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chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(i) Scientific practices. Students ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(ii) Engineering practices. Students identify problems and design solutions using appropriate tools and models.

(iii) To support instruction in the science content standards, it is recommended that districts integrate scientific and engineering practices through classroom and outdoor investigations for at least 80% of instructional time.

(B) Matter and its properties. Students build their knowledge of the natural world using their senses. The students focus on observable properties and patterns of objects, including shape, color, texture, and material.

(C) Force, motion, and energy. Students explore the location, motion, and position of objects and investigate the importance of light energy as it relates to the students' everyday lives. Students focus on demonstrating light energy sources and their effect on objects.

(D) Earth and space. Patterns are recognizable in the natural world and among objects in the sky. Students understand that weather, seasons of the year, and day and night are repeated patterns. Materials found on Earth can be used and classified.

(E) Organisms and environments. All living organisms satisfy basic needs through interactions with nonliving things and living organisms, and they have structures and functions that help them survive within their environments. Students investigate the life cycle of plants and identify likenesses between parents and young.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some

(6) Matter and its properties. The student knows that objects have physical properties that determine how they are described and classified. The student is expected to identify and record observable physical properties of objects, including shape, color, texture, and material, and generate ways to classify objects.

(7) Force, motion, and energy. The student knows that forces cause changes in motion and position in everyday life. The student is expected to describe and predict 21s.

(1) In Kindergarten through Grade 5 Science, content is organized into recurring strands. The concepts within each grade level build on prior knowledge, prepare students for the next grade level, and establish a foundation in science. In Grade 1, the following concepts will be addressed in each strand.

(A) Scientific and engineering practices. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students distinguish between scientific decision-making practices and ethical and social decisions that involve science.

(5) Recurring themes and concepts. Science consists of recurring themes and making connections between overarching concepts. Recurring themes include structure and function, systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. Models have limitations but provide a tool for understanding the ideas presented. Students analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(6) Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(b) Knowledge and skills.

(1) Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:

(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;

(B) use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems;

(C) identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;

(D) use tools, including hand lenses, goggles, heat-resistant gloves, trays, cups, bowls, beakers, s9.5 (t (t)6.8 (a)4.39.96.5 (,)-1 (s)5.407sw (d)-4 (u)-)5.4 (9.5-4 (u)-)5.4 (93(s)5.407sw

(A) develop explanations and propose solutions supported by data and models;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation for society. The student is expected to:

(A) explain how science or an innovation can help others; and

(B) identify [~~what~~] scientists and engineers such as Katherine Johnson, Sally Ride, and Ernest Just [~~are~~] and explore what different scientists and engineers do.

(5) Recurring themes and concepts. The student uses recurring themes and concepts to make connections across disciplines. The student is expected to:

(A) identify and use patterns to describe phenomena or design solutions;

(B) investigate and predict cause-and-effect relationships in science;

(C) describe the properties of objects in terms of relative size (scale) and relative quantity;

(D) examine the parts of a whole to define or model a system;

(E) identify forms of energy and properties of matter;

(F) describe the relationship between structure and function of objects, organisms, and systems; and

(G) describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

(6) Matter and its properties. The student knows that objects have physical properties that determine how they are described and classified. The student is expected to:

(A) classify objects by observable physical properties, including, shape, color, and texture, and attributes such as larger and smaller heavier and lighter;

(B) explain and predict changes in materials caused by heating and cooling; and

(C) demonstrate and explain that a whole object is a system made of organized parts such as a toy that can be taken apart and put back together.

(7) Force, motion, and energy. The student knows that forces cause changes in motion and position in everyday life. The student is expected to:

(A) explain how pushes and pulls can start, stop, or change the speed or direction of an object's motion; and

(B) plan and conduct a descriptive investigation that predicts how pushes and pulls can start, stop, or change the speed or direction of an object's motion.

