

Sixth Grade Science Curriculum Card

[Link to DESE 6-8 Science Grade Level Expectations](#)

updated November 2014

Quarter Taught	Strand 1: Properties and Principles of Matter and Energy
	Properties of and Changes in Matter
	ME1Aa - Identify matter is anything that has mass and volume
	ME1Ab - Describe and compare the volumes (the amount of space an object occupies) of objects or substances directly, using a graduated cylinder, and/or indirectly, using displacement methods
	ME1Ac - Describe and compare the masses (amounts of matter) of objects to the nearest gram using a balance
	ME1Ad - Classify the types of matter in an object into pure substances or mixtures using their specific physical properties
	ME1Ba - Describe the properties of each component in a mixture/solution and their distinguishing properties (e.g., salt water, oil and vinegar, pond water, Kool-Aid)
	ME1Bb - Describe appropriate ways to separate the components of different types of mixtures (sorting, evaporation, filtration, magnets, boiling, chromatography, screening)
	ME1Bc - Predict how various solids (soluble/insoluble) behave (e.g., dissolve, settle, float) when mixed with water
	ME1Ca - Describe evidence (e.g., diffusion of food coloring in water, light reflecting off of dust particles in the air, condensation of water vapor by increased pressure or decreased temperature) that supports the theory that matter is composed of small particles (atoms, molecules) that are in constant, random motion
	ME1Ga - Identify and classify changes in matter as chemical and/or physical
	ME1Gb - Identify chemical changes (i.e., rusting, oxidation, burning, decomposition by acids, decaying, baking) in common objects (i.e., rocks such as limestone, minerals, wood, steel wool, plants) as a result of interactions with sources of energy or other matter that form new substances with different characteristic properties
	ME1Gc - Identify physical changes in common objects (e.g., rocks, minerals, wood, water, steel wool, plants) and describe the processes which caused the change (e.g., weathering, erosion, cutting, dissolving)
	ME1Ia - Demonstrate and provide evidence that mass is conserved during a physical change
	Earth's Resources
	ME1Da - Describe the relationship between the change in the volume of water and changes in temperature as it relates to the properties of water (i.e., water expands and becomes less dense when frozen)
	Forms of Energy: Light
	ME2Aa - Identify sources of visible light (e.g., the Sun and other stars, flint, bulb, flames, lightning)
	ME2Ab - Describe evidence (i.e., cannot bend around walls) that visible light travels in a straight line, using the appropriate tools (i.e., pinhole viewer, ray box, laser pointer)

	ME2Ac - Compare the reflection of visible light by various surfaces (i.e., mirror, smooth and rough surfaces, shiny and dull surfaces, Moon)
	ME2Ad - Compare the refraction of visible light passing through different transparent and translucent materials (e.g., prisms, water, a lens)
	ME2Ae - Predict how different surfaces (transparent, translucent, opaque) and lenses (convex, concave) affect the behavior of visible light rays and the resulting image of an object
	ME2Af - Identify receivers of visible light energy (e.g., eye, photocell)
	ME2Ag - Recognize and explain that an object is “seen” only when the object emits or reflects light to the eye
	ME2Ah - Recognize and explain differences in wavelength and energy levels within that range of visible light that can be seen by the human eye are perceived as differences in color
	ME2Ca - Recognize and describe how energy from the Sun is transferred to Earth in a range of wavelengths and energy levels, including visible light, infrared radiation, and ultraviolet radiation
	Forms of Energy: Sound
	ME2Ai - Describe how sound energy is transferred by wave-like disturbances that spread away from the source through a medium
	ME2Aj - Describe how changes in energy cause changes in loudness and pitch of a sound
	ME2Ak - Predict how the properties of the medium (e.g., air, water, empty space, rock) affect the speed of different types of mechanical waves (i.e., earthquake, sound)
	Characteristics of Living Organisms
	ME2Cb - Recognize and apply the fact that energy from the Sun is the source of almost all energy used to produce the food for living organisms
	Strand 2: Properties and Principles Force and Motion
	Not assessed at this level
	Strand 3: Characteristics and Interactions of Living Organisms
	Characteristics of Living Organisms
	LO1Aa - Describe the common life processes necessary to the survival of organisms (i.e., growth, reproduction, life span, response to stimuli, energy use, exchange of gases, use of water, elimination of waste)
	LO1Ca - Recognize all organisms are composed of cells, the fundamental units of life, which carry on all life processes
	LO1Ea - Recognize most of the organisms on Earth are unicellular (e.g., bacteria, protists) and other organisms, including humans, are multicellular
	LO1Eb - Identify examples of unicellular (e.g., bacteria, some protists, fungi) and multicellular organisms (e.g., some fungi, plants, animals)
	LO2Aa - Compare and contrast the following plant and animal cell structures: cell membrane, nucleus, cell wall, chloroplast and cytoplasm

