KENOSHA UNIFIED SCHOOL DISTRICT NO. 1
CURRICULUM AND INSTRUCTIONAL SERVICES

STANDARDS AND BENCHMARKS
SCIENCE

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
STANDARD A: SCIENCE CONNECTIONS—STUDENTS WILL UNDERSTAND AND DESCRIBE THE UNIFYING CONCEPTS AND PROCESSES AMONG SCIENCE TOPICS WHICH LEAD TO CONNECTIONS BETWEEN PHYSICAL SCIENCE, EARTH/SPACE SCIENCE, AND LIFE SCIENCE.					
A-1: Systems	In something that consists of many parts, the parts usually influence one another. Something may not work as well (or at all) if a part of it is missing, broken, worn out, mismatched, or misconnected. A-1.5	***A system can include processes as well as things.*** ***Any system is usually connected to other systems, both internally and externally.*** ***A-1.6***	***A system can include processes as well as things.*** ***Any system is usually connected to other systems, both internally and externally.*** ***A-1.7***	***A system can include processes as well as things.*** ***Any system is usually connected to other systems, both internally and externally.*** A-1.8	A system has properties that are different from those of its parts. The successful operation of a system involves feedback. It may not be possible to predict accurately the result of changing some part of a system. A-1.9
A-2: Models	***Seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.*** ***Geometric figures, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such***	***Models are often used to think about processes that are not easily observed.*** Different models can be used to represent the same thing.	***Models are often used to think about processes that are not easily observed.*** ***Different models can be used to represent the same thing.***	***Models are often used to think about processes that are not easily observed.*** ***Different models can be used to represent the same thing.***	***Models are often used to think about processes that are not easily observed.*** ***The usefulness of a model can be tested by comparing its predictions to actual observations in the real world.***

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	representations can never be exact in every detail. ***A-2.5***	***A-2.6***	***A-2.7***	***A-2.8***	***A-2.9***
A-3: Change and Constancy	***Some features of things may stay the same even when other features change.*** ***Things change in steady, repetitive, or irregular ways—or some-times in more than one way at the same time. Often the best way to tell which kinds of change are happening is to make a table or graph of measurements.*** ***A-3.5***	***Physical and biological systems tend to change until they become stable and then remain that way unless their surroundings change.*** ***A-3.6***	***Physical and biological systems tend to change until they become stable and then remain that way unless their surroundings change.*** Many systems contain feedback mechanisms that serve to keep changes within specified limits. ***Equations can be used to summarize how the quantity of some-thing changes over time or in response to other changes.*** ***A-3.7***	***Physical and biological systems tend to change until they become stable and then remain that way unless their surroundings change.*** ***Many systems contain feedback mechanisms that serve to keep changes within specified limits.*** ***Equations can be used to summarize how the quantity of some-thing changes over time or in response to other changes.*** ***A-3.8***	A system in equilibrium may return to the same state of equilibrium if the disturbances it experiences are small. Large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium. The concept of the conservation of matter and energy is involved in all fields of science. Graphs and equations are useful ways for depicting and analyzing patterns of change. In evolutionary change, the present arises gradually from the materials and forms of the past. The precise behavior of most systems is unpredictable. A-3.9

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A-4: Scale	Almost anything has limits on how big or small it can be. Finding out what the biggest and the smallest possible values of something are often as revealing as knowing what the usual value is. A-4.5	As the complexity of any system increases, gaining an understanding of it depends increasingly on summaries, such as averages and ranges, and on descriptions of typical examples of that system. A-4.6	***As the complexity of any system increases, gaining an understanding of it depends increasingly on summaries, such as averages and ranges, and on descriptions of typical examples of that system.*** A-4.7	***As the complexity of any system increases, gaining an understanding of it depends increasingly on summaries, such as averages and ranges, and on descriptions of typical examples of that system.*** A-4.8	Representing large numbers in terms of powers of ten makes it easier to think about them and to compare things that are greatly different. Large changes in scale typically change the way that things work in physical or biological systems. As the number of parts of a system grows in size, the number of possible internal interactions increases much more rapidly. A-4.9
A-5: Connections	The study of earth and space science, life and environmental science, and physical science are interconnected by unifying themes.	The study of earth and space science, life and environmental science, and physical science are interconnected by unifying themes.	The study of earth and space science, life and environmental science, and physical science are interconnected by unifying themes.	The study of earth and space science, life and environmental science, and physical science are interconnected by unifying themes.	Any event, issue, or problem in the natural or de-signed world can be associated with the general domains of science and the unifying themes of science. Many scientific investigations require the contributions of individuals from different disciplines, including engineering.

