

Science Curriculum
Rockwood Elementary School
Kindergarten-6th Grade

Updated June 2018

| GRADE K | | | | |
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| Content | Next Generation Standards/PA Science, Technology, & Engineering Education Standards | Clarification Statement | ELA/Literacy Connection | Math Connection |
| <p>Motion & Stability: Forces and Interactions</p> | <p>K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p> | <p>Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.</p> | <p>W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p>K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference.</p> |
| | <p>K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.</p> | <p>Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to</p> | <p>RI.K.1 With prompting and support, ask and answer questions about key details in a text.</p> <p>SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not</p> | |

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| | | increase the speed of the object and a structure that would cause an object such as a marble or ball to turn. | understood. | |
| Energy | <p>K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.</p> <hr/> <p>3.2.K.B6. Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all organisms to stay alive and grow.</p> | Examples of Earth's surface could include sand, soil, rocks, and water. | W.K.7 Participate in shared research and writing projects (e.g. explore a number of books by a favorite author and express opinions about them). | K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which objects has "more of"/"less of" the attribute, and describe the difference. |
| | K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. | Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun. | W.K.7 Participate in shared research and writing projects (e.g. explore a number of books by a favorite author and express opinions about them). | K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. |
| From Molecules to Organisms: Structures & Processes | K-LS-1. Use observations to describe patterns of what plants and animals (including humans) need to survive. | Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of | W.K.7 Participate in shared research and writing projects (e.g. explore a number of books by a favorite author and express opinions about them). | K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. |

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| | <p>3.1.K.A1. Identify the similarities and differences of living and nonliving things.</p> <hr/> <p>3.1.K.A3. Observe, compare, and describe stages of life cycles for plants and/or animals.</p> <hr/> <p>3.1.K.A5. Observe and describe structures and behaviors of a variety of common animals.</p> <hr/> <p>3.1.K.B1. Observe and describe how young animals resemble their parents and other animals of the same kind.</p> <hr/> <p>3.1.K.C2. Describe changes animals and plants undergo throughout the seasons.</p> | <p>animals; the requirement of plants to have light, and, that all living things need water.</p> | | |
| <p>K-ESS2 Earth's Systems</p> | <p>K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.</p> | <p>Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month.</p> | <p>W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>K.CC.A Know number names and count the sequence.</p> <p>K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> |

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| | | <p>Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months).</p> | | <p>K.MD.B.3 Classify objects into given categories; count the number of objects in each category and sort the categories by count.</p> |
| | <p>K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.</p> | <p>Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.</p> | <p>RI.K.1 With prompting and support, ask and answer questions about key details in a text.</p> <p>W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book.</p> <p>W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about a topic.</p> | |

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| <p>Earth and Human Activity</p> | <p>K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.</p> | <p>Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.</p> | <p>SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>K.CC Counting and cardinality.</p> |
| | <p>K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.</p> | <p>Emphasis is on local forms of severe weather.</p> | <p>RI.K.1 With prompting and support, ask and answer questions about key details in a text.</p> <p>SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood.</p> | <p>MP.4 Model with mathematics.</p> <p>K.CC Counting and Cardinality</p> |
| | <p>K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.</p> | <p>Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.</p> | <p>W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.</p> | |

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| <p>Matter</p> | <p>3.2.K.A1. Identify and classify objects by observable properties of matter. Compare different kinds of materials and discuss their uses.</p> <hr/> <p>3.2.K.A3. Describe the way matter can change.</p> <hr/> <p>3.2.K.A5. Constancy and Change-Recognize that everything is made of matter.</p> | | | |
| <p>Heat/Heat Transfer</p> | <p>3.2.K.B3. Describe how temperature can affect the body.</p> | | | |
| <p>Earth's Features and the Processes that Change It</p> | <p>3.3.K.A1. Distinguish between three types of earth materials-rock, soil, and sand.</p> <hr/> <p>3.3.K.A4. Identify sources of water for human consumption and use.</p> <hr/> <p>3.3.K.A5. Record daily weather conditions using simple charts and graphs. Identify seasonal changes in the environment.</p> | | | |

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| | Distinguish between types of precipitation. | | | |
| Evolution | 3.1.K.C3. Constancy & Change-Describe changes that occur as a result of climate. | | | |

| GRADE 1 | | | | |
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| Content | Next Generation Standards | Clarification Statement | ELA/Literacy Connection | Math Connection |
| Waves and their Applications in Technologies for Information Transfer | 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. | Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning form. | <p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</p> | |
| | 1-PS4.2 Make observations to construct an evidence-based account that objects can be seen only when illuminated. | Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be | W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. | |

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| | | <p>from an external light sources or by an object giving off its own light.</p> | <p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</p> | |
| | <p>1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.</p> <hr/> <p>3.2.1.B5. Compare and contrast how light travels through different</p> | <p>Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).</p> | <p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather</p> | |

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| | materials. Explore how mirrors and prisms can be used to redirect a light beam. | | information from provided sources to answer a question. SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. | |
| | 1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. | Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats. | W.1.7 Participate in shared research and writing projects (e.g. explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). | MP.5 Use appropriate tools strategically. 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. 1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. |
| From Molecules to Organisms: Structures and Processes | 1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. 3.1.1.A1. Categorize living and nonliving | Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells and animal scales; stabilizing structures by mimicking | W.1.7 Participate in shared research and writing projects (e.g. explore a number of “how to” books on a given topic and use them to write a sequence of instructions). | |

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| | <p>things by external characteristics.</p> <hr/> <p>3.1.1.A2. Investigate the dependence of living things on the sun’s energy, water, food/nutrients, air, living space, and shelter?</p> <hr/> <p>3.2.1.B6. Energy-Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all organisms to stay alive and grow.</p> <hr/> <p>3.1.1.A5. Identify and describe plant parts and their function.</p> | <p>animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.</p> | | |
| | <p>1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</p> | <p>Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeeping, and other vocalizations) and the responses of the parents (such as feeding, comforting,</p> | <p>R1.1.1 Ask and answer questions about key details in a text.</p> <p>R1.1.2 Identify the main topic and retell key details of a text.</p> <p>R1.1.10 With prompting</p> | <p>1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols greater than, less than, and equal to.</p> <p>1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit and a multiple of 10,</p> |

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| | | and protecting the offspring). | and support, read informational texts appropriately complex for grade. | <p>using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones, and ones; and sometimes it is necessary to compose a ten.</p> <p>1.NBT.C.5 Given a two-digit number, mentally find 10 more or ten less than the number, without having to count; explain the reasoning used.</p> <p>1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</p> |
| Heredity: Inheritance and Variation of Traits | <p>I-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</p> <hr/> <p>3.1.1.B1. Grow plants from seed and describe how they grow and change. Compare to</p> | <p>Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.</p> | <p>R1.1.1 Ask and answer questions about key details in text.</p> <p>W.1.7 Participate in shared research and writing projects (e.g. explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.</p> |

