# 2018-2019 Science Curriculum Map, Grade 5

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<th>Reading Focus: Literature, Informational Writing Focus: Narrative, Opinion, Informative/Explanatory</th>
<th>Unifying Concept: Life Science Human Body</th>
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| **Enduring Understandings:** The human body is a system made up of integrated subsystems that coordinate and perform a variety of operations. | **Essential Questions:**  
- How do the different functions of the skeletal system work together?  
- In what ways are the skeletons of a rodent and a human similar and different?  
- How do muscles, tendons, and ligaments attach and work together to make the body move?  
- What function do joints perform in helping the body move?  
- How does practice affect response time to a visual stimulus? | **Academic Vocabulary:**  
- Bones  
- Cartilage  
- Joint  
- Skeleton  
- Skull  
- Torso  
- Articulated  
- Ball-and-socket joint  
- Compensate  
- Gliding joint  
- Hinge joint  
- Immobilize  
- Opposable thumb  
- Contract  
- Ligament  
- Tendon  
- Muscle  
- Coordination  
- Response  
- Response time  
- Stimulus  
- Tissue |

## Standards

### Highly-Leveraged Standards

**5.S4.C1 Structure and Function in Living Systems:** Understand the relationships between structures and functions of organisms.

**PO1.** Identify the functions and parts of the skeletal system:
- Protection – rib cage  
- Support – vertebrae  
- Movement – pelvis, femur, hip

**PO2.** Identify the following types of muscles:
- Cardiac – heart  
- Smooth – stomach  
- Skeletal – biceps

**PO3.** Identify the functions and parts of the nervous system:
- Control center – brain  
- Relay mechanism – spinal cord  
- Transport messages – nerves

**PO4.** Distinguish between voluntary and involuntary responses.

### Supporting Standards


**PO1.** Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, and organisms) in all science inquiry.

**PO2.** Plan a simple investigation that identifies the variables to be controlled.

**PO3.** Conduct simple investigations (e.g., related to forces and motion, Earth processes) based on student-developed questions in life, physical, and Earth and space sciences.

**PO4.** Measure using appropriate tools (e.g., ruler, scale, balance) and units of measure (i.e., metric, U.S. customary).

**PO5.** Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).

### Constant Standards

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Office of Curriculum, Instruction, and Professional Development  
Last Edited: 6/11/2018
Strand 1: Inquiry Process (HLS – 35 %)
5.S1.C1 Observations, Questions, and Hypotheses: Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.
   PO1. Formulate a relevant question through observations that can be tested by an investigation.
   PO2. Formulate predictions in the realm of science based on observed cause and effect relationships.
   PO3. Locate information (e.g., book, article, website) related to an investigation.

5.S1.C3 Analysis and Conclusions: Analyze and interpret data to explain correlations and results; formulate new questions.
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   PO1. Communicate verbally or in writing the results of an inquiry.
   PO2. Choose an appropriate graphic representation for collected data:
      - Bar graph
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      - Venn diagram
      - Model
   PO3. Communicate with other groups or individuals to compare the results of a common investigation.

Strand 2: History and Nature of Science
5.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., Percy Lavon Julian [scientist], supports Strand 4; Niels Bohr [scientist], supports Strand 5; Edwin Hubble [scientist], supports Strand 6).

5.S2.C2 Nature of Scientific Knowledge: Understand how science is a process for generating knowledge.
   PO1. Provide examples that support the premise that science is an ongoing process that changes in response to new information and discoveries (e.g., space exploration, medical advances).
   PO2. Explain the cycle by which new scientific knowledge generates new scientific inquiry.
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   PO4. Compare collaborative approaches that scientists use for investigations (e.g., teams, individual with peer review).
   PO5. Describe qualities of the scientists’ habits of mind (e.g., openness, skepticism, integrity, integrity, tolerance).

Strand 3: Science in Personal and Social Perspectives
5.S3.C1 Changes in Environments: Describe the interactions between human populations, natural hazards, and the environment.
2018-2019 Science Curriculum Map, Grade 5

PO1. Explain the impacts of natural hazards on habitats (e.g., global warming, floods, asteroid or large meteor impacts).
PO2. Propose a solution, resource, or product that addresses a specific human, animal, or habitat need.
PO3. Evaluate the possible strengths and weaknesses of a proposed solution to a specific problem relevant to human, animal, or habitat needs.