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	A-5.5	A-5.6	A-5.7	A-5.8	A-5.9
STANDARD B: NATURE OF SCIENCE—STUDENTS WILL UNDERSTAND THAT THE STUDY OF SCIENCE IS ONGOING, AND THEORIES AND CONCEPTS IN SCIENCE CHANGE OVER TIME AS NEW EVIDENCE IS FOUND. SCIENTIFIC EXPLANATIONS MUST ADHERE TO CRITERIA SUCH AS: A PROPOSED EXPLANATION MUST BE LOGICALLY CONSISTENT, IT MUST ABIDE BY THE RULES OF EVIDENCE, IT MUST BE OPEN TO QUESTIONS AND POSSIBLE MODIFICATION, AND IT MUST BE BASED ON HISTORICAL AND CURRENT SCIENTIFIC KNOWLEDGE.					
B-1: Science is a Human Endeavor, and There are Many Commonly Known Careers in Science.	***Men and women from many cultures have contributed to science and technology throughout history, but much more remains to be understood.*** ***Science will never be finished.*** ***Many people choose science as a career and devote their lives to studying it.*** In science it is helpful to work with a team and share findings with others. B-1.5	***Women and men of various social and ethnic backgrounds engage in the activities of science, engineering, and related fields.*** ***Many people choose science as a career and de-vote their lives to studying it.*** Some scientists work alone and some in teams, but all communicate extensively with others. B-1.6	***Women and men of various social and ethnic backgrounds engage in the activities of science, engineering, and related fields.*** ***Many people choose science as a career and de-vote their lives to studying it.*** Some scientists work alone and some in teams, but all communicate extensively with others. B-1.7	***Women and men of various social and ethnic backgrounds engage in the activities of science, engineering, and related fields.*** ***Many people choose science as a career and de-vote their lives to studying it.*** Some scientists work alone and some in teams, but all communicate extensively with others. B-1.8	Scientists in different disciplines ask different questions, use different methods of investigation, and accept different types of evidence to support their explanations. ***Many people choose science as a career and devote their lives to studying it.*** Scientists value peer review, truthful reporting about the methods and outcomes of investigations, and making public the results of work. B-1.9
B-2: Nature of Scientific Process and Knowledge	***Science is based on questions.*** ***The job of a scientist is to construct ideas and explanations.*** ***Scientific knowledge may change when new***	***Scientists formulate and test their expla-nations of nature using observations and experiments.*** ***It is part of scientific inquiry to evaluate the results of scientific***	***Scientists formulate and test their expla-nations of nature using observations, experiment, and theoretical and mathematical models.*** ***It is part of scientific***	***Scientists formulate and test their expla-nations of nature using observations, experiments, and theoretical and mathematical models.*** ***It is part of scientific***	***Scientists strive for the best possible explanations about the natural world.*** ***Scientific explanations must be consistent with experimental and observational evidence.***