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| | adult plants. | | support from adults, recall information from experiences or gather information from provided sources to answer a question. | |
| Earth's Structure & Place in the Universe | 1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. | Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day. | W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. | |
| | 1-ESS1-2. Make observations at different times of the year to relate the amount of daylight to the time of year. _____ | Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall. | W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). W.1.8 With guidance and support from adults, recall information from experiences or gather information from | MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknown in all positions, eg. , by using objects, drawings, and equations to represent the problem. |

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| | <p>3.2.1.B3. Observe and record daily temperatures. Draw conclusions from daily temperature records as related to heating and cooling.</p> <hr/> <p>3.3.1.A5. Become familiar with weather instruments. Collect, describe, and record basic information about weather over time.</p> | | provided sources to answer a question. | 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. |
| | 3.3.1.A.1 Observe, describe, and sort earth materials. Compare the composition of different soils. | | | |
| | 3.3.1.A4. Identify and describe types of fresh and salt-water bodies (oceans, rivers, lakes, ponds). | | | |
| Evolution | 3.1.1.C3 Constancy and Change-Describe change that occur as a result of habitat. | | | |
| Matter | 3.2.1.A1. Observe and describe the properties of liquids and solids. Investigate what happens when solids are | | | |

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| | mixed with water and other liquids are mixed with water. | | | |
| | 3.2.1.A3. Identify how heating, melting, cooling, etc. may cause changes in properties of materials. | | | |
| | 3.2.1.A4. Observe and describe what happens when substances are heated or cooled. Distinguish between changes that are reversible (melting, freezing) and not reversible (e.g. baking a cake, burning fuel). | | | |
| | 3.2.1.A5. Constancy and Change-Recognize that everything is made of matter. | | | |
| Force & Motion | 3.2.1.B1. Demonstrate various types of motion. Observe and describe how pushes and pulls change the motion of objects. | | | |
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| Grade 2 | | | | |
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| Content | Next Generation Standards/PA Science, Technology, & Engineering Education Standards | Clarification Statement | ELA/Literacy Connection | Math Connection |
| Matter & Its Interactions | 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. | Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share. | W.2.7 Participate in shared research and writing projects (e.g. read a number of books on a single topic to produce a report; record science observations). W.2.8 Recall information from experiences or gather information from provided sources to answer a question. | MP.4 Model with mathematics 2.MD.D.10 Draw a picture graph and a bar graph (with single unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. |
| | 3.2.2.A5. Constancy and Change-Recognize that everything is made of matter. | | | |
| | 3.3.2.A4. Explore and describe that water exists in solid (ice) and liquid (water) form. Explain and illustrate evaporation and condensation. | | | |
| | 3.2.2.A3. Demonstrate how heating and cooling may cause changes in the properties of materials. | | | |
| | 3.2.2.A4. Experiment and | | | |

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| | explain what happens when two or more substances are combined (e.g. mixing, dissolving, separated, filtering, and evaporation). | | | |
| | 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. | Examples of properties could include strength, flexibility, hardness, texture, and absorbency. | <p>R1.2.8 Describe how reasons support specific points the author makes in a text.</p> <p>W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in bar graph.</p> |
| | 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. | Examples of pieces could include blocks, building bricks, or other assorted small objects. | <p>W.2.7 Participate in shared research and writing projects (e.g. read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> | |

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| | <p>2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.</p> | <p>Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.</p> | <p>RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</p> <p>R1.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.</p> <p>R1.2.8 Describe how reasons support specific points the author makes in a text.</p> <p>W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.</p> | |
| <p>Ecosystems: Interactions, Energy, and Dynamics</p> | <p>2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.</p> <hr/> <p>3.1.2.C2. Explain that living</p> | | <p>W.2.7 Participate in shared research and writing projects (e.g. read a number of books on a single topic to produce a report; record science observations).</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools</p> |

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| | <p>things can only survive if their needs are being met.</p> <hr/> <p>3.2.2.B6. Energy-Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all organisms to stay alive and grow.</p> <hr/> <p>3.2.2.B2. Explore and describe how different forms of energy cause changes (e.g. sunlight, heat, wind).</p> | | <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> | <p>strategically.</p> |
| | <p>2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.</p> | | <p>SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.</p> | <p>MP.4 Model with mathematics.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems.</p> |
| | <p>3.1.2.A5. Explain how different parts of a plant work together to make the organism function.</p> | | | |

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| <p>Biological Evolution: Unity & Diversity</p> | <p>2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.</p> <hr/> <p>3.1.2.A3. Identify similarities and differences in the life cycles of plants and animals.</p> | <p>Emphasis is on the diversity of living things in each of a variety of different habitats.</p> | <p>W.2.7 Participate in shared research and writing projects (e.g. read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph(with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems.</p> |
| | <p>3.1.2.C3. Constancy and Change-Describe some plants and animals that once lived on Earth, (e.g., dinosaurs) but cannot be found anymore. Compare them to now living things that resemble them in some way (e.g. lizards and birds).</p> | | | |
| <p>Earth's Place in the Universe</p> | <p>2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly and slowly.</p> | <p>Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.</p> | <p>R1.2.1 Ask and answer such questions as who, what, where,, why, and how to demonstrate understanding of key details in a text.</p> <p>R1.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>2.NBT.A Understand place value.</p> |

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| | | | <p>W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.</p> <p>W.2.7 Participate in shared research and writing projects (e.g. read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.</p> | |
| | <p>3.3.2.B1. Observe and record the location of the sun and the Moon in the sky over a day, as well as changes in the appearance of the Moon over a month.</p> <p>Observe, describe, and predict seasonal patterns of sunrise and sunset.</p> | | | |
| Earth's Systems | 2-ESS2-1. Compare multiple solutions designed to slow or | Examples of solutions could include different designs of | R1.2.3. Describe the connection between a series | MP.2 Reason abstractly and quantitatively. |

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| | prevent wind or water from changing the shape of the land. | dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land. | of historical events, scientific ideas or concepts, or steps in technical procedures in a text. R1.2.9 Compare and contrast the most important points presented by two texts on the same topics. | MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. 2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. |
| | 2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area. | | SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. | MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. 2.NBT.A.3 Read and write numbers to 1000 using base ten numerals, number names, and expanded form. |
| | 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid. | | W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. W.2.8 Recall information | |

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| | | | from experiences or gather information from provided sources to answer a question. | |
| Engineering Design | K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. | | <p>R1.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</p> <p>W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including collaboration with peers.</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</p> |
| | K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. | | SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. | |
| | K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of | | W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> |

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| | how each performs. | | with peers. W.2.8 Recall information from experiences or gather information from provided sources to answer a question. | MP.5 Use appropriate tools strategically. 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. |
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| GRADE 3 | | | | |
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| Content | Next Generation Standards/PA Science, Technology, & Engineering Education Standards | Clarification Statement | ELA/Literacy Connection | Math Connection |
| Motion and Stability: Forces and Interactions | 3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. | Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all. | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>W3.7 Conduct short research project that build knowledge about a topic.</p> <p>W3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>3MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.</p> |
| | <p>3-PS2-2. Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.</p> <p>3.2.3.B1. Explain how movement can be described in many ways.</p> | Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw. | <p>W3.7 Conduct short research projects that build knowledge about a topic.</p> <p>W3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.</p> | |