(8) Force, motion, and energy. The student knows that energy is everywhere and can be observed in everyday life. The student is expected to:

(A) investigate and describe applications of heat in everyday life such as cooking food or using a clothes [~~hair~~] dryer; and

(B) describe how some changes caused by heat may be reversed such as melting butter and other changes cannot be reversed such as cooking an egg or baking a cake.

(9) Earth and space. The student knows that the natural world has recognizable patterns. The student is expected to describe and predict the patterns of seasons of the year such as order of occurrence and changes in nature.

(10) Earth and space. The student knows that the natural world includes earth materials that can be observed in systems and processes. The student is expected to:

(A) investigate and document the properties of particle size, shape, texture, and color and the components of different types of soils such as topsoil, clay, and sand;

(B) investigate and describe how water can move rock and soil particles from one place to another;

(C) compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including color, clarity, size, shape, and whether it is freshwater or saltwater; and

(D) describe and record observable characteristics of weather, including hot or cold, clear or cloudy, calm or windy, and rainy or icy, and explain the impact of weather on daily choices.

(11) Earth and space. The student knows that earth materials and products made from these materials are important to everyday life. The student is expected to:

(A) identify and describe how plants, animals, and humans use rocks, soil, and [land] water;

(B) explain why water conservation is important; and

(C) [~~(B)~~] describe ways to conserve water such as turning off the faucet when brushing teeth and protect natural sources of water such as [~~turning off the faucet when brushing teeth and~~] keeping trash out of bodies of water.

(12) Organisms and environments. The student knows that the environment is composed of relationships between living organisms and nonliving components. The student is expected to:

(A) classify living and nonliving things based upon whether they have basic needs and produce young;

(B) describe and record examples of interactions and dependence between living and nonliving components in terrariums or aquariums; and

(C) identify and illustrate how living organisms depend on each other through food chains.

(13) Organisms and environments. The student knows that organisms resemble their parents and have structures and undergo processes that help them interact and survive within their environments. The student is expected to:

(A) identify the external structures of different animals and compare how those structures help different animals live, move, and meet basic needs for survival;

(B) record observations of and describe basic life cycles of animals, including a bird, a mammal, and a fish; and

(C) compare ways that young animals resemble their parents.

§112.4. Science, Grade 2, Adopted 2021.

(a) Introduction.

(1) In Kindergarten through Grade 5 Science, content is organized into recurring strands. The concepts within each grade level build on prior knowledge, prepare students for the next grade level, and establish a foundation in science. In Grade 2, the following concepts will be addressed in each strand.

(A) Scientific and engineering practices. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific

methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(i) Scientific practices. Students ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(ii)

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udent asks questions, identifies problems, and plans
nd field investigations to answer questions, explain
priate tools and models. The student is expected to:

based on observations or information from text,
ns;

conduct simple descriptive investigations and use
tions to problems;

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation for society. The student is expected to:

(A) explain how science or an innovation can help others; and

(B)

(A) describe the Sun as a star that provides light and heat and explain that the Moon reflects the Sun's light; and

(B) observe and compare how objects in the sky are more visible and can appear different using tools such as [with] a telescope than with an unaided eye.

(10) Earth and space. The student knows that the natural world includes earth materials that can be observed in systems and processes. The student is expected to:

(A) investigate and describe how wind and water move soil and rock particles across the Earth's surface such as wind blowing sand into dunes on a beach or a river carrying rocks as it flows;

(B) measure, record, and graph weather information, including temperature and precipitation; and

(C) investigate different types of severe weather events such as a hurricane, tornado, or flood and explain that some events are more likely than others in a given region.

(11) Earth and space. The student knows that earth materials and products made from these materials are important to everyday life. The student is expected to:

(A) distinguish between natural and manmade resources; and

(B) describe how human impact can be limited by making choices to conserve and properly dispose of materials such as reducing use of, reusing , or recycling paper, plastic, and metal.