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	things are learned. ***Science experiments will usually work the same way when repeated under similar conditions.*** ***Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigations.*** ***Scientists use different kinds of investigations depending on the questions they are trying to answer.*** B-2.5	***investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists.*** It is common for scientists to differ with one another about the interpretation of the evidence or theory being considered. B-2.6	***inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists.*** It is common for scientists to differ with one another about the interpretation of the evidence or theory being considered. B-2.7	***inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists.*** It is common for scientists to differ with one another about the interpretation of the evidence or theory being considered. B-2.8	***Scientific knowledge is subject to change as new evidence becomes available.*** Mathematical tools and models guide and improve the posing of questions, gathering data, constructing explanations, and communicating results. B-2.9
B-3: History of Science		***Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.***	***Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.***	***Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.***	***In history, diverse cultures have contributed scientific knowledge and technologic inventions.*** Changes in science occur as modifications in existing knowledge. The historical perspective of scientific explanations demonstrates how

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					scientific knowledge changes by evolving over time.
		B-3.6	B-3.7	B-3.8	B-3.9
STANDARD C: SCIENCE INQUIRY—STUDENTS WILL INVESTIGATE QUESTIONS USING SCIENTIFIC METHODS AND TOOLS, REVISE THEIR PERSONAL UNDERSTANDING TO ACCOMMODATE KNOWLEDGE, AND COMMUNICATE THOSE UNDERSTANDINGS TO OTHERS.					
C-1: Ask Questions about Objects, Organ-isms, and Events in the Everyday World.	***Identify, formulate and clarify questions that can be answered through scientific investigations using appropriate equipment and resources.***	***Identify, formulate, and clarify questions that can be answered through scientific investigations using appropriate equipment and resources.***	***Formulate a testable hypothesis suggested by current social issues, scientific literature, or observations of phenomena; and demonstrate its connections to scientific concepts.***	***Formulate a testable hypothesis suggested by current social issues, scientific literature, or observations of phenomena and demonstrate its connections to scientific concepts.***	***Formulate a testable hypothesis suggested by current social issues, scientific literature, or observations of phenomena and demonstrate its connections to scientific concepts.***
	C-1.5	***C-1.6***	***C-1.7***	***C-1.8***	***C-1.9***
C-2: Make Connections to Prior Knowledge.	***Use prior knowledge and investigations to make predictions and help answer the question being investigated.***	***Use prior knowledge of scientific facts, concepts, and investigations to make predictions and help answer the question being investigated.***	***Use prior knowledge of scientific facts, concepts, and investigations to make predictions and help answer the question being investigated.***	***Use prior knowledge of scientific facts, concepts, and investigations to make predictions and help answer the question being investigated.***	***Use prior knowledge of scientific facts, concepts, and investigations to make predictions and guide the design of an experiment.***
	C-2.5	***C-2.6***	***C-2.7***	***C-2.8***	***C-2.9***
C-3: Gather Background Knowledge Related to the Questions Being Investigated.	***Locate and access data and scientific knowledge in age-appropriate information sources and reference materials. (See English/ Language Arts and Information***	***Locate and access data and scientific knowledge in age-appropriate information sources and reference materials. (See English/ Language Arts and Information***	***Locate and access data and scientific knowledge in age-appropriate information sources and reference materials. (See English/ Language Arts and Information***	***Locate and access data and scientific knowledge in age-appropriate information sources and reference materials. (See English/ Language Arts and Information***	***Locate and access data and scientific knowledge in age-appropriate information sources and reference materials. (See English/ Language Arts and Information***