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| | <p>3.2.3.B2 Explore energy’s ability to cause motion or create change.</p> <p>Explore how energy can be found in moving objects, light, sound, and heat.</p> | | | |
| | <p>3-PS2-3. Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.</p> <p>3.2.3.B4. Identify and classify objects and materials that are conductors or insulators of electricity.</p> <p>Identify and classify objects and materials as magnetic or nonmagnetic.</p> <p>3.2.3.B5. Recognize that light travels in a straight line until it strikes an object or travels from one material to another.</p> <p>3.2.3.B6. Energy-Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all</p> | <p>Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.</p> | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> <p>R1.3.8 Describe the logical connection between particular sentences and paragraphs in a text.</p> <p>SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.</p> | |

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| | organisms to stay alive and grow. | | | |
| | 3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets. | Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other. | | |
| From Molecules to Organisms: Structures and Processes | 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. | Changes organism go through during their life form a pattern. | R1.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. | MP.4 Model with mathematics. 3.NBT Number and Operations in Base Ten 3.NF Number and Operations-Fractions |
| | 3.1.3.A1. Describe characteristics of living things that help to identify and classify them. | | | |
| | 3.1.3.A3. Illustrate how plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death. | | | |
| Ecosystems: Interactions, Energy, and Dynamics | 3-LS2-1. Construct an argument that some animals form groups that help members survive. | | R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, | MP.4 Model with mathematics. 3.NBT Number and Operations in Base Ten |
| | 3.1.3.A2 Describe the basic needs of living things and their dependence on light, food, air, water, and shelter. | | | |

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| | 3.1.3.A5. Identify the structures in plants that are responsible for food production, support, water transport, reproduction, growth, and protection. | | using language that pertains to time, sequence, and cause/effect. W3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. | |
| | 3.3.3.A1. Explain and give examples of the ways in which soil is formed. | | | |
| | 3.3.3.A2. Identify the physical properties of minerals and demonstrate how minerals can be tested for these different physical properties. | | | |
| | 3.3.3.A4. Connect the various forms of precipitation to the weather in a particular place and time. | | | |
| | 3.3.3.A5. Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time. | | | |
| Heredity: Inheritance and Variation of Traits | 3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. | Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organism other than humans. | R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers. R1.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. | MP.2 Reason abstractly and quantitatively MP.4 Model with mathematics. 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves |

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| | | | <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> <p>W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.</p> | <p>and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters.</p> |
| | <p>3.1.3.B1. Understand that plants and animals closely resemble their parents.</p> | | | |
| | <p>3.1.3.B5. Patterns-Identify characteristics that appear in both parents and offspring.</p> | | | |
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| | <p>3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.</p> | <p>Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.</p> | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> | <p>MP.2 Reason abstractly and quantitatively</p> <p>MP.4 Model with mathematics.</p> <p>3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.</p> |

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| | | | <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> <p>W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.</p> | <p>Show the data by making a line plot, where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters.</p> |
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| <p>Biological Evolution: Unity and Diversity</p> | <p>3LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.</p> | <p>Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.</p> | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> <p>W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.</p> <p>W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters.</p> |
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| | <p>3.1.3.C3. Constancy and Change-Recognize that fossils provide us with information about living things that inhabited the Earth long ago.</p> | | | |
| | <p>3-LS4-2. Use evidence to construct an explanation of how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.</p> | <p>Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.</p> | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</p> |

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| | <p>3.1.3.C2. Describe animal characteristics that are necessary for survival.</p> | | <p>W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.</p> | |
| | <p>3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.</p> | <p>Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.</p> | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</p> |

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| | <p>3.1.3.C1. Recognize that plants survive through adaptations, such as stem growth towards light and root growth downward in response to gravity.</p> <p>Recognize that many plants and animals can survive harsh environments because of seasonal behaviors (e.g. hibernation, migration, trees shedding leaves).</p> | | <p>W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.</p> <p>W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.</p> | |
| | <p>3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.</p> | <p>Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.</p> | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p>R1.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> |

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| | | | <p>time, sequence, and cause/effect.</p> <p>W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.</p> <p>W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.</p> | |
| Earth's Systems | 3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. | Examples of data could include average temperature, precipitation, and wind direction. | | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. Add, subtract, multiply, or divide to solve one-step word problems involving</p> |

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| | | | | <p>masses or volumes that are given in the same units, e.g., by using drawing (such as a beaker with a measurement scale) to represent the problem.</p> <p>3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in bar graphs.</p> |
| | 3-ESS2-2. Obtain and combine information to describe climates in different regions of the world. | | <p>R1.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.</p> <p>R1.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic.</p> <p>W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> |
| Earth and Human Activity | 3-ESS3-1. Make a claim about the merit of a design solution that reduces the | Examples of design solutions to weather-related hazards could include barriers to | W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. | MP.2 Reason abstractly and quantitatively. |

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| | impact of a weather-related hazard. | prevent flooding, wind resistant roofs, and lightning rods. | W.3.7 Conduct short research projects that build knowledge about a topic. | MP.4 Model with mathematics. |
| | <p>3.3.3.B1 Relate the rotation of the earth and day/night, to the apparent movement of the sun, moon, and stars across the sky.</p> <p>Describe the changes that occur in the observable shape of the moon over the course of a month.</p> | | | |
| | <p>3.4.3.A1. Identify how the natural made world and the human made world are different.</p> <hr/> <p>3.4.3.A2. Identify that some systems are found in nature while others are made by humans.</p> <hr/> <p>3.4.3.A3. Identify how the study of technology uses many of the same ideas and skills as many other subjects.</p> | | | |
| Chemistry | 3.2.3.A1. Differentiate between properties of objects such as size, shape, and eight and properties of materials that make up the objects such as color, texture, and hardness. | | | |

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| | Differentiate between the three states of matter, classifying a substance as a solid, liquid, or gas. | | | |
| | 3.2.3.A2. Recognize that all objects and materials in the world are made of matter. | | | |
| | 3.2.3.A3. Demonstrate how heating and cooling may cause changes in the properties of materials including phase changes. | | | |
| | 3.2.3.A4. Use basic reactions to demonstrate observable changes in properties of matter (e.g. burning, cooking). | | | |
| | 3.2.3.A5. Constancy and Change-Recognize that everything is made of matter. | | | |
| Heat Transfer | 3.2.3.B3. Explore temperature changes that result from the addition or removal of heat. | | | |
| Technology & Society | 3.4.3.B1. Describe how using technology can be good or bad. | | | |
| | 3.4.3.B2. Explain how materials are reused or recycled. | | | |
| | 3.4.3.B3. Identify and define products made to meet individual needs versus wants. | | | |
| | 3.4.3.B4. Illustrate how people have made tools to | | | |

