

Science, Grade 2

Subject: Science

Grade: 02

Num Expectations: 45

Num Breakouts: 171

(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, notebooks, stream tables, soil, sand, gravel, flowering plants, student thermometer, demonstration thermometer, rain gauge, flashlights, ramps, balls, spinning tops, drums, tuning forks, sandpaper, wax paper, items that are flexible, non-flexible items, magnets, hot plate, aluminum foil, Sun-Moon-Earth model, and frog and butterfly 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 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 Alexander Graham Bell, Marie Daly, Mario Molina, and Jane Goodall 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) measure and describe the properties of objects in terms of size and quantity;

Breakouts

- (i) measure the properties of objects in terms of size
- (ii) measure the properties of objects in terms of quantity

- (iii) describe the properties of objects in terms of size
- (iv) describe the properties of objects in terms of 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 matter has physical properties that determine how it is described, classified, and used. The student is expected to:

(A) classify matter by observable physical properties, including texture, flexibility, and relative temperature, and identify whether a material is a solid or liquid;

Breakouts

- (i) classify matter by observable physical properties, including texture
- (ii) classify matter by observable physical properties, including flexibility
- (iii) classify matter by observable physical properties, including relative temperature
- (iv) identify whether a material is a solid or liquid

(B) conduct a descriptive investigation to explain how physical properties can be changed through processes such as cutting, folding, sanding, melting, or freezing; and

Breakouts

- (i) conduct a descriptive investigation to explain how physical properties can be changed through processes
- (C) demonstrate that small units such as building blocks can be combined or reassembled to form new objects for different purposes and explain the materials chosen based on their physical properties.

Breakouts

- (i) demonstrate that small units can be combined or reassembled to form new objects for different purposes
 - (ii) explain the materials chosen based on their physical properties
- (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 objects push on each other and may change shape when they touch or collide; and

Breakouts

- (i) explain how objects push on each other when they touch or collide
 - (ii) explain how objects may change shape when they touch or collide
- (B) plan and conduct a descriptive investigation to demonstrate how the strength of a push and pull changes an object's motion.

Breakouts

- (i) plan a descriptive investigation to demonstrate how the strength of a push changes an object's motion
 - (ii) plan a descriptive investigation to demonstrate how the strength of a pull changes an object's motion
 - (iii) conduct a descriptive investigation to demonstrate how the strength of a push changes an object's motion
 - (iv) conduct a descriptive investigation to demonstrate how the strength of a pull changes 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) demonstrate and explain that sound is made by vibrating matter and that vibrations can be caused by a variety of means, including sound;

Breakouts

- (i) demonstrate that sound is made by vibrating matter
- (ii) demonstrate that vibrations can be caused by a variety of means, including sound
- (iii) explain that sound is made by vibrating matter
- (iv) explain that vibrations can be caused by a variety of means, including sound

- (B) explain how different levels of sound are used in everyday life such as a whisper in a classroom or a fire alarm; and

Breakouts

- (i) explain how different levels of sound are used in everyday life

- (C) design and build a device using tools and materials that uses sound to solve the problem of communicating over a distance.

Breakouts

- (i) design a device using tools and materials that use sound to solve the problem of communicating over a distance

- (ii) build a device using tools and materials that use sound to solve the problem of communicating over a distance

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

Breakouts

- (i) describe the Sun as a star that provides light

- (ii) describe the Sun as a star that provides heat

- (iii) explain that the Moon reflects the Sun's light

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

Breakouts

- (i) observe objects in the sky using tools

- (ii) compare how objects in the sky are more visible with a tool than with an unaided eye

- (iii) compare how objects in the sky can appear different with a tool 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;

Breakouts

- (i) investigate how wind move[s] soil particles across the Earth's surface

- (ii) investigate how water move[s] soil particles across the Earth's surface

- (iii) investigate how wind move[s] rock particles across the Earth's surface

- (iv) investigate how water move[s] rock particles across the Earth's surface

- (v) describe how wind move[s] soil particles across the Earth's surface

- (vi) describe how water move[s] soil particles across the Earth's surface
 - (vii) describe how wind move[s] rock particles across the Earth's surface
 - (viii) describe how water move[s] rock particles across the Earth's surface
- (B) measure, record, and graph weather information, including temperature and precipitation; and
- Breakouts
- (i) measure weather information, including temperature
 - (ii) measure weather information, including precipitation
 - (iii) record weather information, including temperature
 - (iv) record weather information, including precipitation
 - (v) graph weather information, including temperature
 - (vi) graph weather information, including precipitation

- (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.

