

Science – 8th Grade

(1) In Grade 8, the study of science includes planning and conducting field and laboratory investigations using scientific methods, analyzing data, critical-thinking, scientific problem-solving, and using tools such as telescopes to collect and analyze information. Students also use computers and information technology tools to support scientific investigations.

(2) As students learn science skills, they identify the roles of both human activities and natural events in altering Earth systems. Students learn that stars and galaxies are part of the universe, identify light years as a way to describe distance, and learn about scientific theories of the origin of the universe. Cycles within Earth systems are studied as students learn about lunar cycles and the rock cycle.

(3) Students examine information on the periodic table to recognize that elements are grouped into families. In addition, students demonstrate that exothermic and endothermic chemical reactions indicate that energy is lost or gained during a chemical reaction. Interactions in matter and energy are explored in solar, weather, and ocean systems. Students identify the origin of waves and investigate their ability to travel through different media.

(4) Students predict possible outcomes that result from different genetic combinations and explore the extinction of some species.

(5) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(6) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(7) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

(8.1) Scientific processes. The student conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations; and

(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.

(8.2) Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology;

(B) collect data by observing and measuring;

(C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence;

(D) communicate valid conclusions; and

(E) construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.

(8.3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(B) draw inferences based on data related to promotional materials for products and services;

(C) represent the natural world using models and identify their limitations;

(D) evaluate the impact of research on scientific thought, society, and the environment; and

(E) connect Grade 8 science concepts with the history of science and contributions of scientists.

(8.4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:

(A) collect, record, and analyze information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, hot plates, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, calculators, field equipment, computers, computer probes, water test kits, and timing devices; and

(B) extrapolate from collected information to make predictions.

(8.5) Scientific processes. The student knows that relationships exist between science and technology. The student is expected to:
(A) identify a design problem and propose a solution;
(B) design and test a model to solve the problem; and
(C) evaluate the model and make recommendations for improving the model.
(8.6) Science concepts. The student knows that interdependence occurs among living systems. The student is expected to:
(A) describe interactions among systems in the human organism;
(B) identify feedback mechanisms that maintain equilibrium of systems such as body temperature, turgor pressure, and chemical reactions; and
(C) describe interactions within ecosystems.
(8.7) Science concepts. The student knows that there is a relationship between force and motion. The student is expected to:
(A) demonstrate how unbalanced forces cause changes in the speed or direction of an object's motion; and
(B) recognize that waves are generated and can travel through different media.
(8.8) Science concepts. The student knows that matter is composed of atoms. The student is expected to:
(A) describe the structure and parts of an atom; and
(B) identify the properties of an atom including mass and electrical charge.
(8.9) Science concepts. The student knows that substances have chemical and physical properties. The student is expected to:
(A) demonstrate that substances may react chemically to form new substances;
(B) interpret information on the periodic table to understand that physical properties are used to group elements;
(C) recognize the importance of formulas and equations to express what happens in a chemical reaction; and
(D) identify that physical and chemical properties influence the development and application of everyday materials such as cooking surfaces, insulation, adhesives, and plastics.
(8.10) Science concepts. The student knows that complex interactions occur between matter and energy. The student is expected to:
(A) illustrate interactions between matter and energy including specific heat;
(B) describe interactions among solar, weather, and ocean systems; and
(C) identify and demonstrate that loss or gain of heat energy occurs during exothermic and endothermic chemical reactions.
(8.11) Science concepts. The student knows that traits of species can change through generations and that the instructions for traits are contained in the genetic material of the organisms. The student is expected to:
(A) identify that change in environmental conditions can affect the survival of individuals and of species;
(B) distinguish between inherited traits and other characteristics that result from interactions with the environment; and
(C) make predictions about possible outcomes of various genetic combinations of inherited characteristics.
(8.12) Science concepts. The student knows that cycles exist in Earth systems. The student is expected to:
(A) analyze and predict the sequence of events in the lunar and rock cycles;
(B) relate the role of oceans to climatic changes; and
(C) predict the results of modifying the Earth's nitrogen, water, and carbon cycles.
(8.13) Science concepts. The student knows characteristics of the universe. The student is expected to:
(A) describe characteristics of the universe such as stars and galaxies;
(B) explain the use of light years to describe distances in the universe; and
(C) research and describe historical scientific theories of the origin of the universe.
(8.14) Science concepts. The student knows that natural events and human activities can alter Earth systems. The student is expected to:
(A) predict land features resulting from gradual changes such as mountain building, beach erosion, land subsidence, and continental drift;
(B) analyze how natural or human events may have contributed to the extinction of some species; and
(C) describe how human activities have modified soil, water, and air quality.