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| | provide food, clothing, and shelter. | | | |
| | <p>3.4.3.C1. Recognize design is a creative process and everyone can design solutions to problems.</p> <hr/> <p>3.4.3.C2. Explain why the design process requires creativity and consideration of all ideas.</p> <hr/> <p>3.4.3.C3. Recognize that all products and systems are subject to failure; many products and systems can be fixed.</p> | | | |
| | 3.4.3.D1. Identify people's needs and wants and define some problems that can be solved through the design process. | | | |
| | 3.4.3.D2. Observe, analyze, and document how simple systems work. | | | |
| | 3.4.3.D3. Collect information about everyday products and systems by asking questions. | | | |
| | <p>3.4.3.E1. Identify the technologies that support and improve quality of life.</p> <hr/> <p>3.4.3.E2. Identify some processes used in agriculture that require different procedures, products, or systems.</p> | | | |

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| | <p>3.4.3.E3. Recognize that tools, machines, products, and systems use energy in order to do work.</p> | | | |
| | <p>3.4.3.E4. Recognize that information and communication technology is the transfer of messages among people and/or machines over distances through the use of technology.</p> <p>3.4.3.E5. Understand that transportation has many parts that work together to help people travel.</p> <p>3.4.3.E6. Explain how manufacturing systems design and produce products in quantity.</p> <p>3.4.3.E7. Recognize that people live, work, and go to school in buildings representing different types of structures.</p> | | | |

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| Grade 4 | | | | |
| Energy | <p>4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of the object.</p> <hr/> <p>3.2.4.B1. Explain how an object's change in motion can be observed and measured.</p> <hr/> <p>3.2.4.B2. Identify types of energy and their ability to be stored and changed from one form to another.</p> <hr/> <p>3.2.4.B6. Energy-Give examples of how energy can be transformed from one form to another.</p> | | <p>R1.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.</p> <p>R1.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.</p> <p>W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</p> <p>W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> | |

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| | | | W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. | |
| | <p>4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <hr/> <p>3.2.4.B3. Understand that objects that emit light often emit heat.</p> <hr/> <p>3.2.4.B4. Apply knowledge of basic electrical circuits to the design and construction of simple direct current circuits.</p> <p>Compare and contrast series and parallel circuits.</p> <p>Demonstrate that magnets have poles that repel and attract each other.</p> | | <p>W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> | |
| | <p>4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> | <p>Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.</p> | <p>W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>W.4.8 Recall relevant information from</p> | |

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| | | | experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. | |
| | 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. | Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device. | W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. | 4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. |
| Waves and their Applications in Technologies for Information Transfer | 4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. | Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves. | SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. | MP.4 Model with mathematics. 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. |
| | 4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. | | SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas | MP.4 Model with mathematics. 4.G.A.1 Draw points, lines, line segments, rays, angles |

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| | <p>3.2.4.B5. Demonstrate how vibrating objects make sound and sound can make things vibrate.</p> <p>Demonstrate how light can be reflected, refracted, or absorbed by an object.</p> | | or themes. | (right, acute, obtuse), and perpendicular lines. Identify these two-dimensional figures. |
| | <p>4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.</p> | <p>Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send a text.</p> | <p>RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.</p> | |
| <p>From Molecules to Organisms: Structures and Processes</p> | <p>4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <hr/> <p>3.1.4.A1. Classify plants and animals according to the physical characteristics they share.</p> <hr/> <p>3.1.4.A2. Describe the different resources that plants and animals need to live.</p> <hr/> | <p>Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.</p> | <p>W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</p> | <p>4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</p> |

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| | <p>3.1.4.A3. Identify differences in the life cycles of plants and animals.</p> <hr/> <p>3.1.4.A5. Describe common functions living things share to help them function in a specific environment.</p> <hr/> <p>3.1.4.A8. Models-Construct and interpret models and diagrams of various animal and plant life cycles.</p> <hr/> <p>3.1.4.B1. Describe features that are observable in both parents and their offspring.</p> <hr/> <p>3.1.4.B2. Recognize that reproduction is necessary for the continuation of life.</p> <hr/> <p>3.1.4.B5. Patterns-Identify observable patterns in the physical characteristics of plants or groups of animals.</p> | | | |
| | <p>4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</p> <hr/> <p>3.1.4.C1. Identify different characteristics of plants and</p> | <p>Emphasis is on systems of information transfer.</p> | <p>SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.</p> | |

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| | <p>animals that help some populations survive and reproduce in greater numbers.</p> <p>Describe how environmental changes can cause extinction in plants and animals.</p> <hr/> <p>3.1.4.C2. Describe plant and animal adaptations that are important to survival.</p> <hr/> <p>3.1.4.C3. Constancy and Change-Compare fossils to one another and to currently living organisms according to their anatomical similarities and differences.</p> | | | |
| Earth's Place in the Universe | <p>4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</p> <hr/> <p>3.3.4.A1. Describe basic landforms.</p> <p>Identify the layers of the earth.</p> <p>Recognize that the surface of the earth changes due to slow processes and rapid processes.</p> | <p>Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.</p> | <p>W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> <p>W.4.9 Draw evidence from literary or informational texts</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column</p> |

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| | <p>3.3.4.A2. Identify basic properties and uses of Earth’s materials including rocks, soils, water, and gases of the atmosphere.</p> <p>3.3.4.A3. Recognize that fossils provide evidence about the plants and animals that lived long ago and the nature of the environment of that time.</p> <p>3.3.4.A4. Recognize Earth’s different water resources, including both fresh and saltwater.</p> <p>Describe phase changes in the forms of water on Earth.</p> | | to support analysis, reflection, and research. | table. |
| Earth’s Systems | <p>4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p>3.3.4.A5. Describe basic weather elements.</p> <p>Identify weather patterns over time.</p> | Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of disposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow. | <p>W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>4.MD.A.1 Know relative sizes of measurement units within one sytem of units including km, m, cm; kg,g; lb, oz; l, ml; hr, mi, sec. Within a single system of measurement, express</p> |

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| | | | | <p>measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.</p> <p>4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.</p> |
| | <p>4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth’s features.</p> <hr/> <p>3.3.4.A6. Model/Scale-Identify basic landforms using models and simple maps.</p> <p>Constancy/Change-Identify simple changes in the earth system as air, water, soil and rock interact.</p> | <p>Maps can include topographic maps of Earth’s land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.</p> | <p>RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.</p> | <p>4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as</p> |

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| | Scale-Explain how basic weather elements are measured. | | | number line diagrams that feature a measurement scale. |
| | <p>3.3.4.B2. Scales-Know the basic characteristics and uses of telescopes.</p> <p>Patterns/Phases-Identify major lunar phases.</p> <p>Patterns-Explain time (days, seasons) using solar system motions.</p> <hr/> <p>3.3.4.B1. Identify planets in our solar system and their basic characteristics.</p> <p>Describe the earth's place in the solar system that includes the sun (a star), planets, and many moons.</p> <p>Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.</p> | | | |
| Earth and Human Activity | 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. | Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; nonrenewable energy resources are fossil fuels and | W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. | MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. |

