Science, Grade K

Subject: Science
Grade: KG
Num Expectations: 39
Num Breakouts: 159

(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 Kindergarten, 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. 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 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, trays, cups, bowls, sieves or sifters, notebooks, terrariums, aquariums, samples (rocks, sand, soil, loam, gravel, clay, seeds, and plants), windsock, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, blocks or cubes, tuning fork, various flashlights, small paper cups, items that roll, noise makers, hot plate, opaque objects, transparent objects, foil pie pans, foil muffin cups, wax paper, Sun-Moon-Earth model, and plant life cycle model 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 significant features and patterns;

Breakouts

(i) analyze data by identifying any significant features

(ii) analyze data by identifying any 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 on society. The student is expected to:

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

Breakouts

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

(B) identify scientists and engineers such as Isaac Newton, Mae Jemison, and Ynes Mexia 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 the structure and function of objects, organisms, and systems; and

Breakouts

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

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

(iii) describe the relationship between the 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 identify and record observable physical properties of objects, including shape, color, texture, and material, and generate ways to classify objects. The student is expected to:

(A) identify and record observable physical properties of objects, including shape, color, texture, and material, and generate ways to classify objects.

Breakouts

(i) identify observable physical properties of objects, including shape

(ii) identify observable physical properties of objects, including color

(iii) identify observable physical properties of objects, including texture

(iv) identify observable physical properties of objects, including material

(v) record observable physical properties of objects, including shape

(vi) record observable physical properties of objects, including color

(vii) record observable physical properties of objects, including texture

(viii) record observable physical properties of objects, including material

(ix) 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 how a magnet interacts with various materials and how magnets can be used to push or pull.

(A) describe and predict how a magnet interacts with various materials and how magnets can be used to push or pull.

Breakouts

(i) describe how a magnet interacts with various materials

(ii) predict how a magnet [will] interact with various materials

(iii) describe how magnets can be used to push or pull

(iv) predict how magnets can be used to push or pull

(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) communicate the idea that objects can only be seen when a light source is present and compare the effects of different amounts of light on the appearance of objects; and

Breakouts

(i) communicate the idea that objects can only be seen when a light source is present

(ii) compare the effects of different amounts of light on the appearance of objects

(B) demonstrate and explain that light travels through some objects and is blocked by other objects, creating shadows.

Breakouts

(i) demonstrate that light travels through some objects

(ii) demonstrate that light is blocked by other objects, creating shadows

(iii) explain that light travels through some objects

(iv) explain that light is blocked by other objects, creating shadows

(9) Earth and space. The student knows that there are recognizable patterns in the natural world and among objects in the sky. The student is expected to:

(A) identify, describe, and predict the patterns of day and night and their observable characteristics; and

Breakouts

(i) identify the patterns of day and night

(ii) describe the patterns of day and night

(iii) predict the patterns of day and night

(iv) identify observable characteristics [of day and night]

(v) describe observable characteristics [of day and night]

(vi) predict observable characteristics [of day and night]

(B) observe, describe, and illustrate the Sun, Moon, stars, and objects in the sky such as clouds.

Breakouts

(i) observe the Sun

(ii) describe the Sun

(iii) illustrate the Sun

(iv) observe the Moon

(v) describe the Moon

(vi) illustrate the Moon

(vii) observe the stars

(viii) describe the stars

(ix) illustrate the stars

(x) observe objects in the sky

(xi) describe objects in the sky

(xii) illustrate objects in the sky

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

(A) describe and classify rocks by the observable properties of size, shape, color, and texture;

Breakouts

(i) describe rocks by the observable [property] of size

(ii) describe rocks by the observable [property] of shape

(iii) describe rocks by the observable [property] of color

(iv) describe rocks by the observable [property] of texture

(v) classify rocks by the observable [property] of size

(vi) classify rocks by the observable [property] of shape

(vii) classify rocks by the observable [property] of color

(viii) classify rocks by the observable [property] of texture

(B) observe and describe weather changes from day to day and over seasons; and

Breakouts

(i) observe weather changes from day to day

(ii) describe weather changes from day to day

(iii) observe weather changes over seasons

(iv) describe weather changes over seasons

(C) identify evidence that supports the idea that air is all around us and demonstrate that wind is moving air using items such as a windsock, pinwheel, or ribbon.

Breakouts

(i) identify evidence that supports the idea that air is all around us

(ii) demonstrate that wind is moving air using items

(11) Earth and space. The student knows that earth materials are important to everyday life. The student is expected to observe and generate examples of practical uses for rocks, soil, and water.

(A) observe and generate examples of practical uses for rocks, soil, and water.

Breakouts

(i) observe practical uses for rocks

(ii) observe practical uses for soil

(iii) observe practical uses for water

(iv) generate examples of practical uses for rocks

(v) generate examples of practical uses for soil

(vi) generate examples of practical uses for water

(12) Organisms and environments. The student knows that plants and animals depend on the environment to meet their basic needs for survival. The student is expected to:

(A) observe and identify the dependence of plants on air, sunlight, water, nutrients in the soil, and space to grow; and

Breakouts

(i) observe the dependence of plants on air

(ii) observe the dependence of plants on sunlight

(iii) observe the dependence of plants on water

(iv) observe the dependence of plants on nutrients in the soil

(v) observe the dependence of plants on space to grow

(vi) identify the dependence of plants on air

(vii) identify the dependence of plants on sunlight

(viii) identify the dependence of plants on water

(ix) identify the dependence of plants on nutrients in the soil

(x) identify the dependence of plants on space to grow

(B) observe and identify the dependence of animals on air, water, food, space, and shelter.

Breakouts

(i) observe the dependence of animals on air

(ii) observe the dependence of animals on water

(iii) observe the dependence of animals on food

(iv) observe the dependence of animals on space

(v) observe the dependence of animals on shelter

(vi) identify the dependence of animals on air

(vii) identify the dependence of animals on water

(viii) identify the dependence of animals on food

(ix) identify the dependence of animals on space

(x) identify the dependence of animals on shelter

(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 structures of plants, including roots, stems, leaves, flowers, and fruits;

Breakouts

(i) identify the structures of plants, including roots

(ii) identify the structures of plants, including stems

(iii) identify the structures of plants, including leaves

(iv) identify the structures of plants, including flowers

(v) identify the structures of plants, including fruits

(B) identify the different structures that animals have that allow them to interact with their environment such as seeing, hearing, moving, and grasping objects;

Breakouts

(i) identify the different structures that animals have that allow them to interact with their environment

(C) identify and record the changes from seed, seedling, plant, flower, and fruit in a simple plant life cycle; and

Breakouts

(i) identify the changes from seed, seedling, plant, flower, and fruit in a simple plant life cycle

(ii) record the changes from seed, seedling, plant, flower, and fruit in a simple plant life cycle

(D) identify ways that young plants resemble the parent plant.

Breakouts

(i) identify ways that young plants resemble the parent plant