

## Texas Essential Knowledge and Skills for Science

Middle School Science (Beginning with School Year 2010-2011)	Boardworks Middle School Presentations
<b>Grade 6</b>	
<b>(5) Matter and energy. The student knows the differences between elements and compounds. The student is expected to:</b>	
(A) know that an element is a pure substance represented by chemical symbols;	What Are Atoms? Elements and Compounds Symbols for Elements
(B) recognize that a limited number of the many known elements comprise the largest portion of solid Earth, living matter, oceans, and the atmosphere;	What Are Atoms?
(C) differentiate between elements and compounds on the most basic level; and	Elements and Compounds
(D) identify the formation of a new substance by using the evidence of a possible chemical change such as production of a gas, change in temperature, production of a precipitate, or color change.	Types of Chemical Reactions
<b>(6) Matter and energy. The student knows matter has physical properties that can be used for classification. The student is expected to:</b>	
(A) compare metals, nonmetals, and metalloids using physical properties such as luster, conductivity, or malleability;	Metals and Nonmetals Metalloids
(B) <i>calculate density to identify an unknown substance; and</i>	–
(C) <i>test the physical properties of minerals, including hardness, color, luster, and streak.</i>	–
<b>7) Matter and energy. The student knows that some of Earth's energy resources are available on a nearly perpetual basis, while others can be renewed over a relatively short period of time. Some energy resources, once depleted, are essentially nonrenewable. The student is expected to:</b>	
(A) research and debate the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources; and	Fossil Fuels Nonrenewable Energy Resources Renewable Energy Energy Recourses for the Future
(B) design a logical plan to manage energy resources in the home, school, or community.	Reducing Our Energy Bills
<b>(8) Force, motion, and energy. The student knows force and motion are related to potential and kinetic energy. The student is expected to:</b>	
(A) compare and contrast potential and kinetic energy;	What is Energy?
(B) identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces;	Calculating Resultant Force Distance, Time and Speed What Are Forces?

(C) calculate average speed using distance and time measurements;	Average and Instantaneous Speed Graphing Speed
(D) measure and graph changes in motion; and	Graphing Speed
(E) <i>investigate how inclined planes and pulleys can be used to change the amount of force to move an object.</i>	–
<b>(9) Force, motion, and energy. The student knows that the Law of Conservation of Energy states that energy can neither be created nor destroyed, it just changes form. The student is expected to:</b>	
(A) investigate methods of thermal energy transfer, including conduction, convection, and radiation;	Conduction and Convection Radiation
(B) verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substances attain the same temperature such as an ice cube melting; and	Conduction and Convection Heat and Temperature
(C) demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy to light energy.	What is Energy? Energy Changes
<b>(10) Earth and space. The student understands the structure of Earth, the rock cycle, and plate tectonics. The student is expected to:</b>	
(A) build a model to illustrate the structural layers of Earth, including the inner core, outer core, mantle, crust, asthenosphere, and lithosphere;	The Structure of the Earth
(B) classify rocks as metamorphic, igneous, or sedimentary by the processes of their formation;	Different Types of Rocks Metamorphic Rocks Igneous Rocks Sedimentary Rocks
(C) identify the major tectonic plates, including Eurasian, African, Indo-Australian, Pacific, North American, and South American; and	What is Plate Tectonics?
(D) describe how plate tectonics causes major geological events such as ocean basins, earthquakes, volcanic eruptions, and mountain building.	What is Plate Tectonics? Plate Boundaries
<b>(11) Earth and space. The student understands the organization of our solar system and the relationships among the various bodies that comprise it. The student is expected to:</b>	
(A) describe the physical properties, locations, and movements of the Sun, planets, Galilean moons, meteors, asteroids, and comets;	The Solar System
(B) understand that gravity is the force that governs the motion of our solar system; and	Gravity
(C) describe the history and future of space exploration, including the types of equipment and transportation needed for space travel.	Exploring Space
<b>(12) Organisms and environments. The student knows all organisms are classified into Domains and Kingdoms. Organisms within these taxonomic groups share similar characteristics which allow them to interact with the living and nonliving parts of their ecosystem. The student is expected to:</b>	
(A) understand that all organisms are composed of one or more cells;	Animal and Plant Cells