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| | | fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning fossil fuels. | <p>W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> <p>W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> | <p>4.OA.A.1 Interpret a multiplication equation as a comparison, e.g. interpret $35=5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</p> |
| | 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. | Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity. | <p>R1.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>4.OA.A.1 Interpret a multiplication equation as a comparison, e.g. interpret $35=5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</p> |
| | 3.4.4.A1. Understand that tools materials, and skills are used to make things and carry out tasks. | | | |
| | 3.4.4.A2. Understand that systems have parts and | | | |

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| | components that work together. | | | |
| | 3.4.4.A3. Describe how various relationships exist between technology and other fields. | | | |
| | 3.4.4.B1. Describe how technology affects humans in various ways. | | | |
| | 3.4.4.B2. Explain how the use of technology affects the environment in good and bad ways. | | | |
| | 3.4.4.B3. Explain why new technologies are developed and old ones are improved in terms of needs and wants. | | | |
| | 3.4.4.B4. Describe how the history of civilization is linked closely to technological development. | | | |
| | 3.4.4.C1. Understand that there is no perfect design. | | | |
| | 3.4.4.C2. Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make the item. Evaluate the item. | | | |

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| | <p>Communicate the solution with others. Present the results.</p> | | | |
| | <p>3.4.4.C3. Explain how asking questions and making observations help a person understand how things work and can be repaired.</p> | | | |
| | <p>3.4.4.D1. Investigate how things are made and how they can be improved.</p> | | | |
| | <p>3.4.4.D2. Recognize and use everyday symbols (e.g. icons, simple electrical symbols measurement) to communicate key ideas.</p> <p>Identify and use simple hand tools (e.g. hammer, scale) correctly and safely.</p> | | | |
| | <p>3.4.4.D3. Investigate and assess the influence of a specific technology or system on the individual, family, community, and environment.</p> | | | |
| | <p>3.4.4.E1. Identify tools and devices that have been designed to provide information about a healthy lifestyle.</p> | | | |
| | <p>3.4.4.E2. Identify the</p> | | | |

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| | technologies in agriculture that make it possible for food to be available year round. | | | |
| | 3.4.4.E3. Identify types of energy and the importance of energy conservation. | | | |
| | 3.4.4.E4. Explain how information and communication systems allow information to be transferred from human to human. | | | |
| | 3.4.4.E5. Recognize that a transportation system has many parts that work together to help people travel and to move goods from place to place. | | | |
| | 3.4.4.E6. Identify key aspects of manufacturing processes (designing products, gathering resources and using tools to separate, form and combine materials in order to produce products). | | | |
| | 3.4.4.E7. Understand that structures rest on foundations and that some structures are temporary, while others are permanent. | | | |
| Matter | 3.2.4.A1. Identify and | | | |

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| | <p>classify objects based on their observable and measurable physical properties.</p> <p>Compare and contrast solids, liquids, and gases based on their properties.</p> | | | |
| | <p>3.2.4.A2. Demonstrate that materials are composed of parts that are too small to be seen without magnification.</p> | | | |
| | <p>3.2.4.A3. Demonstrate the conservation of mass during physical changes such as melting or freezing.</p> | | | |
| | <p>3.2.4.A4. Recognize that combining two or more substances may make new materials with different properties.</p> | | | |
| | <p>3.2.4.A5. Models-Use models to demonstrate the physical change as water goes from liquid to ice and from liquid to vapor.</p> | | | |

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| <p>Matter and Its Interactions</p> | <p>5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.</p> | <p>Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.</p> | <p>RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>5.NBT.A.1 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimals point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of ten.</p> <p>5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.</p> <p>5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.</p> <p>5.MD.C.4 Measure volumes by counting unit cubes; using cubic cm, cubic in, cubic ft, and improvised units.</p> |

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| | <p>5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.</p> <hr/> <p>3.2.5.A1. Describe how water can be changed from one state to another by adding or taking away heat.</p> | <p>Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.</p> | <p>W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.</p> |
| | <p>5-PS1-3. Make observations and measurements to identify materials based on their properties.</p> | <p>Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.</p> | <p>W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>W.5.9 Draw evidence from</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> |

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| | | | literary or informational texts to support analysis, reflection, and research. | |
| | 5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances. | | <p>W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> | |
| Motion and Stability: Forces and Interactions | 5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down. | “Down” is a local description of the direction that points toward the center of the spherical Earth. | <p>R1.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</p> <p>W.5.1 Write opinion pieces</p> | |

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| | | | on topics or texts, supporting a point of view with reasons and information. | |
| Energy | <p>5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.</p> <hr/> <p>3.1.5.A2. Describe how life on earth depends on energy from the sun.</p> | Examples of models could include diagrams, and flowcharts. | <p>R1.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or solve a problem efficiently.</p> <p>SL.5.5 Include multimedia components (e.g. graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.</p> | |
| From Molecules to Organisms: Structures and Processes | <p>5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.</p> <hr/> <p>3.1.5.A3. Compare and contrast the similarities and differences in life cycles of different organisms.</p> <hr/> <p>3.1.5.A5. Explain the concept of a cell as the basic unit of life.</p> <p>Compare and contrast plant and animal cells.</p> | Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil. | <p>R1.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</p> <p>W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (eg., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.</p> |

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| <p>Ecosystems: Interactions, Energy, and Dynamics</p> | <p>5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.</p> <hr/> <p>3.1.5.C1. Describe how organisms meet some of their needs in an environment by using behaviors (patterns of activities) in response to information (stimuli) received from the environment.</p> <hr/> <p>3.1.5.C2. Give examples of how inherited characteristics (e.g., shape of beak, length of neck, location of eyes, shape of teeth) may change over time as adaptations to changes in the environment that enable organisms to survive.</p> | <p>Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems include organisms, ecosystems, and the Earth.</p> | <p>R1.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>SL.5.5 Include multimedia components (eg., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> |
| <p>Earth's Place in the Universe</p> | <p>5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.</p> | <p>Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).</p> | <p>R1.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal</p> |

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| | | | <p>R1.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point (s).</p> <p>R1.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</p> <p>W5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</p> | <p>point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p> |
| | <p>5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.</p> | <p>Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.</p> | <p>SL.5.5 Include multimedia components (eg., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</p> |
| <p>Earth's Systems</p> | <p>5-ESS2-1. Develop a model</p> | <p>Examples could include the</p> | <p>R1.5.7 Draw on information</p> | <p>MP.2 Reason abstractly and</p> |

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| | <p>using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.</p> <hr/> <p>3.3.5.A1. Describe how landforms are the result of a combination of destructive forces such as erosion and constructive erosion, deposition of sediment, etc.</p> <hr/> <p>3.3.5.A2. Describe the usefulness of Earth’s physical resources as raw materials for the human made world.</p> <hr/> <p>3.3.5.A3. Explain how geological processes observed today such as erosion, movement of lithospheric plates, and changes in the composition of the atmosphere are similar to those in the past.</p> <hr/> <p>3.3.5.A4. Explain the basic components of the water cycle.</p> <hr/> <p>3.3.5.A5. Differentiate between weather and</p> | <p>influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.</p> | <p>from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>SL.5.5 Include multimedia components (e.g. graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.</p> | <p>quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</p> |
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| | <p>climate.</p> <p>Explain how the cycling of water, both in and out of the atmosphere, has an effect on climate.</p> <hr/> <p>3.3.5.B1. Provide evidence that the earth revolves around (orbits) the sun in a year's time and that the earth rotates on its axis once approximately every 24 hours.</p> | | | |
| | <p>5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</p> | | <p>R1.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>SL.5.5 Include multimedia components (e.g. graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> |

