TEKs for Universe Outreach Lecture

Kindergarten

(K.6) **Science concepts.** The student knows that systems have parts and are composed of organisms and objects. The student is expected to:

(A) sort organisms and objects into groups according to their parts and describe how the groups are formed, and
Refer *to slides 2, 9, and 22-26*

(D) identify parts that, when separated from the whole, may result in the part or the whole not working, such as cars without wheels and plants without roots.
Refer *to slides 2, 9, and 22-26*

(K.7) **Science concepts.** The student knows that many types of changes occur. The student is expected to:

(A) observe, describe, and record changes in size, mass, color, position, quantity, time, temperature, sound, and movement; and
Refer *to slides 14-26*

(B) identify that heat causes change, such as ice melting or the Sun warming the air and compare objects according to temperature
Refer *to slides12, 22, and 23*

First Grade

(1.6) **Science concepts.** The student knows that systems have parts and are composed of organisms and objects. The student is expected to:

(A) sort organisms and objects according to their parts and characteristics; and
Refer *to slides 2 and 9*

(D) identify parts that, when put together, can do things they cannot do by themselves, such as a working camera with film, a car moving with a motor, and an airplane flying with fuel.
Refer *to slides 2, 9, 10, 12, 22-26*

(1.7) **Science concepts.** The student knows that many types of change occur. The student is expected to:

(A) observe, measure, and record changes in size, mass, color, position, quantity, sound, and movement; and
Refer *to slides 10, 12, 14-26, and 30*

(B) identify and test ways that heat may cause change such as when ice melts.

Refer *to slides 12, 22, and 23*

Second Grade

(2.7) **Science concepts.** The student knows that many types of change occur. The student is expected to:

(A) observe, measure, record, analyze, predict, and illustrate changes in size, mass, temperature, color, position, quantity, sound, and movement; and
Refer *to slides 9-12,14-26, and 30*

(B) identify, predict, and test uses of heat to cause change such as melting and evaporation.
Refer *to slides12, 22, and 23*

Third Grade

(3.6) **Science concepts.** The student knows that forces cause change. The student is expected to:

(A) measure and record changes in the position and direction of the motion of an object to which a force such as a push or pull has been applied.
Refer *to slides 2, 9, 15-17, 19-23, and 30*

(3.7) **Science concepts.** The student knows that matter has physical properties. The student is expected to:

(B) identify matter as liquids, solids, and gases.
Refer *to slides 9, 12, and 24-26*

(3.11) **Science concepts.** The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:

(C) identify the planets in our solar system and their position in relation to the Sun.

Fourth grade

(4.5) **Science concepts.** The student knows that complex systems may not work if some parts are removed. The student is expected to:

(B) predict and draw conclusions about what happens when part of a system is removed.
Refer *to slides 2, 9, 10, and 22-26*

(4.6) **Science concepts.** The student knows that change can create recognizable patterns. The student is expected to:

(A) identify patterns of change such as in weather, metamorphosis, and objects in the sky.
Refer *to slides 3-6, 12, and 17-21*

(4.7) **Science concepts.** The student knows that matter has physical properties. The student is expected to:

(A) observe and record changes in the states of matter caused by the addition or reduction of heat.
Refer *to slides 12, 22, and 23*

Fifth Grade

(5.5) **Science concepts.** The student knows that a system is a collection of cycles, structures, and processes that interact. The student is expected to:

(A) describe some cycles, structures, and processes that are found in a simple system; and
Refer *to slides 9-12*

(B) describe some interactions that occur in a simple system.
Refer *to slides 9, 10, 12, and 22-26*

(5.8) **Science concepts.** The student knows that energy occurs in many forms. The student is expected to:

(A) differentiate among forms of energy including light, heat, electrical, and solar energy; and
Refer *to slides 2, 10, 12, 22, and 23*

(B) identify and demonstrate everyday examples of how light is reflected, such as from tinted windows, and refracted, such as in cameras, telescopes, and eyeglasses.
Refer *to slides 4, 8-12, 14, and 31*

(5.11) **Science concepts.** The student knows that certain past events affect present and future events. The student is expected to:

(B) draw conclusions about "what happened before" using data such as from tree-growth rings and sedimentary rock sequences; and
Refer *to slides 2, 8, 15-26, and 31*

(C) identify past events that led to the formation of the Earth's renewable, non-renewable, and inexhaustible resources.
Refer *to slides 2,12, and 22-26*

(5.12) **Science concepts.** The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:

(D) identify gravity as the force that keeps planets in orbit around the Sun and the moon in orbit around the Earth.

Sixth Grade

(6.5) **Scientific concepts.** The student knows that systems may combine with other systems to form a larger system. The student is expected to:

(A) identify and describe a system that results from the combination of two or more systems such as in the solar system; and

Refer *to slide 13*

(B) describe how the properties of a system are different from the properties of its parts.

Refer *to slides 9-12*

(6.6) **Science concepts.** The student knows that there is a relationship between force and motion. The student is expected to:

(A) identify and describe the changes in position, direction of motion, and speed of an object when acted upon by force; and

Refer *to slides 13, 15-21, and 30*

(B) demonstrate that changes in motion can be measured and graphically represented.

Refer *to slides 8, 17, and 30*

(6.7) **Science concepts.** The student knows that substances have physical and chemical properties. The student is expected to:

(A) demonstrate that new substances can be made when two or more substances are chemically combined and compare the properties of the new substances to the original substances; and

Refer *to 9, and 22-26*

(B) classify substances by their physical and chemical properties.

(6.8) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to:

(A) define matter and energy.

Refer *to slides 2, 9, and 22-26*

(6.13) **Science concepts.** The student knows components of our solar system. The student is expected to:

(A) identify characteristics of objects in our solar system including the Sun, planets, meteorites, comets, asteroids, and moons.