(B) recognize that the presence of a nucleus determines whether a cell is prokaryotic or eukaryotic;	–
C) recognize that the broadest taxonomic classification of living organisms is divided into currently recognized Domains;	Classifying Organisms
(D) identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized Kingdoms;	Classifying Organisms
(E) describe biotic and abiotic parts of an ecosystem in which organisms interact; and	Habitats
(F) diagram the levels of organization within an ecosystem, including organism, population, community, and ecosystem.	Habitats
<b>Grade 7</b>	
<b>(5) Matter and energy. The student knows that interactions occur between matter and energy. The student is expected to:</b>	
(A) recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis;	What is Photosynthesis? What is Energy?
(B) demonstrate and explain the cycling of matter within living systems such as in the decay of biomass in a compost bin; and	Recycling Nutrients
(C) diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.	Food Chains Food Webs Pyramids of Number and Biomass
<b>(6) Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. The student is expected to:</b>	
(A) identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur;	What Are Atoms?
(B) distinguish between physical and chemical changes in matter in the digestive system; and	Chemical Digestion Digestion
(C) recognize how large molecules are broken down into smaller molecules such as carbohydrates can be broken down into sugars.	Chemical Digestion
<b>(7) Force, motion, and energy. The student knows that there is a relationship among force, motion, and energy. The student is expected to:</b>	
(A) contrast situations where work is done with different amounts of force to situations where no work is done such as moving a box with a ramp and without a ramp, or standing still;	–
(B) illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy in digestion; and	What is Energy? Digestion
(C) demonstrate and illustrate forces that affect motion in everyday life such as emergence of seedlings, turgor pressure, and geotropism.	–

<b>(8) Earth and space. The student knows that natural events and human activity can impact Earth systems. The student is expected to:</b>	
(A) predict and describe how different types of catastrophic events impact ecosystems such as floods, hurricanes, or tornadoes;	Weather Hazards Environmental Change Hurricanes Tornados Flooding
(B) analyze the effects of weathering, erosion, and deposition on the environment in ecoregions of Texas; and	Erosion, Transportation and Deposition Chemical Weathering Biological Weathering Physical Weathering
(C) <i>model the effects of human activity on groundwater and surface water in a watershed.</i>	–
<b>(9) Earth and space. The student knows components of our solar system. The student is expected to:</b>	
(A) analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere; and	The Solar System What is Photosynthesis? The Water Cycle The Atmosphere
(B) identify the accommodations, considering the characteristics of our solar system, that enabled manned space exploration.	Exploring Space
<b>(10) Organisms and environments. The student knows that there is a relationship between organisms and the environment. The student is expected to:</b>	
(A) observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms;	Habitats
(B) describe how biodiversity contributes to the sustainability of an ecosystem; and	Environmental Change
(C) <i>observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds.</i>	–
<b>(11) Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. The student is expected to:</b>	
(A) examine organisms or their structures such as insects or leaves and use dichotomous keys for identification;	Classifying Organisms
(B) explain variation within a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival such as migration, hibernation, or storage of food in a bulb;	Animal Behavior Types of Animal Behavior Human Behavior Adaptations