(12) Organisms and environments. The student knows that living organisms have basic needs that must be met through interactions within their environment. The student is expected to:

(A) describe how the physical characteristics of environments, including the amount of rainfall, support plants and animals within an ecosystem;

(B) create and describe food chains identifying producers and consumers to demonstrate how animals depend on other living things; and

(C) explain and demonstrate how some plants depend on other living things, wind, or water for pollination and to move their seeds around.

(13) Organisms and environments. The student knows that organisms have structures and undergo processes that help them interact and survive within their environments. The student is expected to:

(A) identify the roots, stems, leaves, flowers, fruits, and seeds of plants and compare how those structures help different plants meet their basic needs for survival;

(B) record and compare how the structures and behaviors of animals help them find and take in food, water, and air;

(C)

(A) Scientific and engineering practices. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(i) Scientific practices. Students ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(ii) Engineering practices. Students identify problems and design solutions using appropriate tools and models.

(iii) To support instruction in the science content standards, it is recommended that districts integrate scientific and engineering practices through classroom and outdoor investigations for at least 30% of instructional time.

(B) Matter and energy. Students build upon the knowledge learned in Kindergarten-Grade 2 by investigating the physical properties of matter. Students explore states of matter and observe that changes can occur to matter through heating and cooling. The students explore using substances by combining them to create or modify objects based on their physical properties.

(C) Force, motion, and energy. Students manipulate objects by pushing and pulling to demonstrate changes in motion and position. Students also identify forces such as magnetism and gravity. Students understand energy exists in many forms, including

(B)

(3) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation for society. The student is expected to:

(A) explain how scientific discoveries and innovative solutions to problems impact science and society; and

(B) explore, illustrate, and compare life cycles in organisms such as beetles, crickets, radishes, or lima beans.

§112.6. Science, Grade 4, Adopted 2021.

(a) Introduction.

(1) In Kindergarten through Grade 5 Science, content is organized into recurring strands. The concepts within each grade level build on prior knowledge, prepare students for the next grade

knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently

(C) demonstrate that matter is conserved when mixtures such as soil and water [dry] oil and water are formed.

(7) Force, motion, and energy. The student knows the nature of forces and the patterns of their interactions. The student is expected to plan and conduct descriptive investigations to explore the patterns of forces such as gravity, friction, or magnetism in contact or at a distance on an object.

(8) Force, motion, and energy. The student knows that energy is everywhere and can be observed in cycles, patterns, and systems. The student is expected to:

(A) investigate and identify the transfer of energy by objects in motion, waves in water, and sound;

(B) identify conductors and insulators of thermal and electrical energy; and

(C) demonstrate and describe how electrical energy travels in a closed path that can produce light and thermal energy.

(9) Earth and space. The student recognizes patterns among the Sun, Earth, Moon system and their effects. The student is expected to:

(A) collect and analyze data to identify sequences and predict patterns of change in seasons such as change in temperature and length of daylight; and

(B) collect and analyze data to identify sequences and predict patterns of change in the observable appearance of the Moon from Earth.

(10) Earth and space. The student knows that there are processes on Earth that create patterns of change. The student is expected to:

(A) describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process;

(B) model and describe slow changes to Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice; and

(C) differentiate between weather and climate.

(11) Earth and space. The student understands how natural resources are important and can be managed. The student is expected to:

(A) identify and explain advantages and disadvantages of using Earth's renewable and nonrenewable natural resources such as wind, water, sunlight, plants, animals, coal, oil, and natural gas; and

(B) explain the critical role of energy resources and how conservation, disposal, and recycling of natural resources impact the environment and modern life.

(12) Organisms and environments. The student describes patterns, cycles, systems, and relationships within environments. The student is expected to:

(A) investigate and explain how most producers can make their own food using sunlight, water, and carbon dioxide through the cycling of matter;

(B) describe the cycling of matter and flow of energy through food webs, including the roles of the Sun, producers, consumers, and decomposers; and

(C) identify and describe past environments based on fossil evidence, including common Texas fossils.