	LO2Ab - Recognize the chloroplast as the cell structure where food is produced in plants and some unicellular organisms (e.g., algae, some protists)
	LO2Ba - Describe how plants use energy from the sun to produce food and oxygen through the process of photosynthesis
	Strand 4: Changes in Ecosystems and Interactions of Organisms with Their Environment
	Ecosystems and Populations
	EC1Aa - Identify the biotic factors (populations of organisms) and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition) that make up an ecosystem
	EC1Ba - Identify populations within a community that are in competition with one another for resources
	EC1Bb - Identify the factors that affect the number and types of organisms an ecosystem can support (e.g., food availability, abiotic factors such as quantity of light and water, temperature and temperature range, soil composition, disease, competitions from other organisms, predation)
	EC1Bc - Predict the possible effects of changes in the number and types of organisms in an ecosystem on the populations of other organisms within that ecosystem
	EC1Da - Describe beneficial and harmful activities of organisms, including humans (e.g., deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources), and explain how these activities affect organisms within an ecosystem
	EC1Db - Predict the impact (beneficial or harmful) of a natural environmental change (e.g., forest fire, flood, volcanic eruption, avalanche) on the organisms in an ecosystem
	EC1Dc - Describe possible solutions to potentially harmful environmental changes within an ecosystem
	EC2Aa - Diagram and describe the transfer of energy in an aquatic food web and a land food web with reference to producers, consumers, decomposers, scavengers, and predator/prey relationships
	EC2Ab - Classify populations of unicellular and multicellular organisms as producers, consumers, and decomposers by the role they serve in the ecosystem
	EC3Aa - Identify fossils as evidence some types of organisms (e.g., dinosaurs, trilobites, mammoths, giant tree ferns) that once lived in the past, and have since become extinct, have similarities with and differences from organisms living today
	EC3Ca - Relate examples of adaptations (specialized structures or behaviors) within a species to its ability to survive in a specific environment (e.g., hollow bones/flight, hollow hair/insulation, dense root structure/compact soil, seeds/food, protection for plant embryo vs. spores, fins/movement in water)
	EC3Cb - Predict how certain adaptations, such as behavior, body structure, or coloration, may offer a survival advantage to an organism in a particular environment
	Strand 5: Processes and Interactions of the Earth's System (Geosphere, Atmosphere, and Hydrosphere)
	Earth's Resources
	ES1Aa - Describe the components of soil and other factors that influence soil texture, fertility, and resistance to erosion (e.g., plant roots and debris, bacteria, fungi, worms, rodents)