5.S3.C2 Science and Technology in Society: Develop viable solutions to a need or problem.
PO1. Describe the relationship between science and technology.
PO2. Explain how scientific knowledge, skills, and technological capabilities are integral to a variety of careers.
PO3. Design and construct a technological solution to a common problem or need using common materials.

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Social Justice Standards

Identity 4 – I can feel good about my identity without making someone else feel badly about who they are. (ID.3-5.4)
Diversity 8 – I want to know more about other people’s lives and experiences, and I know how to ask questions respectfully and listen carefully and non-judgmentally. (DI.3-5-8)
Justice 11 – I try to get to know people as individuals because I know it is unfair to think all people in a shared identity group are the same. (JU.3-5.11)
Action 17 – I know it’s important for me to stand up for myself and for others, and I know how to get help if I need ideas on how to do this. (AC.3-5.17)

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

Adopted Texts and Materials

Textbook:
- “Human Body” materials unit/kit
- Teacher’s manual for “Human Body”
- 8 copies of Human Body (Science Stories)
- Learning Progressions for K – 5 Science
- FOSS website: [www.fossweb.com](http://www.fossweb.com)
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**Instructional and Assessment Guides**

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

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

**Concept Map** - pre and post with linking phrases to indicate relationships of concepts and processes

**Formative/Performance Assessment**

Examples:
- Quick writes (e.g. definitions and examples of types of hinges found in the human skeletal system)
- Conduct research and construct explanations using words, visuals, and data (e.g. how do other species ‘skeletons compare with humans?)
- Engage in arguments with evidence and reasoning (e.g. write a paragraph to argue that the human body is like or not like a machine)
- Design and conduct a fair test experiment identifying and controlling variables and using safe procedures (Investigation 4, part 4)

**Additional Instructional Resources**

- Learning Science Just Got Easier
  A great site loaded with science information for both teachers and students.

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

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

3 **Constant Standards** are repeatedly addressed to reinforce grade-level mastery.
### Reading Focus: Literature, Informational

Writing Focus: Narrative, Opinion, Informative/Explanatory

### Unifying Concept: Physical Science

**Mixtures and Solutions**

### Suggested Duration: 11 weeks

#### Enduring Understandings:

- All matter is made up of smaller and smaller units.
- Matter can be combined or separated to produce energy and create new substances.

#### Essential Questions:

- What are different ways mixtures can be separated?
- How can solutions be separated?
- How can an unknown chemical be identified by its solubility?
- How do the properties of a mystery crystal help identify what substance it is?
- What does it mean for a solution to be saturated?
- How is the concentration of a solution measured and why is that useful?

#### Academic Vocabulary:

- Crystal
- Dissolving
- Evaporation
- Mixture
- Property
- Solution
- Saturated solution
- Solubility
- Change
- Chemical reaction

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Examples:
- Quick writes (e.g. data tables to record amounts of substance mixed and resulting reactions).
- Conduct research and construct explanations using words, visuals, and data (e.g. helpful versus harmful chemical reactions)।
- Engage in arguments with evidence and reasoning (e.g. write a paragraph or short paper supporting or not

### Additional Instructional Resources

- Resources folio in Mixtures & Solutions Teacher Edition Science Story folio in Mixtures & Solutions Teacher Edition
  - [http://science-class.net/archive/science-class/Chemistry/mixtures_solutions.htm](http://science-class.net/archive/science-class/Chemistry/mixtures_solutions.htm)
- Ask An Expert
- CHEM4KIDS
  - This section covers states of matter from solids and liquids to gases and plasmas. We also have information on solutions and mixtures. This is the place to start.
- HowStuffWorks
  - Ever wonder how a dimmer switch works? How about the biochemical reactions that produce the bread we eat? This site is loaded with understandable information for teachers and students about everyday encounters with the world. Check it out!
  - [http://www.howstuffworks.com/](http://www.howstuffworks.com/)
- Science of Cooking
  - If you're a curious cook or a budding chemistry student this site is for you!
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Unifying Concept: Physical Science Models and Design

Essential Questions:
- How do scientists develop models to explain how systems work?
- How can you construct a model for a specific purpose?
- How can you make a model of something you cannot observe?
- How can you improve your model for a specific purpose?
- What is the design process used by engineers?