(13) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that function to help them survive within their environments. The student is expected to:

(A) explore and explain how structures and functions of plants such as waxy leaves and deep roots enable them to survive in their environment; and

(B) differentiate between inherited and acquired physical traits of organisms.

§112.7. Science, Grade 5, Adopted 2021.

(a) Introduction.

(1) In Kindergarten through Grade 5 Science, content is organized into recurring strands. The concepts within each grade level build on prior knowledge, prepare students for the next grade level, and establish a foundation for high school courses. In Grade 5, the following concepts will be addressed in each strand.

(A) Scientific and engineering practices. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.

(i) Scientific practices. Students ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.

(ii) Engineering practices. Students identify problems and design solutions using appropriate tools and models.

(iii) To support instruction in the science content standards, it is recommended that districts integrate scientific and engineering practices through classroom and outdoor investigations for at least 50% of instructional time.

(B) Matter and energy. Students investigate matter expanding their understanding of properties learned in Grade 4 (mass, volume, states, temperature, magnetism, and relative density) to include solubility and the ability to conduct or insulate both thermal and electrical energy. Students observe the combination of substances to make mixtures and develop an understanding of conservation of matter. These concepts lead to the understanding of elements and compounds. Students wehrt4.2 (om)0.con of motg11TEh.5 (ul)6.9

biotic and abiotic factors in an ecosystem. Students build on their understanding of food webs from Grade 4 by predicting how ecosystem changes affect the flow of energy. Additionally, they describe how humans impact the ecosystem. Students also learn how organisms' structures help them to survive, and they distinguish between instinctual and learned behaviors in animals. This will set the foundation for Grade 6 where students compare and contrast variations within organisms and how they impact survival.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.

(3) Scientific hypotheses and theories. Students are expected to know that:

(A) hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and

(B) scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.

(4) Science and sol

materials to support digital data collection such as computers, tablets, and cameras to observe, measure, test, and analyze information;

(E) collect observations and measurements as evidence;

(F) construct appropriate graphic organizers used to collect data,

(G) explain how factors or conditions impact stability and change in objects, organisms, and systems.

(6) Matter and energy. The student knows that matter has measurable physical properties that determine how matter is identified, classified, changed, and used. The student is expected to:

(A) compare and contrast matter based on measurable, testable, and observable physical properties, including mass, magnetism, relative density (sinking and floating using water as a reference point), physical state (solid, liquid, gas), volume, solubility in water, and the ability to conduct or insulate thermal energy and electric energy;

(B) demonstrate and explain that some mixtures maintain physical properties of their substances such as iron filings and sand or [and] sand and water;

(C) compare the properties of substances before and after they are combined into a solution and demonstrate that matter is conserved in solutions; and

(D) illustrate how matter is made up of particles that are too small to be seen such as air in a balloon.

(7) Force, motion, and energy. The student knows the nature of forces and the patterns of their interactions. The student is expected to:

(A) investigate and explain how equal and unequal forces acting on an object can be seen in investigations.

(A) observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem;

(B) predict how changes in the ecosystem affect the cycling of matter and flow of energy in a food web; and

(C) describe a healthy ecosystem and how human activities can be beneficial or harmful to an ecosystem.

(13) Organisms and environments. The student knows that organisms undergo similar life processes and have structures and behaviors that help them survive within their environments. The student is expected to:

(A) analyze the structures and functions of different species to identify how organisms survive in the same environment; and

(B) explain how instinctual behavioral traits such as turtle hatchlings returning to the sea and learned behavioral traits such as orcas hunting in packs increase chances of survival.

ATTACHMENT II
Text of Proposed New 19 TAC

Chapter 112. Texas Essential Knowledge and Skills for Science

Subchapter B. Middle School

§112.25. Implementation of Texas Essential Knowledge and Skills for Science, Middle School, Adopted 2021.