Breakouts

- (i) investigate different types of severe weather events
- (ii) 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

Breakouts

- (i) distinguish between natural and manmade resources
- (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.

Breakouts

- (i) describe how human impact can be limited by making choices to conserve materials
- (ii) describe how human impact can be limited by making choices to properly dispose of materials

- (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;

Breakouts

- (i) describe how the physical characteristics of environments, including the amount of rainfall, support plants within an ecosystem

- (ii) describe how the physical characteristics of environments, including the amount of rainfall, support animals within an ecosystem
- (B) create and describe food chains identifying producers and consumers to demonstrate how animals depend on other living things; and

Breakouts

- (i) create food chains identifying producers to demonstrate how animals depend on other living things
 - (ii) create food chains identifying consumers to demonstrate how animals depend on other living things
 - (iii) describe food chains identifying producers to demonstrate how animals depend on other living things
 - (iv) describe food chains identifying consumers to demonstrate how animals depend on other living things
- (C) explain and demonstrate how some plants depend on other living things, wind, or water for pollination and to move their seeds around.

Breakouts

- (i) explain how some plants depend on other living things, wind, or water for pollination
- (ii) explain how some plants depend on other living things, wind, or water to move their seeds around
- (iii) demonstrate how some plants depend on other living things, wind, or water for pollination
- (iv) demonstrate how some plants depend on other living things, wind, or water 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;

Breakouts

- (i) identify the roots of plants
- (ii) identify the stems of plants
- (iii) identify the leaves of plants
- (iv) identify the flowers of plants
- (v) identify the fruits of plants
- (vi) identify the seeds of plants
- (vii) compare how those structures [roots, stems, leaves, flowers, fruits, and seeds] 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;

Breakouts

- (i) record how the structures of animals help them find food
 - (ii) record how the structures of animals help them find water
 - (iii) record how the structures of animals help them find air
 - (iv) record how the behaviors of animals help them find food
 - (v) record how the behaviors of animals help them find water
 - (vi) record how the behaviors of animals help them find air
 - (vii) record how the structures of animals help them take in food
 - (viii) record how the structures of animals help them take in water
 - (ix) record how the structures of animals help them take in air
 - (x) record how the behaviors of animals help them take in food
 - (xi) record how the behaviors of animals help them take in water
 - (xii) record how the behaviors of animals help them take in air
 - (xiii) compare how the structures of animals help them find food
 - (xiv) compare how the structures of animals help them find water
 - (xv) compare how the structures of animals help them find air
 - (xvi) compare how the behaviors of animals help them find food
 - (xvii) compare how the behaviors of animals help them find water
 - (xviii) compare how the behaviors of animals help them find air
 - (xix) compare how the structures of animals help them take in food
 - (xx) compare how the structures of animals help them take in water
 - (xxi) compare how the structures of animals help them take in air
 - (xxii) compare how the behaviors of animals help them take in food
 - (xxiii) compare how the behaviors of animals help them take in water
 - (xxiv) compare how the behaviors of animals help them take in air
- (C) record and compare how being part of a group helps animals obtain food, defend themselves, and cope with changes; and

Breakouts

- (i) record how being part of a group helps animals obtain food
- (ii) record how being part of a group helps animals defend themselves
- (iii) record how being part of a group helps animals cope with changes
- (iv) compare how being part of a group helps animals obtain food

- (v) compare how being part of a group helps animals defend themselves
- (vi) compare how being part of a group helps animals cope with changes
- (CI) investigate and describe some of the unique life cycles of animals where young animals do not resemble their parents, including butterflies and frogs.

Breakouts

- (i) investigate some of the unique life cycles of animals where young animals do not resemble their parents, including butterflies
- (ii) investigate some of the unique life cycles of animals where young animals do not resemble their parents, including frogs
- (iii) describe some of the unique life cycles of animals where young animals do not resemble their parents, including butterflies
- (iv) describe some of the unique life cycles of animals where young animals do not resemble their parents, including frogs