Science, Grade 1

Subject: Science
Grade: 01
Num Expectations: 44
Num Breakouts: 163

(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 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, correlative, comparative, or experimental. The method chosen should be appropriate to the grade level and question being asked. Student learning for different types of investigations includes descriptive investigations, which have no hypothesis that tentatively answers the research question and involve collecting data and recording observations without making comparisons; correlative and comparative investigations, which have a hypothesis that predicts a relationship and involve collecting data, measuring variables relevant to the hypothesis that are manipulated, and comparing results; and experimental investigations, which involve processes similar to comparative investigations but in which a hypothesis can be tested by comparing a treatment with a control.

(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. Students focus on observable properties and patterns of objects, including larger and smaller, heavier and lighter, shape, color, and texture. The students understand changes in materials caused by heating and cooling.

(C) Force, motion, and energy. Students know that force and motion are related and that energy exists in many forms as a part of everyday life. Magnetism interacts with various materials and can be used as a push and pull. The students investigate the importance of heat and focus on changes caused by heating and cooling.

(D) Earth and space. Patterns, cycles, and systems are recognizable in the natural world and among objects in the sky. Students make informed choices by understanding weather and seasonal patterns. Students understand that natural resources on Earth, including rocks, soil, and water, are used by humans and can be conserved.

(E) Organisms and environments. All living organisms interact with living and nonliving things within their environments and use structures to meet their basic needs. Students know that organisms are interdependent and part of a food chain. The students investigate the life cycle of animals 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 questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.

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

(A) observations are active acquisition of either qualitative or quantitative information from a primary source through the senses;

(B) inferences are conclusions reached on the basis of observations or reasoning supported by relevant evidence;

(C) 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

(D) 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 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 Statements

(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;

Breakouts

(i) ask questions based on observations or information from text, phenomena, models, or investigations

(ii) 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;

Breakouts

(i) use scientific practices to plan simple descriptive investigations

(ii) use scientific practices to conduct simple descriptive investigations

(iii) 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;

Breakouts

(i) identify safe practices during classroom investigations as outlined in Texas Education Agency-approved safety standards

(ii) describe safe practices during classroom investigations as outlined in Texas Education Agency-approved safety standards

(iii) demonstrate safe practices during classroom investigations as outlined in Texas Education Agency-approved safety standards

(iv) identify safe practices during field investigations as outlined in Texas Education Agency-approved safety standards

(v) describe safe practices during field investigations as outlined in Texas Education Agency-approved safety standards

(vi) demonstrate safe practices during 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, sieves/sifters, tweezers, primary balance, notebooks, terrariums, aquariums, stream tables, soil samples (loam, sand, gravel, rocks, and clay), seeds, plants, windsock, pinwheel, student thermometer, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, flashlights, sandpaper, wax paper, items that are magnetic, non-magnetic items, a variety of magnets, hot plate, aluminum foil, Sun-Moon-Earth model, and plant and animal life cycle models to observe, measure, test, and compare;

Breakouts

(i) use tools to observe

(ii) use tools to measure

(iii) use tools to test

(iv) use tools to compare

(E) collect observations and measurements as evidence;

Breakouts

(i) collect observations as evidence

(ii) collect measurements as evidence

(F) record and organize data using pictures, numbers, words, symbols, and simple graphs; and

Breakouts

(i) record data using pictures

(ii) record data using numbers

(iii) record data using words

(iv) record data using symbols

(v) record data using simple graphs

(vi) organize data using pictures

(vii) organize data using numbers

(viii) organize data using words

(ix) organize data using symbols

(x) organize data using simple graphs

(G) develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

Breakouts

(i) develop models to represent phenomena or design a prototype for a solution to a problem

(ii) develop models to represent objects or design a prototype for a solution to a problem

(iii) develop models to represent processes or design a prototype for a solution to a problem

(iv) use models to represent phenomena or design a prototype for a solution to a problem

(v) use models to represent objects or design a prototype for a solution to a problem

(vi) use models to represent processes or design a prototype for a solution to a problem

(2) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(A) identify basic advantages and limitations of models such as their size, properties, and materials;

Breakouts

(i) identify basic advantages of models

(ii) identify basic limitations of models

(B) analyze data by identifying any significant features and patterns;

Breakouts

(i) analyze data by identifying significant features

(ii) analyze data by identifying significant patterns

(C) use mathematical concepts to compare two objects with common attributes; and

Breakouts

(i) use mathematical concepts to compare two objects with common attributes

(D) evaluate a design or object using criteria to determine if it works as intended.