(a) The provisions of §§112.26-112.28 of this subchapter shall be implemented by school districts.

(b) No later than July 31, 2023, the commissioner of education shall determine whether instructional materials funding has been made available to Texas public schools for materials that cover the essential knowledge and skills for science as adopted in §§112.26-112.28 of this subchapter.

(c) If the commissioner makes the determination that instructional materials funding has been made available under subsection (b) of this section, §§112.26-112.28 of this subchapter shall be implemented beginning with the 2024-2025 school year and apply to the 2024-2025 and subsequent school years.

(d) If the commissionep739.96 0 01-4 (er)-p73003 Tweter[2)125 nis-s subcubcubcubcubcubc.9 (h6.9 (i)6. Tw 72)125 nis4(ubc.9 t

(C) Force, motion, and energy. Students investigate the relationship between force and motion using a variety of means, including calculations and measurements through the study of Newton's Third Law of Motion. Subsequent grades will study force and motion through Newton's First and Second Laws of Motion. Energy occurs as either potential or kinetic energy. Potential energy can take several forms, including gravitational, elastic, and chemical energy. Energy is conserved throughout systems by changing from one form to another and transfers through waves.

(D) Earth and space. Cycles within Sun, Earth, and Moon systems are studied as students learn about seasons and tides. Students identify that the Earth is divided into spheres and examine the processes within and organization of the geosphere. Researching the advantages and disadvantages of short- and long-term uses of resources enables informed decision making about resource management.

(E) Organisms and environments. All living organisms are made up of smaller units called cells. Ecosystems are organized into communities, populations, and organisms. Students compare and contrast variations within organisms and how they impact survival. Students examine relationships and interactions between organisms, biotic factors, and abiotic factors in an ecosystem.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.

(3) Scientific hypotheses and theories. Students are expected to know that:

(A) hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and

(B) scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students distinguish between scientific decision-making practices and ethical and social decisions that involve science.

(5) Recurring themes and concepts. Science consists of recurring themes and making connections

(A) ask questions and define problems based on observations or information from text,

(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

(5) Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:

(A) identify and apply patterns to understand and connect scientific phenomena or to design solutions;

(B) identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;

(C) analyze how differences in scale, proportion, or quantity affect a system's structure or performance;

(D) examine and model the parts of a system and their interdependence in the function of the system;

(E) analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems;

(F) analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems; and

(G) analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.

(6) Matter and energy. The student knows that matter is made of atoms, can be classified according to its properties, and can undergo changes. The student is expected to:

(A) compare solids, liquids, and gases in terms of their structure, shape, volume, and kinetic energy of atoms and molecules;

(B) investigate the physical properties of matter to distinguish between pure substances, homogeneous mixtures (solutions), and heterogeneous mixtures;

(C) classify elements on the periodic table as metals, nonmetals, and metalloids using their physical properties **and describe the position of rare Earth elements and their importance to modern life** ;

(D) compare the density of substances relative to various fluids; and

(E) identify the formation of a new substance by using the evidence of a possible chemical change, including production of a gas, change in thermal energy, production of a precipitate, and color change.

(7) Force, motion, and energy. The student knows the nature of forces and their role in systems that experience stability or change. The student is expected to:

(A) identify and explain how forces act on objects, including gravity, friction, magnetism, applied forces, and normal forces, using real-world applications;

(B) calculate the net force on an object in a horizontal or vertical direction using diagrams and determine if the forces are balanced or unbalanced; and

(C) identify simultaneous force pairs that are equal in magnitude and opposite in direction that result from the interactions between objects using Newton's Third Law of Motion.