(C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch ( <i>Geospiza fortis</i> ) or domestic animals.	Evolution Selecting Characteristics
<b>(12) Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to:</b>	
(A) investigate and explain how internal structures of organisms have adaptations that allow specific functions such as gills in fish, hollow bones in birds, or xylem in plants;	Adaptations Leaves and Glucose
(B) identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems;	Digestion Cells to Organisms Human Sex Cells and Systems Respiration and the Circulatory System The Respiratory System The Nervous System The Endocrine System The Musculoskeletal System
(C) recognize levels of organization in plants and animals, including cells, tissues, organs, organ systems, and organisms;	Cells to Organisms
(D) differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole	Animal and Plant Cells
(E) compare the functions of a cell to the functions of organisms such as waste removal; and	Animal and Plant Cells Cells to Organisms
(F) recognize that according to cell theory all organisms are composed of cells and cells carry on similar functions such as extracting energy from food to sustain life.	Animal and Plant Cells
<b>(13) Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli. The student is expected to:</b>	
(A) investigate how organisms respond to external stimuli found in the environment such as phototropism and fight or flight; and	Animal Behavior Types of Animal Behavior Human Behavior
(B) describe and relate responses in organisms that may result from internal stimuli such as wilting in plants and fever or vomiting in animals that allow them to maintain balance.	Types of Animal Behavior
<b>(14) Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to:</b>	

(A) define heredity as the passage of genetic instructions from one generation to the next generation;	Causes of Variation Inheritance Genes and Alleles
(B) compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction; and	Types of Reproduction
(C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus.	Causes of Variation Inheritance Genes and Alleles
<b>Grade 8</b>	
<b>(5) Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to:</b>	
(A) describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud;	Atomic Structure
(B) identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity;	Atomic Structure
(C) interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements;	The Periodic Table
(D) recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts;	Symbols for Elements Formulae of Compounds
(E) investigate how evidence of chemical reactions indicate that new substances with different properties are formed; and	Types of Chemical Reactions
(F) recognize whether a chemical equation containing coefficients is balanced or not and how that relates to the law of conservation of mass.	Balancing Equations Conservation of Mass
<b>(6) Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:</b>	
(A) demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion;	What Are Forces?
(B) differentiate between speed, velocity, and acceleration; and	Distance, Speed and Time
(C) investigate and describe applications of Newton's law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.	What Are Forces? Calculating Resultant Forces Distance, Speed and Time
<b>(7) Earth and space. The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. The student is expected to:</b>	
(A) model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons;	Days, Years and Seasons
(B) demonstrate and predict the sequence of events in the lunar cycle; and	The Earth, Moon and Sun
(C) relate the position of the Moon and Sun to their effect on ocean tides.	-
<b>(8) Earth and space. The student knows characteristics of the universe. The student is expected to:</b>	

(A) describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification;	The Solar System
(B) recognize that the Sun is a medium-sized star near the edge of a disc-shaped galaxy of stars and that the Sun is many thousands of times closer to Earth than any other star;	The Solar System
(C) <i>explore how different wavelengths of the electromagnetic spectrum such as light and radio waves are used to gain information about distances and properties of components in the universe;</i>	–
(D) <i>model and describe how light years are used to measure distances and sizes in the universe;</i>	–
(E) <i>research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe.</i>	–
<b>(9) Earth and space. The student knows that natural events can impact Earth systems. The student is expected to:</b>	
(A) describe the historical development of evidence that supports plate tectonic theory;	What is Plate Tectonics?
(B) relate plate tectonics to the formation of crustal features; and	The Structure of the Earth What is Plate Tectonics? Plate Boundaries
(C) <i>interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering.</i>	–
<b>(10) Earth and space. The student knows that climatic interactions exist among Earth, ocean, and weather systems. The student is expected to:</b>	
(A) recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds and ocean currents;	Wind and Ocean Currents
(B) identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts; and	What is Weather?
(C) identify the role of the oceans in the formation of weather systems such as hurricanes.	Hurricanes
<b>(11) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:</b>	
(A) describe producer/consumer, predator/prey, and parasite/host relationships as they occur in food webs within marine, freshwater, and terrestrial ecosystems;	Feeding Types Food Chains Food Webs
(B) investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition;	Habitats Competition
(C) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations; and	Environmental Change Evolution
(D) <i>recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.</i>	–