Academic Vocabulary:
- Black box
- Bearing
- Model
- Design
- Siphon
- Engineer
- Circuit
- Friction
- Collaborate
- Hub
- Conceptual model
- Traction
- Physical model
- Wheel
- Switch
- Technology
- Axle
- Variable

Enduring Understandings:
Models are used to explain how systems are constructed and how they work. Engineers use scientific knowledge to design and build useful things.

Highly-Leveraged Standards

Strand 5: Physical Science (HLS- 31%)
PO1. Describe the following forces:
- Gravity
- Friction
PO2. Describe the various effects forces can have on an object (e.g., cause motion, halt motion, change direction of motion, cause deformation).
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- Atoms (e.g., H, N, Na)
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| **5.S1.C4 Communication:** Communicate results of investigations. |  |
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#### Strand 2: History and Nature of Science

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Social Justice Standards
Identity 4 – I can feel good about my identity without making someone else feel badly about who they are. (ID.3-5.4)
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Teaching Tolerance Anti-Bias Framework https://www.tolerance.org/frameworks

Adopted Texts and Materials
Textbook:
• “Models and Designs” materials unit/kit
• Teacher’s manual for “Models and Designs”
• 8 copies of Models and Designs (Science Stories)
Learning Progressions for K – 5 Science

FOSS website: www.fossweb.com

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<td><img src="image" alt="Paper Airplane" /></td>
</tr>
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### Instructional and Assessment Guides

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

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

- **Concept Map** - pre and post with linking phrases to indicate relationships of concepts and processes

- **Formative/Performance Assessment** – examples:
  Conduct research and construct explanations using words, visuals, and data (e.g. present a timeline that explores the development of a technology like the automobile and predict what the technology may be like in 50 years)
  Engage in arguments with evidence and reasoning (e.g. Is new or improved technology helpful or harmful?)
  Develop a detailed plan of the design process for the go-carts, along with an analysis of the results and further revisions (Investigation 4, part 3)
  Develop a project to design an invention using simple machines.
  Connect the invention to inventors and what they are known for possible submit to the Science & Engineering Fair.

### Additional Instructional Resources

- Rube Goldberg videos (search YouTube)
- Ask An Expert: http://ciese.org/materials/resources/askanexpert/
- Build-It-Yourself: http://build-it-yourself.com/
  This site is loaded with understandable information for teachers and students about our everyday encounters with the world. Check it out!

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).*

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## Unifying Concept: Earth and Space Science
### Solar System (mini-kit)

### Suggested Duration: 2-3 weeks

### Reading Focus: Literature, Informational Writing Focus: Narrative, Opinion, Informative/Explanatory

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### Enduring Understandings:

Earth is a part of one solar system, within one galaxy, which is a small part of the greater universe. Our solar system is made up of various objects that are interrelated; there are forces acting upon the earth.

### Essential Questions:
- How does the motion of the Moon and Earth around the Sun create the phases of the Moon?
- How does gravity affect the celestial objects in our solar system?
- What are the characteristics of the planets and other celestial objects in our solar system?
- How does the motion of a planet create the effect of night and day?
- Why do some celestial objects appear to move in a way that is different from their real motion?
- What efforts have humans made to explore space?

### Academic Vocabulary:
- Lunar cycle
- Rotation
- Revolution
- Orbit
- Star
- Gravity
- Asteroid
- Meteor
- Comet

### Standards

**Highly-Leveraged Standards**


**PO1.** Describe how the Moon’s appearance changes during a four-week lunar cycle.

**PO2.** Describe how Earth’s rotation results in day and night at any particular location.

**PO3.** Distinguish between revolution and rotation.

**PO4.** Describe the role of gravity as an attractive force between celestial objects.


**PO1.** Identify the known planets of the solar system.

**PO2.** Describe the distinguishing characteristics of the known planets in the solar system.

**PO3.** Describe various objects in the sky (e.g., asteroids, comets, stars, meteors/shooting stars).

**Supporting Standards**

5.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 and form conclusions.