	ES1Ba - Identify and describe the properties of water that make it an essential component of the Earth system (e.g., its ability to act as a solvent, its ability to remain as a liquid at most Earth temperatures)
	ES3Aa - Relate the comparative amounts of freshwater and salt water on the Earth to the availability of water as a resource for living organisms and human activity
	ES3Ab - Describe the effect of human activities (e.g., landfills, use of fertilizers and herbicides, farming, septic systems) on the quality of water
	Internal Processes and External Events
	ES2Aa - Make inferences about the formation of sedimentary rocks from their physical properties (e.g., layering and the presence of fossils indicate sedimentation)
	ES2Ab - Explain how the formation of sedimentary rocks depends on weathering and erosion
	ES2Ac - Describe how weathering agents and erosional processes (i.e., force of water as it freezes or flows, expansion/contraction due to temperature, force of wind, force of plant roots, action of gravity, chemical decomposition) slowly cause surface changes that create and/or change landforms
	ES2Ad - Describe how the Earth's surface and surface materials can change abruptly through the activity of floods, rock/mudslides, or volcanoes
	ES2Ba - Identify events (earthquakes, volcanic eruptions) and the landforms created by them on the Earth's surface that occur at different plate boundaries
	ES2Da - Explain the types of fossils and the processes by which they are formed (i.e. replacement, mold and cast, preservation, trace)
	ES2Db - Use fossil evidence to make inferences about changes on Earth and in its environment (i.e., superposition of rock layers, similarities between fossils in different geographical locations, fossils of seashells indicate the area was once underwater)
	ES3Ac - Analyze the ways humans affect the erosion and deposition of soil and rock materials (e.g., clearing of land, planting vegetation, paving land, construction of new buildings, building or removal of dams) and propose possible solutions
	Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It
	Not assessed at this level
	Strand 7: Scientific Inquiry
	Embedded in All Units
	IN1Aa - Formulate testable questions and hypotheses
	IN1Ab - Identify and describe the importance of the independent variables, dependent variables, control of constants, and multiple trials to design of a valid experiment
	IN1Ac - Design and conduct a valid experiment
	IN1Ad - Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment
	IN1Ae - Recognize different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects, organisms, or events; some involve collecting

	specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; some involve making models)
	IN1Ba - Make qualitative observations using the five senses
	IN1Bb - Determine the appropriate tools and techniques to collect data
	IN1Bc - Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, computers, spring scales, balances, magnets, metric rulers, graduated cylinders, stopwatches)
	IN1Bd - Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, force (weight) to the nearest Newton, time to the nearest second
	IN1Be - Compare amounts/measurements
	IN1Bf - Judge whether measurements and computation of quantities are reasonable
	IN1Ca - Use quantitative and qualitative data as support for reasonable explanations (conclusions)
	IN1Cb - Use data as support for observed patterns and relationships, and to make predictions to be tested
	IN1Cc - Determine the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions)
	IN1Cd - Evaluate the reasonableness of an explanation (conclusion)
	IN1Ce - Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories)
	IN1Da - Communicate the procedures and results of investigations and explanations through: • oral presentations • drawings and maps • data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) • graphs (bar, single line, pictograph) • writings
	Strand 8: Impact of Science, Technology, and Human Activity
	Embedded in All Units
	ST1Aa - Explain how technological improvements, such as those developed for use in space exploration, the military, or medicine, have led to the invention of new products that may improve lives here on Earth (e.g., new materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics, lasers)
	ST1Ba - Identify the link between technological developments and the scientific discoveries made possible through their development (e.g., Hubble telescope and stellar evolution, composition and structure of the universe; the electron microscope and cell organelles; sonar and the composition of the Earth; manned and unmanned space missions and space exploration; Doppler radar and weather conditions; MRI and CAT-scans and brain activity)
	ST1Ca - Describe how technological solutions to problems (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics, Hubble telescope) can have both benefits and drawbacks (e.g., design constraints, unintended consequences, risks) (Assess Locally)

	ST2Aa - Describe how the contributions of scientists and inventors, representing different cultures, races, and gender, have contributed to science, technology and human activity (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, Albert Einstein, Mae Jemison, Edwin Hubble, Jonas Salk, Louis Pasteur, Jane Goodall, Tom Akers, John Wesley Powell, Rachel Carson) (Assess Locally)
	ST2Ba - Describe the difficulty science innovators experience as they attempt to break through accepted ideas (hypotheses, laws, theories) of their time to reach conclusions that may lead to changes in those ideas and serve to advance scientific understanding (e.g., Darwin, Copernicus, Newton)
	ST2Bb - Describe explanations have changed over time as a result of new evidence
	ST3Ba - Describe ways in which science and society influence one another (e.g., scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment; societal challenges often inspire questions for scientific research; social priorities often influence research priorities through the availability of funding for research)
	ST3Bb - Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS)