

Science and Technology

3.4 Physical Science, Chemistry and Physics

K	1	2	3	4	5
<p>A. Recognize basic concepts about the structure and properties of matter. (E)</p> <ul style="list-style-type: none"> Describe properties of matter (e.g., hardness, reactions to simple chemical tests). Know different material characteristics (e.g., texture, state of matter, solubility). 	<p>A. Recognize basic concepts about the structure and properties of matter. (I)</p> <ul style="list-style-type: none"> Describe properties of matter (e.g., hardness, reactions to simple chemical tests). Know that combining two or more substances can make new materials with different properties. Know different material characteristics (e.g., texture, state of matter, solubility). 		<p>A. Recognize basic concepts about the structure and properties of matter. (E)</p> <ul style="list-style-type: none"> Describe properties of matter (e.g., hardness, reactions to simple chemical tests). Know that combining two or more substances can make new materials with different properties. Know different material characteristics (e.g., texture, state of matter, solubility). 		<p>A. Describe concepts about the structure and properties of matter. (I)</p> <ul style="list-style-type: none"> Identify elements as basic building blocks of matter that cannot be broken down chemically. Distinguish compounds from mixtures. Describe and conduct experiments that identify chemical and physical properties. Describe reactants and products of simple chemical reactions.
		<p>B. Know basic energy types, sources and conversions. (C)</p> <ul style="list-style-type: none"> Identify energy forms and examples (e.g., sunlight, heat, stored, motion). Know the concept of the flow through an object or system. Describe static electricity in terms of attraction, repulsion and sparks. 	<p>B. Know basic energy types, sources and conversions. (E)</p> <ul style="list-style-type: none"> Identify energy forms and examples (e.g., sunlight, heat, stored, motion). Know the concept of the flow through an object or system. Describe static electricity in terms of attraction, repulsion and 	<p>B. Know basic energy types, sources and conversions. (E)</p> <ul style="list-style-type: none"> Identify energy forms and examples (e.g., sunlight, heat, stored, motion). Know the concept of the flow through an object or system. Describe static electricity in terms of attraction, repulsion and 	<p>B. Relate energy sources and transfers to heat and temperature. (I)</p> <ul style="list-style-type: none"> Identify and describe sound changes in moving objects. Know that the sun is a major source of energy that emits wavelengths of visible light, infrared and ultraviolet radiation. Explain the conversion of one form of energy to another by applying knowledge of each form of

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		<ul style="list-style-type: none"> Apply knowledge of the basic electrical circuits to design and construct simple direct current circuits. Classify materials as conductors and nonconductors. Know and demonstrate the basic properties of heat by producing it in a variety of ways. Know the characteristics of light (e.g., reflection, refraction, absorption) and use them to produce heat, color or a virtual image. 	<p style="text-align: center;">sparks.</p> <ul style="list-style-type: none"> Apply knowledge of the basic electrical circuits to design and construct simple direct current circuits. Classify materials as conductors and nonconductors. Know and demonstrate the basic properties of heat by producing it in a variety of ways. Know the characteristics of light (e.g., reflection, refraction, absorption) and use them to produce heat, color or a virtual image. 	<p style="text-align: center;">sparks.</p> <ul style="list-style-type: none"> Apply knowledge of the basic electrical circuits to design and construct simple direct current circuits. Classify materials as conductors and nonconductors. Know and demonstrate the basic properties of heat by producing it in a variety of ways. Know the characteristics of light (e.g., reflection, refraction, absorption) and use them to produce heat, color or a virtual image. 	<p style="text-align: center;">energy.</p> <ul style="list-style-type: none"> Explain the parts and functions in an electrical circuit.
<p>C. Observe and describe different types of force and motion. (E)</p> <ul style="list-style-type: none"> Identify characteristics of sound (pitch, loudness and echoes). Describe various types of motion Compare the relative movement of objects and describe types of 	<p>C. Observe and describe different types of force and motion. (C)</p> <ul style="list-style-type: none"> Identify characteristics of sound (pitch, loudness and echoes). Recognize forces that attract or repel other objects and demonstrate them. Describe various types of motion 	<p>C. Observe and describe different types of force and motion. (E)</p> <ul style="list-style-type: none"> Identify characteristics of sound (pitch, loudness and echoes). Recognize forces that attract or repel other objects and demonstrate them. Describe various types of motion 	<p>C. Observe and describe different types of force and motion. (I)</p> <ul style="list-style-type: none"> Identify characteristics of sound (pitch, loudness and echoes). Recognize forces that attract or repel other objects and demonstrate them. Describe various 	<p>C. Observe and describe different types of force and motion. (E)</p> <ul style="list-style-type: none"> Identify characteristics of sound (pitch, loudness and echoes). Recognize forces that attract or repel other objects and demonstrate them. Describe various types of motion 	<p>C. Identify and explain the principles of force and motion. (I)</p> <ul style="list-style-type: none"> Describe the motion of an object based on its position, direction and speed. Classify fluid power systems according to fluid used or mode of power transmission (e.g., air, oil). Explain various motions using

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<p>motion that are evident.</p> <ul style="list-style-type: none"> Describe the position of an object by locating it relative to another object or the background (e.g., geographic direction, left, up). 	<ul style="list-style-type: none"> Compare the relative movement of objects and describe types of motion that are evident. Describe the position of an object by locating it relative to another object or the background (e.g., geographic direction, left, up). 	<ul style="list-style-type: none"> Compare the relative movement of objects and describe types of motion that are evident. Describe the position of an object by locating it relative to another object or the background (e.g., geographic direction, left, up). 	<p>types of motion</p> <ul style="list-style-type: none"> Compare the relative movement of objects and describe types of motion that are evident. Describe the position of an object by locating it relative to another object or the background (e.g., geographic direction, left, up). 	<ul style="list-style-type: none"> Compare the relative movement of objects and describe types of motion that are evident. Describe the position of an object by locating it relative to another object or the background (e.g., geographic direction, left, up). 	<p>models.</p> <ul style="list-style-type: none"> Explain how convex and concave mirrors and lens change light images. Explain how sound and light travel in waves of differing speeds, sizes and frequencies.
	<p>D. Describe the composition and structure of the universe and the earth's place in it. (E)</p> <ul style="list-style-type: none"> Recognize earth's place in the solar system. Explain and illustrate the causes of seasonal changes. Identify planets in our solar system and their general characteristics. Describe the solar system motions and use them to explain time (e.g., days, seasons), major lunar phases and eclipses. 	<p>D. Describe the composition and structure of the universe and the earth's place in it. (E)</p> <ul style="list-style-type: none"> Recognize earth's place in the solar system. Explain and illustrate the causes of seasonal changes. Identify planets in our solar system and their general characteristics. Describe the solar system motions and use them to explain time (e.g., days, seasons), major lunar phases and eclipses. 	<p>D. Describe the composition and structure of the universe and the earth's place in it. (I)</p> <ul style="list-style-type: none"> Recognize earth's place in the solar system. Explain and illustrate the causes of seasonal changes. Identify planets in our solar system and their general characteristics. Describe the solar system motions and use them to explain time (e.g., days, seasons), major lunar phases and eclipses. 	<p>D. Describe the composition and structure of the universe and the earth's place in it. (E)</p> <ul style="list-style-type: none"> Recognize earth's place in the solar system. Explain and illustrate the causes of seasonal changes. Identify planets in our solar system and their general characteristics. Describe the solar system motions and use them to explain time (e.g., days, seasons), major lunar phases and eclipses. 	<p>D. Describe essential ideas about the composition and structure of the universe and the earth's place in it. (I)</p> <ul style="list-style-type: none"> Compare various planets' characteristics. Describe basic star types and identify the sun as a star type. Describe and differentiate comets, asteroids and meteors. Identify gravity as the force that keeps planets in orbit around the sun and governs the rest of the movement of the solar system and the universe. Illustrate how the position of stars and

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					constellations change in relation to the Earth during an evening and from month to month. <ul style="list-style-type: none"> • Identify equipment and instruments that explore the universe. • Identify the accomplishments and contributions provided by selected past and present scientists in the field of astronomy. • Identify and articulate space program efforts to investigate possibilities of living in space and on other planets.