**PO2.** Analyze whether the data is consistent with the proposed explanation that motivated the investigation.

**PO3.** Evaluate the reasonableness of the outcome of an investigation.

**PO4.** Develop new investigations and predictions based on questions that arise from the findings of an investigation.

**PO5.** Identify possible relationships between variables in simple investigations (e.g., time and distance; incline and mass of object).
**PO4.** Describe the change in position and motion of the following objects in the sky over time:
- Real motion – Moon, planets
- Apparent motion (due to the motion of the Earth) – Sun, Moon, stars

**PO5.** Explain the apparent motion of the Sun and stars.

**PO6.** Describe efforts to explore space (e.g., Apollo missions, space shuttles, Hubble space telescope, space probes).

<table>
<thead>
<tr>
<th>Constant Standards³</th>
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<tbody>
<tr>
<td><strong>Strand 1: Inquiry Process (HLS –35 %)</strong></td>
</tr>
<tr>
<td><strong>5.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> Formulate a relevant question through observations that can be tested by an investigation.</td>
</tr>
<tr>
<td><strong>PO2.</strong> Formulate predictions in the realm of science based on observed cause and effect relationships.</td>
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<td><strong>PO3.</strong> Locate information (e.g., book, article, website) related to an investigation.</td>
</tr>
<tr>
<td><strong>PO1.</strong> Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, and organisms) in all science inquiry.</td>
</tr>
<tr>
<td><strong>PO2.</strong> Plan a simple investigation that identifies the variables to be controlled.</td>
</tr>
<tr>
<td><strong>PO3.</strong> Conduct simple investigations (e.g., related to forces and motion, Earth processes) based on student-developed questions in life, physical, and Earth and space sciences.</td>
</tr>
<tr>
<td><strong>PO4.</strong> Measure using appropriate tools (e.g., ruler, scale, balance) and units of measure (i.e., metric, U.S. customary).</td>
</tr>
<tr>
<td><strong>PO5.</strong> Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).</td>
</tr>
<tr>
<td><strong>5.S1.C4 Communication:</strong> Communicate results of investigations.</td>
</tr>
<tr>
<td><strong>PO1.</strong> Communicate verbally or in writing the results of an inquiry.</td>
</tr>
<tr>
<td><strong>PO2.</strong> Choose an appropriate graphic representation for collected data:</td>
</tr>
<tr>
<td>- Bar graph</td>
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<tr>
<td>- Line graph</td>
</tr>
<tr>
<td>- Venn diagram</td>
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<tr>
<td>- Model</td>
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<tr>
<td><strong>PO3.</strong> Communicate with other groups or individuals to compare the results of a common investigation.</td>
</tr>
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| **Strand 2: History and Nature of Science** |
| **5.S2.C2 Nature of Scientific Knowledge:** Understand how science is a process for generating knowledge. |
| **PO1.** Provide examples that support the premise that science is an ongoing process that changes in response to new information and discoveries (e.g., space exploration, medical advances). |
| **PO2.** Explain the cycle by which new scientific knowledge generates new scientific inquiry. |
PO3. Describe how scientific knowledge is subject to modification and/or change as new information/technology challenges prevailing theories.

PO4. Compare collaborative approaches that scientists use for investigations (e.g., teams, individual with peer review).

PO5. Describe qualities of the scientists’ habits of mind (e.g., openness, skepticism, integrity, tolerance).

Strand 3: Science in Personal and Social Perspectives

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

PO1. Explain the impacts of natural hazards on habitats (e.g., global warming, floods, asteroid or large meteor impacts).

PO2. Propose a solution, resource, or product that addresses a specific human, animal, or habitat need.

PO3. Evaluate the possible strengths and weaknesses of a proposed solution to a specific problem relevant to human, animal, or habitat needs.

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

PO1. Describe the relationship between science and technology.

PO2. Explain how scientific knowledge, skills, and technological capabilities are integral to a variety of careers.

PO3. Design and construct a technological solution to a common problem or need using common materials.

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<thead>
<tr>
<th>Science and Engineering Practices</th>
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<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>
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<td>• Structure &amp; Function</td>
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Adopted Texts and Materials

Textbook:

• District “Solar System” materials kit
### Teacher Edition for “Solar System”
### 8 copies of Solar System (Delta)
### Learning Progressions for K – 5 Science
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- **Concept Map** - pre and post with linking phrases to indicate relationships of concepts and processes
  - Draw and label a diagram of the solar system, using scientific vocabulary.
  - Compare and contrast the processes of rotation and revolution

#### Additional Instructional Resources

- [Windows to the Universe](http://www.windows2universe.org/)

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