Science, Grade 3

Subject: Science
Grade: 03
Num Expectations: 45
Num Breakouts: 174

(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 3, 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 60% 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 mechanical, thermal, light, and sound. The students identify forms of energy in everyday life.

(D) Earth and space. Students learn that there are recognizable processes that change the Earth over time. Students compare day-to-day changes in weather. They also investigate how soil is formed through the processes of weathering and decomposition. Students model rapid changes to Earth's surface as well as explore ways to conserve Earth's resources. Students recognize that there are identifiable objects and patterns in Earth's solar system. Students model the orbits of

the Sun, Earth, and Moon as well as describe their relationship to each other. This will set the foundation for Grade 4 when they look at changes in the appearance of the Moon. Students also identify the sequence of the planets in Earth's solar system.

(E) Organisms and environments. Students explore patterns, systems, and cycles within environments by investigating characteristics of organisms, life cycles, and interactions among all components of the natural environment. Students examine how environment and the structures and functions of animals play a key role in survival. Students know that when changes in the environment occur, organisms may thrive, become ill, or perish. Students also examine fossils as evidence of past living organisms.

(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 descriptive investigations and use engineering practices to design solutions to problems;

Breakouts

(i) use scientific practices to plan descriptive investigations

(ii) use scientific practices to conduct descriptive investigations

(iii) use engineering practices to design solutions to problems

(C) demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;

Breakouts

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

(ii) demonstrate the use of safety equipment during classroom investigations as outlined in Texas Education Agency-approved safety standards

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

(iv) demonstrate the use of safety equipment during field investigations as outlined in Texas Education Agency-approved safety standards

(D) use tools, including hand lenses; metric rulers; Celsius thermometers; wind vanes; rain gauges; graduated cylinders; beakers; digital scales; hot plates; meter sticks; magnets; notebooks; Sun, Earth, Moon system models; timing devices; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras, to observe, measure, test, and analyze information;

Breakouts

(i) use tools to observe

(ii) use tools to measure

(iii) use tools to test

(iv) use tools to analyze information

(E) collect observations and measurements as evidence;

Breakouts

(i) collect observations as evidence

(ii) collect measurements as evidence

(F) construct appropriate graphic organizers to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input- output tables that show cause and effect; and

Breakouts

(i) construct appropriate graphic organizers to collect data, including tables

(ii) construct appropriate graphic organizers to collect data, including bar graphs

(iii) construct appropriate graphic organizers to collect data, including line graphs

(iv) construct appropriate graphic organizers to collect data, including tree maps

(v) construct appropriate graphic organizers to collect data, including concept maps

(vi) construct appropriate graphic organizers to collect data, including Venn diagrams

(vii) construct appropriate graphic organizers to collect data, including flow charts or sequence maps

(viii) construct appropriate graphic organizers to collect data, including input-output tables that show cause and effect

(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 advantages and limitations of models such as their size, scale, properties, and materials;

Breakouts

(i) identify advantages of models

(ii) identify limitations of models

(B) analyze data by identifying any significant features, patterns, or sources of error; Breakouts

(i) analyze data by identifying any significant features , patterns, or sources of error

(C) use mathematical calculations to compare patterns and relationships; and Breakouts

(i) use mathematical calculations to compare patterns

(ii) use mathematical calculations to compare relationships

(D) evaluate a design or object using criteria.

Breakouts

(i) evaluate a design or object using criteria

(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 relevant evidence and engage respectfully in scientific discussion.

Breakouts

(i) listen actively to others' explanations to identify relevant 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 scientific discoveries and innovative solutions to problems impact science and society; and

Breakouts

(i) explain how scientific discoveries impact science

(ii) explain how scientific discoveries impact society

(iii) explain how innovative solutions to problems impact science

(iv) explain how innovative solutions to problems impact society

(B) 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.

Breakouts

(i) research STEM careers

(ii) explore resources 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 use patterns to explain scientific phenomena or to design solutions;

Breakouts

(i) identify patterns to explain scientific phenomena or to design solutions

(ii) use patterns to explain scientific phenomena or to design solutions

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

Breakouts

(i) identify cause-and-effect relationships to explain scientific phenomena or analyze problems

(ii) investigate cause-and-effect relationships to explain scientific phenomena or analyze problems

(C) use scale, proportion, and quantity to describe, compare, or model different systems;
Breakouts

(i) use scale to describe, compare, or model different systems

(ii) use proportion to describe, compare, or model different systems

(iii) use quantity to describe, compare, or model different systems

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

Breakouts

(i) examine the parts of a system

(ii) model the parts of a system

(iii) examine interdependence [of the parts] in the function of the system

(iv) model interdependence [of the parts] in the function of the system

(E) investigate the flow of energy and cycling of matter through systems;