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| <p>Earth and Human Activity</p> | <p>5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.</p> | | <p>R1.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R1.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>R1.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</p> <p>W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> |
| <p>Engineering Design</p> | <p>3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success</p> | | <p>W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with</p> |

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| | and constraints on materials, time, or cost. | | <p>different aspects of a topic.</p> <p>W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> | <p>mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>3-5.OA Operations and Algebraic Thinking</p> |
| | 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. | | <p>R.1.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>R.1.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>R.1.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>3-5.OA Operations and Algebraic Thinking</p> |
| | 3-5-ETS1-3. Plan and carry out fair tests in which | | W.5.7 Conduct short research projects that use several | MP.2 Reason abstractly and quantitatively. |

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| | variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. | | sources to build knowledge through investigation of different aspects of a problem. W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources, summarize or paraphrase information in notes and finished work, and provide a list of sources. W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. | MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. 3-5.OA Operations and Algebraic Thinking |
| Genetics | 3.1.5.B1. Differentiate between inherited and acquired characteristics of plants and animals. | | | |
| Physics | 3.2.5.B1. Explain how mass of an object resists change to motion. _____ 3.2.5.B2. Examine how energy can be transferred from one form to another. _____ 3.2.5.B3. Demonstrate how heat energy is usually a byproduct of an energy | | | |

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| | <p>transformation.</p> <hr/> <p>3.2.5.B4. Demonstrate how electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.</p> <p>Demonstrate how electromagnets can be made and used.</p> <hr/> <p>3.2.5.B5. Compare the characteristics of sound as it is transmitted through different materials.</p> <p>Relate the rate of vibration to the pitch of the sound.</p> | | | |
| Technology | <p>3.4.5.A1. Explain how people use tools and techniques to help them do things.</p> <hr/> <p>3.4.5.A2. Understand that a subsystem is a system that operates as part of a larger system.</p> <hr/> <p>3.4.5.A3. Describe how technologies are often combined.</p> <hr/> <p>3.4.5.B1. Explain how the use of technology can have</p> | | | |

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| | <p>unintended consequences.</p> <hr/> <p>3.4.5.B2. Describe how waste may be appropriately recycled or disposed of to prevent unnecessary harm to the environment.</p> <hr/> <p>3.4.5.B3. Describe how community concerns support or limit technological developments.</p> <hr/> <p>3.4.5.B4. Identify how the way people live and work has changed history in terms of technology.</p> <hr/> <p>3.4.5.C1. Explain how the design process is a purposeful method of planning practical solutions to problems.</p> <hr/> <p>3.4.5.C2. Describe how design, as a dynamic process of steps, can be performed in different sequences and repeated.</p> <hr/> <p>3.4.5.C3. Identify how invention and innovation are creative ways to turn ideas into real things.</p> <hr/> <p>3.4.5.D1. Identify ways to improve a design solution.</p> <hr/> | | | |
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| | <p>3.4.5.D2. Use information provided in manuals, protocols, or by experienced people to see and understand how things work.</p> <hr/> <p>3.4.5.D3. Determine if the human use of a product or system creates positive or negative results.</p> <hr/> <p>3.4.5.E1. Identify how technological advances have made it possible to create new devices and to repair or replace certain parts of the human body.</p> <hr/> <p>3.4.5.E2. Understand that there are many different tools necessary to maintain an ecosystem, wither natural or man-made.</p> <hr/> <p>3.4.5.E3. Explain how tools, machines, products, and systems use energy in order to do work.</p> <hr/> <p>3.4.5.E4. Describe how the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.</p> <hr/> <p>3.4.5.E5. Examine reasons</p> | | | |
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| | <p>why a transportation system may lose efficiency or fail (e.g one part is missing or malfunctioning or if a subsystem is not working).</p> <hr/> <p>3.4.5.E6. Examine how manufacturing technologies have become an integral part of the engineered world.</p> <hr/> <p>3.4.5.E7. Describe the importance of guidelines when planning a community.</p> <hr/> | | | |
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| Sixth Grade | | | | |
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| Content | Next Generation Standards/PA Science, Technology, & Engineering Education Standards | Clarification Statement | ELA/Literacy Connection | Math Connection |
| From Molecules to Organisms: Structures and Processes/Organisms & Cells | <p>MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</p> <hr/> <p>3.1.6.A1. Describe the similarities and differences of major physical characteristics in plants, animals, fungi, protists, and bacteria.</p> | Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells. | WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. | 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. |
| | MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. | Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall. | SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. | 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thoughts of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and |

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| | | | | independent variables using graphs and tables, and relate these to the equation. |
| | MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. | Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems. | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. WHST.6-8.1 Write arguments focused on discipline content. | 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. |
| | MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. | Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. WHST.6-8.1 Write arguments focused on discipline content. | 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 6.SP.B.4 Summarize numerical data sets in relation to their context. |

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| | | structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury. | | |
| | MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. | Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds. | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p> <p>WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts and information through the selection, organization, and analysis of relevant content.</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.</p> | 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. |
| | MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling | Emphasis is on tracing movement of matter and flow of energy. | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. | 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one |

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| | of matter and flow of energy into and out of organisms. | | <p>RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p> <p>WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts and information through the selection, organization, and analysis of relevant content.</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.</p> | another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. |
| | MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. | Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released. | SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. | |
| | MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. | | WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and | |

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| | | | providing basic bibliographic information for sources. | |
| | 3.1.6.A2. Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers and decomposers. | | | |
| | 3.1.6.A4. Recognize that all organisms are composed of cells and that many organisms are unicellular and must carry out all life functions in one cell. | | | |
| | 3.1.6.A5. Describe basic structures that plants and animals have that contribute to their ability to make or find food and reproduce. | | | |
| | 3.1.6.A6. Identify examples of unicellular and multicellular organisms. | | | |
| | 3.1.6.A8. Scale-Explain why the details of most cells are visible only through a microscope. | | | |
| Biological Evolution: Unity and Diversity | MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, | Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to | 6.EE.B.6 Use variables to represent numbers and write expressions when solving real-world or mathematical |

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| | <p>diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operated today as in the past.</p> <hr/> <p>3.1.6.C1. Differentiate between instinctive and learned animal behaviors that relate to survival.</p> | <p>organisms and the chronological order of fossil appearance in the rock layers.</p> | <p>the precise details of explanations or descriptions.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p> | <p>problems; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> |
| | <p>MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.</p> | <p>Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, teacher-led) with diverse partners on grade 6</p> | <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving real-world or mathematical problems; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> |