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A. Describe concepts about the structure and properties of matter. (E) <ul style="list-style-type: none"> • Identify elements as basic building blocks of matter that cannot be broken down chemically. • Distinguish compounds from mixtures. • Describe and conduct experiments that identify chemical and physical properties. • Describe reactants and products of simple chemical reactions. 		A. Explain concepts about the structure and properties of matter. (E) <ul style="list-style-type: none"> • Know that atoms are composed of even smaller sub-atomic structures whose properties are measurable. • Explain the repeating pattern of chemical properties by using the repeating patterns of atomic structure within the periodic table. • Predict the behavior of gases through the use of Boyle's, Charles' or the ideal gas law, in everyday situations. • Describe phases of matter according to the Kinetic Molecular Theory.

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		<ul style="list-style-type: none"> • Explain the formation of compounds and their resulting properties using bonding theories (ionic and covalent). • Recognize formulas for simple inorganic compounds. • Describe various types of chemical reactions by applying the laws of conservation of mass and energy. • Apply knowledge of mixtures to appropriate separation techniques. • Understand that carbon can form several types of compounds.
<p>B. Relate energy sources and transfers to heat and temperature. (E)</p> <ul style="list-style-type: none"> • Identify and describe sound changes in moving objects. • Know that the sun is a major source of energy that emits wavelengths of visible light, infrared and ultraviolet radiation. • Explain the conversion of one form of energy to another by applying knowledge of each form of energy. • Explain the parts and functions in an electrical circuit. 		<p>B. Analyze energy sources and transfers of heat. (E)</p> <ul style="list-style-type: none"> • Determine the efficiency of chemical systems by applying mathematical formulas. • Use knowledge of chemical reactions to generate an electrical current. • Evaluate energy changes in chemical reactions. • Use knowledge of conservation of energy and momentum to explain common phenomena (e.g., refrigeration system, rocket propulsion). • Explain resistance, current and electro-motive force (Ohm's Law).
<p>C. Identify and explain the principles of force and motion. (E)</p> <ul style="list-style-type: none"> • Describe the motion of an object based on its position, direction and speed. • Classify fluid power systems according to fluid used or mode of power transmission (e.g., air, oil). • Explain various motions using models. • Explain how convex and concave mirrors and lens change light images. • Explain how sound and light travel in waves of differing speeds, sizes and frequencies. 		<p>C. Distinguish among the principles of force and motion. (E)</p> <ul style="list-style-type: none"> • Identify the relationship of electricity and magnetism as two aspects of a single electromagnetic force. • Identify elements of simple machines in compound machines. • Explain fluid power systems through the design and construction of appropriate models. • Describe sound effects (e.g., Doppler effect, amplitude, frequency, reflection, refraction, absorption, sonar, seismic). • Describe light effects (e.g., Doppler effect, dispersion, absorption, emission spectra, polarization, interference). • Describe and measure the motion of sound,

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		light and other objects. <ul style="list-style-type: none"> • Know Newton's laws of motion (including inertia, action and reaction) and gravity and apply them to solve problems related to forces and mass. • Determine the efficiency of mechanical systems by applying mathematical formulas.
D. Describe essential ideas about the composition and structure of the universe and the earth's place in it. (E) <ul style="list-style-type: none"> • Compare various planets' characteristics. • Describe basic star types and identify the sun as a star type. • Describe and differentiate comets, asteroids and meteors. • Identify gravity as the force that keeps planets in orbit around the sun and governs the rest of the movement of the solar system and the universe. • Illustrate how the position of stars and constellations change in relation to the Earth during an evening and from month to month. • Identify equipment and instruments that explore the universe. • Identify the accomplishments and contributions provided by selected past and present scientists in the field of astronomy. • Identify and articulate space program efforts to investigate possibilities of living in space and on other planets. 		D. Explain essential ideas about the composition and structure of the universe. (E) <ul style="list-style-type: none"> • Compare the basic structures of the universe (e.g., galaxy types, nova, black holes, neutron stars). • Describe the structure and life cycle of star, using the Hertzsprung-Russell diagram. • Describe the nuclear processes involved in energy production in a star. • Explain the "red-shift" and Hubble's use of it to determine stellar distance and movement. • Compare absolute versus apparent star magnitude and their relation to stellar distance. • Explain the impact of the Copernican and Newtonian thinking on man's view of the universe. • Identify and analyze the finding of several space instruments in regards to the extent and composition of the solar system and universe.

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