Breakouts

(i) investigate the flow of energy through systems

(ii) investigate the cycling of matter through systems

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

Breakouts

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

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

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

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

Breakouts

(i) explain how factors or conditions impact stability in objects

(ii) explain how factors or conditions impact stability in organisms

(iii) explain how factors or conditions impact stability systems

(iv) explain how factors or conditions impact change in objects

(v) explain how factors or conditions impact change in organisms

(vi) explain how factors or conditions impact change in 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) measure, test, and record physical properties of matter, including temperature, mass, magnetism, and the ability to sink or float in water;

Breakouts

(i) measure physical properties of matter, including temperature

(ii) measure physical properties of matter, including mass

(iii) measure physical properties of matter, including magnetism

(iv) measure physical properties of matter, including the ability to sink or float in water

(v) test physical properties of matter, including temperature

(vi) test physical properties of matter, including mass

(vii) test physical properties of matter, including magnetism

(viii) test physical properties of matter, including the ability to sink or float in water

(ix) record physical properties of matter, including temperature

(x) record physical properties of matter, including mass

(xi) record physical properties of matter, including magnetism

(xii) record physical properties of matter, including the ability to sink or float in water

(B) describe and classify samples of matter as solids, liquids, and gases and demonstrate that solids have a definite shape and that liquids and gases take the shape of their container;

Breakouts

(i) describe samples of matter as solids

(ii) describe samples of matter as liquids

(iii) describe samples of matter as gases

(iv) classify samples of matter as solids, liquids, and [or] gases

(v) demonstrate that solids have a definite shape

(vi) demonstrate that liquids take the shape of their container

(vii) demonstrate that gases take the shape of their container

(C) predict, observe, and record changes in the state of matter caused by heating or cooling in a variety of substances such as ice becoming liquid water, condensation forming on the outside of a glass, or liquid water being heated to the point of becoming water vapor (gas); and Breakouts

(i) predict changes in the state of matter caused by heating or cooling in a variety of substances

(ii) observe changes in the state of matter caused by heating or cooling in a variety of substances

(iii) record changes in the state of matter caused by heating or cooling in a variety of substances

(D) demonstrate that materials can be combined based on their physical properties to create or modify objects such as building a tower or adding clay to sand to make a stronger brick and justify the selection of materials based on their physical properties.

Breakouts

(i) demonstrate that materials can be combined based on their physical properties to create or modify objects

(ii) justify the selection of materials based on their physical properties

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

(A) demonstrate and describe forces acting on an object in contact or at a distance, including magnetism, gravity, and pushes and pulls; and

Breakouts

(i) demonstrate forces acting on an object in contact or at a distance, including magnetism

(ii) demonstrate forces acting on an object in contact or at a distance, including gravity

(iii) demonstrate forces acting on an object in contact or at a distance, including pushes

(iv) demonstrate forces acting on an object in contact or at a distance, including pulls

(v) describe forces acting on an object in contact or at a distance, including magnetism

(vi) describe forces acting on an object in contact or at a distance, including gravity

(vii) describe forces acting on an object in contact or at a distance, including pushes

(viii) describe forces acting on an object in contact or at a distance, including pulls

(B) plan and conduct a descriptive investigation to demonstrate and explain how position and motion can be changed by pushing and pulling objects such as swings, balls, and wagons.

Breakouts

(i) plan a descriptive investigation to demonstrate how position can be changed by pushing objects

(ii) plan a descriptive investigation to demonstrate how position can be changed by pulling objects

(iii) plan a descriptive investigation to demonstrate how motion can be changed by pushing objects

(iv) plan a descriptive investigation to demonstrate how motion can be changed by pulling objects

(v) conduct a descriptive investigation to demonstrate how position can be changed by pushing objects

(vi) conduct a descriptive investigation to demonstrate how position can be changed by pulling objects

(vii) conduct a descriptive investigation to demonstrate how motion can be changed by pushing objects

(viii) conduct a descriptive investigation to demonstrate how motion can be changed by pulling objects

(ix) plan a descriptive investigation to explain how position can be changed by pushing objects

(x) plan a descriptive investigation to explain how position can be changed by pulling objects

(xi) plan a descriptive investigation to explain how motion can be changed by pushing objects

(xii) plan a descriptive investigation to explain how motion can be changed by pulling objects

(xiii) conduct a descriptive investigation to explain how position can be changed by pushing objects

(xiv) conduct a descriptive investigation to explain how position can be changed by pulling objects

(xv) conduct a descriptive investigation to explain how motion can be changed by pushing objects

(xvi) conduct a descriptive investigation to explain how motion can be changed by pulling objects

(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) identify everyday examples of energy, including light, sound, thermal, and mechanical;

and Breakouts

(i) identify everyday examples of energy, including light

(ii) identify everyday examples of energy, including sound

(iii) identify everyday examples of energy, including thermal

(iv) identify everyday examples of energy, including mechanical

(B) plan and conduct investigations that demonstrate how the speed of an object is related to its mechanical energy.