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| | | | <p>topics, texts, and issues, building on others' ideas and expressing their own clearly.</p> <p>SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</p> | |
| | <p>MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.</p> | <p>Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p> <p>RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> | |

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| | <p>MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.</p> | <p>Emphasis is on using simple probability statements and proportional reasoning to construct explanations.</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in</p> | <p>6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>6.SP.B.5 Summarize numerical data sets in relation to their context.</p> <p>7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> |
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| | | | <p>groups, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.</p> <p>SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</p> | |
| | <p>MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p> | <p>Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these specific discoveries.</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information from sources.</p> | |
| | <p>MS-LS4-6. Use mathematical representations to support explanations of how natural selection may</p> | <p>Emphasis is on using mathematical models, probability statements, and proportional reasoning to</p> | | <p>MP.4 Model with mathematics.</p> <p>6.RP.A.1 Understand the</p> |

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| | lead to increases and decreases of specific traits in populations over time. | support explanations of trends in changes to population over time. | | <p>concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>6.SP.B.5 Summarize numerical data sets in relation to their context.</p> <p>7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> |
| Heredity: Inheritance and Variation of Traits | MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. | Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins. | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).</p> <p>SL.8.5 Include multimedia</p> | |

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| | | | components and visual displays in presentations to clarify claims and findings and emphasize salient points. | |
| | MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. | Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent (s) to offspring and resulting genetic variation. | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).</p> <p>SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p> | <p>MP.4 Model with mathematics.</p> <p>6.SP.B.5 Summarize numerical data sets in relation to their context.</p> |
| Matter and Its Interactions/Chemistry | MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended | Emphasis is on developing models of molecules that vary in complexity. Examples of single | RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version | <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with</p> |

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| | <p>structures.</p> <hr/> <p>3.2.6.A1. Distinguish the differences in properties of solids, liquids, and gases.</p> <p>Differentiate between volume and mass. Investigate that equal volumes of different substances usually have different masses.</p> | <p>molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.</p> | <p>of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p> | <p>mathematics.</p> <p>6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.</p> <p>8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.</p> |
| | <p>MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction occurred.</p> | <p>Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.</p> <p>6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP.B.5 Summarize numerical data sets in relation to their context.</p> |
| | <p>MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p> | <p>Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> | |

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| | | | WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase that data and conclusions of others while avoiding plagiarism and following a standard format for citation. | |
| | MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. | Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium. | RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). | 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g. temperatures above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. |
| | MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. | Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms. | RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). | MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. 6.RP.A.3 Use ratio and rate reasoning to solve real-world |

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| | | | | and mathematical problems. |
| | MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. | <p>Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could include chemical reactions such as dissolving ammonium chloride or calcium chloride.</p> <p>WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> | RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. | |
| | 3.2.6.A2. Compare and contrast pure substances with mixtures. | | | |
| | 3.2.6.A3. Explain and give examples of how mass is conserved in a closed system. | | | |
| | 3.2.6.A4. Differentiate between physical changes and chemical changes. | | | |
| | 3.2.6.A5. Constancy and | | | |

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| | Change-Identify characteristic properties of matter that can be used to separate one substance from the other. | | | |
| Motion and Stability: Forces and Interactions/Physics | <p>MS-PS2-1. Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p>3.2.6.B1. Explain how changes in motion require a force.</p> | Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle. | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p> <p>6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.</p> <p>7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of</p> |

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| | | | | <p>answers using mental computation and estimation strategies.</p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> |
| | <p>MS-PS2-2. Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.</p> | <p>Emphasis is on balanced (Newton’s First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion(Newton’s Second Law), frame of reference, and specification of units).</p> | <p>RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.</p> <p>7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> <p>7.EE.B.4 Use variables to represent quantities in a</p> |

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| | | | | real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| | MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. | Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor. | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. | MP.2 Reason abstractly and quantitatively. |
| | MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. | Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the sun, and orbital periods of objects within the solar system. | WHST.6-8.1 Write arguments focused on discipline-specific content. | |
| | MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even through the objects are | Examples of this phenomenon could include the interactions of magnets, electrically-charge strips of tape, and electrically-charged pith balls. Examples of investigations could include | RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. WHST.6-8.7 Conduct short | |

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| | not in contact. | first-hand experiences or simulations. | research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. | |
| | <p>3.2.6.B2. Describe energy as a property of objects associated with heat, light, electricity, magnetism, mechanical motion, and sound.</p> <p>Differentiate between potential and kinetic energy.</p> | | | |
| | <p>3.2.6.B3. Give examples of how heat moves in predictable ways, normally flowing from warmer objects to cooler ones until they reach the same temperature.</p> <p>Explain the effect of heat on particle motion by describing what happens to particles during a phase change.</p> | | | |
| | <p>3.2.6.B4. Describe how electric current produces magnetic forces and how moving magnets produce electric current.</p> <p>Derive Ohm's Law through</p> | | | |

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| | investigation of voltage, current, and resistance. | | | |
| | <p>3.2.6.B6. Energy-Demonstrate that heat moves in predictable ways from warmer objects to cooler ones.</p> <p>Scale-Investigate that materials may be composed of parts too small to be seen without magnification.</p> | | | |
| Energy | MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. | Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball. | <p>RST-6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.RP.A.1 Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with b not equal to 0, and use rate language in the context of a ratio relationship.</p> <p>7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> <p>8.EE.A.1 Know and apply the properties of integer exponents to generate</p> |

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| | | | | <p>equivalent numerical expressions.</p> <p>8.EE.A.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2=p$ and $x^3=p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes.</p> <p>8.F.A.3 Interpret the equation $y=mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.</p> |
| | <p>MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.</p> | <p>Emphasis is on the relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples</p> | <p>SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.</p> | |

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| | | of models could include representations, diagrams, pictures, and written descriptions of systems. | | |
| | MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. | Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup. | RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. | |
| | MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. | Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature changes of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added. | RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. | MP.2 Reason abstractly and quantitatively. 6.SP.B.5 Summarize numerical data sets in relation to their context. |
| | MS-PS3-5. Construct, use, | Examples of empirical | RST-6-8.1 Cite specific | MP.2 Reason abstractly and |

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| | and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. | evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object. | textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. WHST.6-8.1 Write arguments focused on discipline content. | quantitatively. 6.RP.A.1 Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities. 7.RP.A.2 Recognize and represent proportional relationships between quantities. 8.F.A.3 Interpret the equation $y=mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. |
| Earth Structure, Processes, and Cycles | MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclical patterns of lunar phases, eclipses of the sun and moon, and seasons. <hr/> 3.3.6.A1. Recognize and interpret various mapping representations of Earth's common features. | Examples of models can be physical, graphical, or conceptual. | SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. | MP.4 Model with mathematics. 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. 7.RP.A.2 Recognize and represent proportional relationships between quantities. |
| | MS-ESS1-2. Develop and | Emphasis for the model is on | SL.8.5 Include multimedia | MP.4 Model with |

