “Why Humans Can’t Live Off Sunlight”</td>
</tr>
<tr>
<td>• “Life Finds a Way”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scholastic Leveled Readers aligned with Diversity of Life Science Kit</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Multicultural Inclusive Strategies</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Science Module Supplemental Resources</th>
</tr>
</thead>
</table>
### Instructional and Assessment Guides

#### Culturally Responsive Practices

- **Kahoot!** – An online quiz game where you can either create your own or find related user created topics. It provides immediate feedback on student/class understanding. Requires free account creation.
- **AAAS Science Assessment** (create free tests)
  - [http://assessment.AAAS.org/pages/home](http://assessment.AAAS.org/pages/home)

### Additional Instructional Resources

- **TUSD Science Center Diversity of Life - FOSS kit**
- **Science Spot Website** ([http://www.sciencespot.net](http://www.sciencespot.net)) – general science page, good for generating ideas, web quests, or slide show assessments provided by other users.
- **TUSD Science Resources 6th Grade**: [http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum](http://curriculum.tusd1.org/Subject-Areas/Science/Science-Grades-6-8-Curriculum)
- **Bill Nye videos**: [https://www.youtube.com/watch?v=7bDpYZsC8mQ&t=272s](https://www.youtube.com/watch?v=7bDpYZsC8mQ&t=272s)
  - [https://www.youtube.com/watch?v=WxYM870So4A&list=PL02OkFq1s-GKn6aTK9-Dp0cRanab4onZE](https://www.youtube.com/watch?v=WxYM870So4A&list=PL02OkFq1s-GKn6aTK9-Dp0cRanab4onZE)
- **Mr. Parr Science Parodies** (Scientifically accurate parodies based on popular songs with science lyrics) [https://www.youtube.com/watch?v=wRZthGlzEUc](https://www.youtube.com/watch?v=wRZthGlzEUc)
  - [https://www.youtube.com/watch?v=dngsFl2X3nc](https://www.youtube.com/watch?v=dngsFl2X3nc)
  - [https://www.youtube.com/watch?v=p4zOXOM6wgE&list=PL_gPpFyP9OlglY4JNif087AsXOtdycpCBG](https://www.youtube.com/watch?v=p4zOXOM6wgE&list=PL_gPpFyP9OlglY4JNif087AsXOtdycpCBG)
- **An interactive cell model animation**: [https://www.cellsalive.com/cells/cell_model_js.htm](https://www.cellsalive.com/cells/cell_model_js.htm)

### 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.
- Write an original procedure to conduct a controlled experiment. (i.e, celery transpiration, vials of unknowns for living/nonliving).
- Identify the parts of the scientific process.
- Concept Map (pre and post to show student growth) Teacher provides list of biology vocabulary words – students generate concept map based on current understandings of connections.
- Google doc – Formative assessment examples: [www.edutopia.org/groups/assessment/250941](http://www.edutopia.org/groups/assessment/250941)
- Quick writes (definitions and examples of living vs. nonliving, characteristics of life, microscope care and use) and drawings in notebooks (e.g. draw and label diagrams of animal and plant cells, parts of a microscope) using scientific vocabulary.
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>
<thead>
<tr>
<th>Reading Focus: Informational</th>
<th>Unifying Concept:</th>
<th>Quarter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing Focus: Informative/Explanatory</td>
<td>Inquiry Process</td>
<td>Essential Questions:</td>
</tr>
<tr>
<td>Enduring Understandings:</td>
<td>How do you use the inquiry process to understand the world around you?</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standards

#### Highly-Leveraged Standards

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

6.S1.C1 **Observations, Questions, and Hypotheses**: Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.
- **PO1.** Differentiate among a question, hypothesis, and prediction.
- **PO2.** Formulate questions based on observations that lead to the development of a hypothesis.
- **PO3.** Locate research information, not limited to a single source, for use in the design of a controlled investigation.

- **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 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.

6.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.