Breakouts

(i) plan investigations that demonstrate how the speed of an object is related to its mechanical energy

(ii) conduct investigations that demonstrate how the speed of an object is related to its mechanical energy

(9) Earth and space. The student knows there are recognizable objects and patterns in Earth's solar system. The student is expected to:

(A) construct models and explain the orbits of the Sun, Earth, and Moon in relation to each other; and

Breakouts

(i) construct models of the Sun, Earth, and Moon in relation to each other

(ii) explain the orbits of the Sun, Earth, and Moon in relation to each other

(B) identify the order of the planets in Earth's solar system in relation to the Sun.

Breakouts

(i) identify the order of the planets in Earth's solar system in relation to the Sun

(10) Earth and space. The student knows that there are recognizable processes that change Earth over time. The student is expected to:

(A) compare and describe day-to-day weather in different locations at the same time, including air temperature, wind direction, and precipitation;

Breakouts

(i) compare day-to-day weather in different locations at the same time, including air temperature

(ii) compare day-to-day weather in different locations at the same time, including wind direction

(iii) compare day-to-day weather in different locations at the same time, including precipitation

(iv) describe day-to-day weather in different locations at the same time, including air temperature

(v) describe day-to-day weather in different locations at the same time, including wind direction

(vi) describe day-to-day weather in different locations at the same time, including precipitation

(B) investigate and explain how soils such as sand and clay are formed by weathering of rock and by decomposition of plant and animal remains; and

Breakouts

(i) investigate how soils are formed by weathering of rock

(ii) explain how soils are formed by weathering of rock

(iii) investigate how soils are formed by decomposition of plant remains

(iv) investigate how soils are formed by decomposition of animal remains

(v) explain how soils are formed by decomposition of plant remains

(vi) explain how soils are formed by decomposition of animal remains

(C) model and describe rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides.

Breakouts

(i) model rapid changes in Earth's surface

(ii) describe rapid changes in Earth's surface

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

(A) explore and explain how humans use natural resources such as in construction, in agriculture, in transportation, and to make products;

Breakouts

(i) explore how humans use natural resources

(ii) explain how humans use natural resources

(B) explain why the conservation of natural resources is important;

and Breakouts

(i) explain why the conservation of natural resources is important

(C) identify ways to conserve natural resources through reducing, reusing, or recycling.

Breakouts

(i) identify ways to conserve natural resources through reducing, reusing, or recycling

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

(A) explain how temperature and precipitation affect animal growth and behavior through migration and hibernation and plant responses through dormancy;

Breakouts

(i) explain how temperature affect[s] animal growth

(ii) explain how temperature affect[s] animal behavior through migration

(iii) explain how temperature affect[s] animal behavior through hibernation

(iv) explain how precipitation affect[s] animal growth

(v) explain how precipitation affect[s] animal behavior through migration

(vi) explain how precipitation affect[s] animal behavior through hibernation

(vii) explain how temperature affect[s] plant responses through dormancy

(viii) explain how precipitation affect[s] plant responses through dormancy

(B) identify and describe the flow of energy in a food chain and predict how changes in a food chain such as removal of frogs from a pond or bees from a field affect the ecosystem;

Breakouts

(i) identify the flow of energy in a food chain

(ii) describe the flow of energy in a food chain

(iii) predict how changes in a food chain affect the ecosystem

(C) describe how natural changes to the environment such as floods and droughts cause some organisms to thrive and others to perish or move to new locations; and

Breakouts

(i) describe how natural changes to the environment cause some organisms to thrive

(ii) describe how natural changes to the environment cause some organisms to perish or move to new locations

(D) identify fossils as evidence of past living organisms and environments, including common Texas fossils.

Breakouts

(i) identify fossils as evidence of past living organisms, including common Texas fossils

(ii) identify fossils as evidence of past environments, 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 external structures and functions of animals such as the neck of a giraffe or webbed feet on a duck enable them to survive in their environment; and Breakouts

(i) explore how external structures of animals enable them to survive in their environment

(ii) explore how functions of animals enable them to survive in their environment

(iii) explain how external structures of animals enable them to survive in their environment

(iv) explain how functions of animals enable them to survive in their environment

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

Breakouts

(i) explore life cycles in organisms

(ii) illustrate life cycles in organisms

(iii) compare life cycles in organisms