Breakouts

(i) evaluate a design or object using criteria to determine if it works as intended

(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;

Breakouts

(i) develop explanations supported by data

(ii) develop explanations supported by models

(iii) propose solutions supported by data

(iv) propose solutions supported by models

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

Breakouts

(i) communicate explanations individually in a variety of settings

(ii) communicate explanations collaboratively in a variety of settings

(iii) communicate explanations individually in a variety of formats

(iv) communicate explanations collaboratively in a variety of formats

(v) communicate solutions individually in a variety of settings

(vi) communicate solutions collaboratively in a variety of settings

(vii) communicate solutions individually in a variety of formats

(viii) communicate solutions collaboratively in a variety of formats

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

Breakouts

(i) listen actively to others' explanations to identify important evidence

(ii) 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

Breakouts

(i) explain how science or an innovation can help others

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

Breakouts

(i) identify scientists

(ii) identify engineers

(iii) explore what different scientists do

(iv) explore what different 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;

Breakouts

(i) identify patterns to describe phenomena or design solutions

(ii) use patterns to describe phenomena or design solutions

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

Breakouts

(i) investigate cause-and-effect relationships in science

(ii) predict cause-and-effect relationships in science

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

Breakouts

(i) describe the properties of objects in terms of relative size (scale)

(ii) describe the properties of objects in terms of relative quantity

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

Breakouts

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

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

Breakouts

(i) identify forms of energy

(ii) identify properties of matter

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

Breakouts

(i) describe the relationship between structure and function of objects

(ii) describe the relationship between structure and function of organisms

(iii) describe the relationship between structure and function of systems

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

Breakouts

(i) describe how factors or conditions can cause objects to either change or stay the same

(ii) describe how factors or conditions can cause organisms to either change or stay the same

(iii) describe how factors or conditions can cause 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 and heavier and lighter;

Breakouts

(i) classify objects by observable physical properties, including shape

(ii) classify objects by observable physical properties, including color

(iii) classify objects by observable physical properties, including texture

(iv) classify objects by observable physical properties, including attributes

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

Breakouts

(i) explain changes in materials caused by heating

(ii) explain changes in materials caused by cooling

(iii) predict changes in materials caused by heating

(iv) predict changes in materials caused by cooling

(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.

Breakouts

(i) demonstrate that a whole object is a system made of organized parts

(ii) explain that a whole object is a system made of organized parts

(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

Breakouts

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

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

(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.

Breakouts

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

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

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

(iv) conduct a descriptive investigation that predicts how 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 dryer; and

Breakouts

(i) investigate applications of heat in everyday life

(ii) describe applications of heat in everyday life

(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.

Breakouts

(i) describe how some changes caused by heat may be reversed

(ii) describe how other changes [caused by heat] cannot be reversed

(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.

(A) describe and predict the patterns of seasons of the year such as order of occurrence and changes in nature.

Breakouts

(i) describe the patterns of seasons of the year

(ii) predict the patterns of seasons of the year

(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;

Breakouts

(i) investigate the properties of particle size

(ii) investigate the properties of particle shape

(iii) investigate the properties of particle texture

(iv) investigate the properties of particle color

(v) document the properties of particle size

(vi) document the properties of particle shape

(vii) document the properties of particle texture

(viii) document the properties of particle color

(ix) investigate the components of different types of soils

(x) document the components of different types of soils

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

Breakouts

(i) investigate how water can move rock particles from one place to another

(ii) investigate how water can move soil particles from one place to another

(iii) describe how water can move rock particles from one place to another

(iv) describe how water can move 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

Breakouts

(i) compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including color

(ii) compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including clarity

(iii) compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including size

(iv) compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including shape

(v) compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including whether it is freshwater or saltwater

(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.

Breakouts

(i) describe observable characteristics of weather, including hot or cold

(ii) describe observable characteristics of weather, including clear or cloudy

(iii) describe observable characteristics of weather, including calm or windy

(iv) describe observable characteristics of weather, including rainy or icy

(v) record observable characteristics of weather, including hot or cold

(vi) record observable characteristics of weather, including clear or cloudy

(vii) record observable characteristics of weather, including calm or windy

(viii) record observable characteristics of weather, including rainy or icy

(ix) 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 water;

Breakouts

(i) identify how plants use rocks

(ii) identify how animals use rocks

(iii) identify how humans use rocks

(iv) identify how plants use soil

(v) identify how animals use soil

(vi) identify how humans use soil

(vii) identify how plants use water

(viii) identify how animals use water

(ix) identify how humans use water

(x) describe how plants use rocks

(xi) describe how animals use rocks

(xii) describe how humans use rocks

(xiii) describe how plants use soil

(xiv) describe how animals use soil

(xv) describe how humans use soil

(xvi) describe how plants use water

(xvii) describe how animals use water

(xviii) describe how humans use water

(B) explain why water conservation is important; and

Breakouts

(i) explain why water conservation is important

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

Breakouts

(i) describe ways to conserve water

(ii) protect natural sources 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;

Breakouts

(i) classify living and nonliving things based upon whether they have basic needs

(ii) classify living and nonliving things based upon whether they produce young

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

Breakouts

(i) describe examples of interactions between living and nonliving components in terrariums or aquariums

(ii) describe examples of dependence between living and nonliving components in terrariums or aquariums

(iii) record examples of interactions between living and nonliving components in terrariums or aquariums

(iv) record examples of dependence between living and nonliving components in terrariums or aquariums

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

Breakouts

(i) identify how living organisms depend on each other through food chains

(ii) 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;

Breakouts

(i) identify the external structures of different animals

(ii) compare how those [external] structures help different animals live

(iii) compare how those [external] structures help different animals move

(iv) compare how those [external] structures help different animals 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

Breakouts

(i) record observations of animals, including a bird

(ii) record observations of animals, including a mammal

(iii) record observations of animals, including a fish

(iv) describe basic life cycles of animals, including a bird

(v) describe basic life cycles of animals, including a mammal

(vi) describe basic life cycles of animals, including a fish

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

Breakouts

(i) compare ways that young animals resemble their parents