#### Supporting Standards

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

- **PO1.** Explain the importance of water to organisms.
- **PO2.** Describe the basic structure of a cell, including:
  - Cell wall
  - Cell membrane
  - Nucleus
- **PO3.** Describe the function of each of the following cell parts:
  - Cell wall
  - Cell membrane
  - Nucleus
- **PO4.** Differentiate between plant and animal cells.
- **PO5.** Explain the hierarchy of cells, tissues, organs, and systems.
- **PO6.** Relate the following structures of living organisms to their functions:
  - Animals:
    - Respiration – gills, lungs
    - Digestion – stomach, intestines
    - Circulation – heart, veins, arteries, capillaries
  - Plants:
    - Transpiration – stomata, roots, xylem, phloem
    - Absorption – roots, xylem, phloem
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. Evaluate the observations and data reported by others.

PO4. Interpret simple tables and graphs produced by others.

PO5. Analyze the results from previous and/or similar investigations to verify the results of the current investigation.

PO6. Formulate new questions based on the results of a completed investigation.


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.

PO4. Create a list of instructions that others can follow in carrying out a procedure (without the use of personal pronouns).

PO5. Communicate the results and conclusion of the investigation.

- Response to stimulus (phototropism, hydrotropism, geotropism) - roots, xylem, phloem

PO7. Describe how the various systems of living organisms work together to perform a vital function:
   - Respiratory and circulatory
   - Muscular and skeletal
   - Digestive and excretory


PO1. Explain that sunlight is the major source of energy for most ecosystems.

PO2. Describe how the following environmental conditions affect the quality of life:
   - Water quality
   - Climate
   - Population density
   - Smog

Strand 5: Physical Science (HLS – 31%)


PO1. Identify various ways in which electrical energy is generated using renewable and nonrenewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).

PO2. Identify several ways in which energy may be stored.

PO3. Compare the following ways in which energy may be transformed:
   - Mechanical to electrical
   - Electrical to thermal

PO4. Explain how thermal energy (heat energy) can be transferred by:
   - Conduction
   - Convection
   - Radiation
Constant Standards

Strand 2: History and Nature of Science

6.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., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).

PO2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).

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

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


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

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

PO1. Evaluate the effects of the following natural hazards:

- Sandstorm
- Hurricane
- Tornado
- Ultraviolet light
- Lightning-caused fire


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 technological discovery that influences science.
### Science and Engineering Practices

Practices describe a robust process for how scientists investigate and build models and theories of the natural world or how engineers design and build systems.

- 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

### Crosscutting Concepts (CCC)

Cross boundaries between science disciplines and provide an organizational framework to connect knowledge from various disciplines into a coherent and scientifically based view of the world.

- Patterns
- Cause & Effect
- Systems & System Models
- Scale, Proportion, & Quantity

---

### 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 16** – I am concerned about how people (including myself) are treated and feel for people when they are excluded or mistreated because of their identities. (AC.6-8.16)

### Teaching Tolerance Anti-Bias Framework

[https://www.tolerance.org/frameworks](https://www.tolerance.org/frameworks)

### Culturally Responsive Practices

(CULTUSPARKS, SPARKS Strategies)

---

### Instructional Resources

#### Energy & Environmental Sciences Enrichment:
- Wind energy mini investigations: [http://stem-works.com/subjects/2-wind-energy/activities](http://stem-works.com/subjects/2-wind-energy/activities)

#### Weather and Water Enrichment:
- National Parks Service Climate Science Lessons: [https://www.nps.gov/teachers/teacher-resources.htm?q=Climate+Science+in+Focus](https://www.nps.gov/teachers/teacher-resources.htm?q=Climate+Science+in+Focus)

#### Diversity of Life Enrichment:
- Plant multi week inquiry: [https://blogs.cornell.edu/cibt/labs-activities/labs/becoming-a-plant/](https://blogs.cornell.edu/cibt/labs-activities/labs/becoming-a-plant/)

---
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.