(8) Force, motion, and energy. The student knows that the total energy in systems is conserved through energy transfers and transformations. The student is expected to:

(A) compare and contrast gravitational, elastic, and chemi

(B) describe how energy is conserved through transfers and transformations in systems such

(1) In Grades 6 through 8 Science, content is organized into recurring strands. The concepts within each grade level build on prior knowledge, prepare students for the next grade level, and establish a foundation for high school courses. In Grade 7, the following concepts will be addressed in each strand.

(A) Scientific and engineering practices. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, whicy is tes invmlle.6 (y io)-7 (ho. (t))-2.8 ()4.2 (l2.8 (tio)-7 (na.6 (y i(h)109 (n

(B) scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students distinguish between scientific decision-making practices and ethical and social decisions that involve science.

(5) Recurring themes and concepts. Science c

(C)

(D)

(13) Organisms and environments. The student knows how systems are organized and function to support the health of an organism and how traits are inherited. The student is expected to:

(A) identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems;

(B)

weather patterns and climate. In addition, students understand that climate can be impacted by natural events and human activities.

(E) Organisms and environments. Students identify the function of organelles. Traits are contained in genetic material that is found on genes within a chromosome from the parent. These traits influence the success of a species over time. Students explore how organisms and their populations respond to environmental changes, including those caused by human activities.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.

(3) Scientific hypotheses and theories. Stud

(D) examine and model the parts of a system and their interdependence in the function of the system;

(E) analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems;

(F) analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems; and

(G) analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.

(6) Matter and energy. The student understands that matter can be classified according to its properties and matter is conserved in chemical changes that occur within closed systems. The student is expected to:

(A) explain by modeling how matter is classified as elements, compounds, homogeneous mixtures, or heterogeneous mixtures;

(B) describe the arrangement of the periodic table, including groups and periods, to explain how properties are used to classify elements;

(C) [~~(B)~~] describe the properties of cohesion, adhesion, and surface tension in water and relate to observable phenomena such as the formation of droplets, transport in plants, and insects walking on water;

(D) [~~(C)~~] compare and contrast the properties of acids and bases, including pH relative to water **[~~, sour or bitter taste, and how these substances feel to the touch~~]** ; and

(E) [~~(D)~~] investigate how mass is conserved in chemical reactions and relate conservation of mass to the rearrangement of atoms using chemical equations, including photosynthesis.

(7) Force, motion, and energy. The student understands the relationship between force and motion within systems. The student is expected to:

(A) calculate and analyze how the acceleration of an object is dependent upon the net force acting on the object and the mass of the object using Newton's Second Law of Motion; and

(B) investigate and describe how Newton's three laws of motion act simultaneously within systems such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.

(8) Force, motion, and energy. The student knows how energy is transferred through waves. The student is expected to:

(A) compare the characteristics of amplitude, frequency, and wavelength in transverse waves, including the electromagnetic spectrum; and

(B) explain the use of electromagnetic waves in applications such as radiation therapy, wireless technologies, fiber optics, microwaves, ultraviolet sterilization, astronomical observations, and X-rays.

(9) Earth and space. The student describes the characteristics of the universe and the relative scale of its components. The student is expected to:

(A) describe the life cycle of stars and compare and classify stars using the Hertzsprung-Russ

(10) Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. The student is expected to:

(A) describe how energy from the Sun, hydrosphere, and atmosphere interact and influence weather and climate;

(B) identify global patterns of atmospheric movement and how they influence local weather; and

(C) describe the interactions between ocean currents and air masses that produce tropical cyclones, including typhoons and hurricanes.

(11) Earth and space. The student knows that natural events and human activity can impact global climate. The student is expected to:

(A) use scientific evidence to describe how natural events, including volcanic eruptions, meteor impacts, abrupt changes in ocean currents, and the release and absorption of greenhouse gases influence climate;

(B) use scientific evidence to describe how human activities **, including** **[~~such as~~]** the release of greenhouse gases, deforestation, and urbanization **,** can influence climate; and

[~~(C) describe efforts to mitigate climate change, including a reduction in greenhouse gas emissions.~~