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| | <p>use a model to describe the role of gravity in the motions within galaxies and the solar system.</p> | <p>gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state)</p> | <p>components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p> | <p>mathematics.</p> <p>6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> |
| | <p>MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.</p> | <p>Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.RP.A.1 Understand the concept of a ratio and use</p> |

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| | | differences among solar system objects. Examples of scale properties include the size of an object's layers. (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models. | RST. 6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table). | ratio language to describe a ratio relationship between two quantities. 7.RP.A.2 Recognize and represent proportional relationships between quantities. |
| | MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geological time scale is used to organize Earth's 4.6 billion-year-old history. | Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of major events could range from being very recent (such as formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions. | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. | 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| | 3.3.6.A2. Examine how soil fertility, composition, resistance to erosion, and texture are affected by many factors. | | | |

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| | <p>3.3.6.A4. Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.</p> | | | |
| | <p>3.3.6.A5. Describe the composition and layers of the atmosphere.</p> <p>Explain the effects of oceans on climate.</p> <p>Describe how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.</p> | | | |
| | <p>3.3.6.A6. Models/Scales-Describe the scales involved in characterizing Earth and its atmosphere.</p> <p>Models/Scales-Create models of Earth's common physical features.</p> | | | |
| | <p>MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives the process.</p> | <p>Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals</p> | <p>SL. 8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p> | |

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| | | and rocks through the cycling of Earth's materials. | | |
| | MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. | Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movement of water, ice and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate. | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. WHST. 6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. SL. 8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. | MP.2 Reason abstractly and quantitatively. 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| | MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. | Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches). | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed | MP.2 Reason abstractly and quantitatively. 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, |

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| | | | visually (e.g. in a flowchart, diagram, model, graph, or table). RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. | depending on the purpose at hand, any number in a specified set. 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| | MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. | Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical. | | |
| | MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. | Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and | RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. WHST. 6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each | MP.2 Reason abstractly and quantitatively. 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, |

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| | | visualizations) or obtained through laboratory experiments (such as with condensation). | source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. | explaining the meaning of 0 in each situation. |
| | MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. | Emphasis in on how patterns vary by latitude, altitude, and geographical land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations. | SL. 8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. | |
| Origin & Evolution of the Universe | <p>3.3.6.B1. Compare and contrast the size, composition, and surface features of the planets that comprise the solar system as well as the objects orbiting them.</p> <p>Recognize the role of gravity as a force that pulls all things on or near the earth toward the center of the earth and in</p> | | | |

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| | <p>the formation of the solar system and the motions of objects in the solar system.</p> <p>Explain why the planets orbit the sun in nearly circular paths.</p> <p>Describe how the planets change their position relative to the background of the stars.</p> <p>Explain how the tilt of the earth and its revolution around the sun cause an uneven heating of the earth which in turn causes the seasons and weather patterns.</p> | | | |
| | <p>3.3.6.B2. Models-Use models to demonstrate that earth has different seasons and weather patterns.</p> <p>Models-Use models to demonstrate that the phases of the moon are a result of its orbit around Earth.</p> | | | |
| | <p>MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resource are the result of past and current geoscience processes.</p> | <p>Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>WHST.6-8.2 Write informative/explanatory texts to examine a topic and</p> | <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at</p> |

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| | | <p>a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geological traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).</p> | <p>convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.</p> | <p>hand, any number in a specified set.</p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> |
| | <p>MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.</p> | <p>Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as pass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> |

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| | | fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts). | | |
| | MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. | Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land). | <p>WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>WHST. 6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information from sources.</p> | <p>6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> |
| | MS-ESS3-4. Construct an | Examples of evidence | RST.6-8.1 Cite specific | 6.RP.A.1 Understand the |

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| | <p>argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</p> | <p>include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.</p> | <p>textual evidence to support analysis of science and technical texts.</p> <p>WHST.6-8.1 Write arguments focused on discipline content.</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.</p> | <p>concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> |
| | <p>MS.ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p> | <p>Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic</p> | <p>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a</p> |

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| | | activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures. | | variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. |
| The Scope of Technology | 3.4.6.A1. Identify how creative thinking and economic and cultural influences shape technological development. | | | |
| | 3.4.6.A2. Describe how systems thinking involves considering how every part relates to others. | | | |
| | 3.4.6.A3. Explain how knowledge from other fields of study (STEM) integrate to create new technologies. | | | |
| | MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant | | RST. 6-8.1 Cite specific textual evidence to support analysis of science and technical texts. WHST. 6-8.8 Gather relevant | MP.2 Reason abstractly and quantitatively. 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive |

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| | <p>scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p> | | <p>information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.</p> | <p>and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> |
| | <p>MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> | | <p>RST. 6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST. 6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>WHST. 6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>WHST. 6-8.9 Draw evidence</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> |

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| | | | from informational texts to support analysis, reflection, and research. | |
| | MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. | | <p>RST. 6-8.1 Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST. 6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).</p> <p>RST. 6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> | <p>MP.2 Reason abstractly and quantitatively.</p> <p>7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> |
| | MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. | | SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. | <p>MP.2 Reason abstractly and quantitatively.</p> <p>7.SP Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.</p> |

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| Technology & Society | 3.4.6.B1. Describe how economic, political, and cultural issues are influenced by the development and use of technology. | | | |
| | 3.4.6.B2. Describe how technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems. | | | |
| | 3.4.6.B3. Interpret how societal and cultural priorities are reflected in technological devices. | | | |
| | 3.4.6.B4. Demonstrate how new technologies are developed based on people's needs, wants, values, and/or interests. | | | |
| Technology and Engineering Design | 3.4.6.C1. Recognize that requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design. | | | |
| | 3.4.6.C2. Show how models are used to communicate and test design ideas and processes. | | | |

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| | 3.4.6.C3. Explain why some technological problems are best solved through experimentation. | | | |
| Abilities for a Technological World | 3.4.6.D1. Apply a design process to solve problems beyond the laboratory classroom. | | | |
| | 3.4.6.D2. Use computers appropriately to access and organize and apply information. | | | |
| | 3.4.6.D3. Design and use instruments to evaluate data. | | | |
| The Designed World | 3.4.6.E1. Describe how advances and innovations in medical technologies are used to improve health care. | | | |
| | 3.4.6.E2. Identify how emerging agricultural technologies have an effect on ecosystem dynamics and human/animal food resources. | | | |
| | 3.4.6.E3. Investigate that power is the rate at which energy is converted from one form to another or transferred from one place to another. | | | |
| | 3.4.6.E4. Illustrate how | | | |

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| | <p>communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.</p> <p>Examine how communications information technologies are used to help humans make decisions and solve problems.</p> | | | |
| | <p>3.4.6.E5. Demonstrate how transporting people and goods involves a combination of individuals and sub-systems, such as structural, propulsion, suspension, guidance, control, and support.</p> | | | |
| | <p>3.4.6.E6. Identify key aspects of manufacturing systems that use mechanical processes to change the form of natural materials (e.g. separating, forming, combining, conditioning).</p> | | | |
| | <p>3.4.6.E7. Explain how the type of structure determines the way the parts are put together.</p> | | | |