Seventh Grade

(7.5) **Science concepts.** The student knows that an equilibrium of a system may change. The student is expected to:

(A) describe how systems may reach an equilibrium such as when a volcano erupts.

Refer *to slides 2, 5, 9, and 22-26*

(7.6) **Science concepts.** The student knows that there is a relationship between force and motion. The student is expected to:

(B) demonstrate that an object will remain at rest or move at a constant speed and in a straight line if it is not being subjected to an unbalanced force.

Refer *to slides 9, 13, 15, 17-21, and 30*

(7.7) **Science concepts.** The student knows that substances have physical and chemical properties. The student is expected to:

(C) recognize that compounds are composed of elements.

(7.8) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to:

(A) illustrate examples of potential and kinetic energy in everyday life such as objects at rest, movement of geologic faults, and falling water.

Refer *to slides 2, 17-26, and 30*

Eighth Grade

(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.

(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

Refer *to slide 9*

(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.

Refer *to slides 2, 9, and 22- 26*

(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; and

Refer to slides 22 and 23

(C) identify and demonstrate that loss or gain of heat energy occurs during exothermic and endothermic chemical reactions.

(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;

Refer *to slides 3-13, 17-26, 30, and 31*

(B) explain the use of light years to describe distances in the universe; and

Refer *to slides 8, 17, and 21-23*

(C) research and describe historical scientific theories of the origin of the universe.

Refer *to slides 2, 8, 15, 17-26, 30, and 31*

Astronomy

(7.8) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to:

(A) illustrate examples of potential and kinetic energy in everyday life such as objects at rest, movement of geologic faults, and falling water.

(5) **Science concepts.** The student knows the scientific theories of the evolution of the universe. The student is expected to:

(A) research and analyze scientific empirical data on the estimated age of the universe;
Refer *to slides 5, 6, 8, 21, 22, and 31*

(B) research and describe the historical development of the Big Bang Theory; and
Refer *to slides 2, 5, 6, 8, 13, 15-26, 30, and 31*

(C) interpret data concerning the formation of galaxies and our solar system.
Refer *to slides 2, 9, and 17-23*

(6) **Science concepts.** The student knows the characteristics and the life cycle of stars. The student is expected to:

(A) describe nuclear reactions in stars; and

(B) identify the characteristics of stars such as temperature, age, relative size, composition, and radial velocity using spectral analysis.
Refer *to slides 8-26, 30, and 31*

(7) **Science concepts.** The student knows how mathematical models, computer simulations, and exploration can be used to study the universe. The student is expected to:

(A) demonstrate the use of units of measurement in astronomy such as light year and Astronomical Units;
Refer *to slides 8, 17, and 21-23*

(B) research and describe the historical development of the laws of universal gravitation and planetary motion and the theory of special relativity, and

Chemistry

(4) **Science concepts.** The student knows the characteristics of matter. The student is expected to:

(A) differentiate between physical and chemical properties of matter.

(5) **Science concepts.** The student knows that energy transformations occur during physical or chemical changes in matter. The student is expected to:

(A) identify changes in matter, determine the nature of the change, and examine the forms of energy involved;

Refer *to slides 2, 9-12, and 22-26*

(B) identify and measure energy transformations and exchanges involved in chemical reactions; and

(C) measure the effects of the gain or loss of heat energy on the properties of solids, liquids, and gases.

Refer *to slides 12, and 22-26*

(7) **Science concepts.** The student knows the variables that influence the behavior of gases. The student is expected to:

(A) describe interrelationships among temperature, particle number, pressure, and volume of gases contained within a closed system; and

Refer *to slides 12, and 22-26*

(9) **Science concepts.** The student knows the processes, effects, and significance of nuclear fission and nuclear fusion. The student is expected to:

(A) compare fission and fusion reactions in terms of the masses of the reactants and products and the amount of energy released in the nuclear reactions.

Refer *to slides 22 and 23*

(15) **Science concepts.** The student knows factors involved in chemical reactions. The student is expected to:

(A) verify the law of conservation of energy by evaluating the energy exchange that occurs as a consequence of a chemical reaction.

Refer *to slides 2, 15, and 17-26*

Physics

(4) **Science concepts.** The student knows the laws governing motion. The student is expected to:

(D) identify and describe motion relative to different frames of Reference.

Refer *to slides 14-21 and 30*

(5) **Science concepts.** The student knows that changes occur within a physical system and recognizes that energy and momentum are conserved. The student is expected to:

(A) interpret evidence for the work-energy theorem; and

(A) observe and describe examples of kinetic and potential energy and their transformations.

(6) **Science concepts.** The student knows forces in nature. The student is expected to:

(B) research and describe the historical development of the concepts of gravitational, electrical, and magnetic force.

(9) **Science concepts.** The student knows simple examples of quantum physics. The student is expected to:

(A) describe the photoelectric effect; and

Refer *to slide 14*

Physics and Chemistry

(6) **Science concepts.** The student knows the impact of energy transformations in everyday life. The student is expected to:

(A) describe the law of conservation of energy.

(7) **Science concepts.** The student knows relationships exist between properties of matter and its components. The student is expected to:

(C) identify constituents of various materials or objects such as metal salts, light sources, fireworks displays, and stars using spectral analysis techniques.

Refer *to slide 4, and 8-12*

(8) **Science concepts.** The student knows that changes in matter affect everyday life. The student is expected to:

(A) distinguish between physical and chemical changes in matter such as oxidation, digestion, changes in states, and stages in the rock cycle;

Refer *to slides 2, 9-12, and 22-26*

(C) analyze energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks to classify them as endergonic or exergonic reactions.