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	and Technology Literacy Standards.) ***C-3.5***	***and Technology Literacy Standards.)*** ***C-3.6***	***and Technology Literacy Standards.)*** ***C-3.7***	***and Technology Literacy Standards.)*** ***C-3.8***	***and Technology Literacy Standards.)*** ***C-3.9***
C-4: Design and Conduct Responsible and Safe Investigations to Help Answer Questions.	***Demonstrate knowledge of age-appropriate safe laboratory procedures.*** ***Design, plan, and conduct investigations that involve logical data collection, accurate measurements, and identifying, controlling, and changing variables.*** ***C-4.5***	***Demonstrate knowledge of age-appropriate safe laboratory procedures.*** ***Design, plan, and conduct investigations that involve the identification of independent (manipulated) and dependent (responding) and controlled variables and determining which is the most logical data to collect.*** ***C-4.6***	***Demonstrate knowledge of age-appropriate safe laboratory procedures.*** ***Design, plan, and conduct investigations that involve the identification of independent (manipulated) and dependent (responding) and controlled variables and determining which is the most logical data to collect.*** ***C-4.7***	***Demonstrate knowledge of age-appropriate safe laboratory procedures.*** ***Design, plan, and conduct investigations that involve the identification of independent (manipulated) and dependent (responding) and controlled variables and determining which is the most logical data to collect.*** ***C-4.8***	***Demonstrate knowledge of age-appropriate safe laboratory procedures.*** ***Design an appropriate scientific investigation based on current issues, scientific concepts, or student observations.*** ***C-4.9***
C-5: Safely Use Appropriate Senses, Equipment and Tools to Make Observations and Gather Data.	***Determine which metric measuring tool is the most appropriate to use for data gathering when answering a question or planning an investigation, and use the measuring tool appropriately.*** ***Identify when to use an appropriate standard metric unit of length, liquid capacity, mass,***	***Select and use appropriate tools and equipment to make accurate observations and SI measurements for the purpose of scientific investigation.***	***Select and use appropriate tools and equipment to make accurate observations and SI measurements for the purpose of scientific investigation.***	***Select and use appropriate tools and equipment to make accurate observations and SI measurements for the purpose of scientific investigation.***	***Select and use appropriate tools and equipment to make accurate observations and SI measurements for the purpose of scientific investigation.***

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	time, and temperature. (See Math D-3.) ***C-5.5***	***C-5.6***	***C-5.7***	***C-5.8***	***C-5.9***
C-6: Collecting and Representing Qualitative and Quantitative Data **(See Math Standard E.)**	***Collect, compare, and organize observations and results in a journal, record sheet, response sheet, calendar, or by using media and technology appropriate to purpose and content.*** ***Create and interpret bar graphs, line graphs, tables, and charts to organize and analyze data.*** ***C-6.5***	***Collect and organize qualitative and quantitative data in a journal, lab report, record sheet, or by using media and technology appropriate to purpose and content.*** ***Create and interpret appropriate types of graphs (bar graphs, line graphs, pie graphs).*** ***C-6.6***	***Collect and organize qualitative and quantitative data in a journal, lab report, record sheet, or by using media and technology appropriate to purpose and content.*** ***Create and interpret appropriate types of graphs (bar graphs, line graphs, pie graphs).*** ***C-6.7***	***Collect and organize qualitative and quantitative data in a journal, lab report, record sheet, or by using media and technology appropriate to purpose and content.*** ***Create and interpret appropriate types of graphs (bar graphs, line graphs, pie graphs).*** ***C-6.8***	***Collect and organize qualitative and quantitative data in a, lab note-book or report, or by using media and technology appropriate to purpose and content.*** ***Create and interpret appropriate types of graphs.*** ***C-6.9***
C-7: Summarizing, Synthesizing, Inferring, and Building Explanations	***Analyze, interpret, and summarize data to determine patterns and representative values, cause and effect, and the data's useful-ness for building explanations and asking new questions.*** ***Compare results and explanations to known science concepts, models, or theories.*** ***Interpret bar graphs, line graphs, tables, and***	***Analyze and interpret qualitative and quantitative data for experimental errors; and use them to build explanations, develop models, and raise further questions.*** ***Use the explanations and models found in science to develop likely explanations for the results of the investigation.***	***Analyze and interpret qualitative and quantitative data for experimental errors; and use them to build explanations, develop models, and raise further questions.*** ***Use the explanations and models found in science to develop likely explanations for the results of the investigation.***	***Analyze and interpret qualitative and quantitative data for experimental errors; and use them to build explanations, develop models, and raise further questions.*** ***Use the explanations and models found in science to develop likely explanations for the results of the investigation.***	***Use experimental results, mathematical formulas, models, and current scientific knowledge to develop and defend likely explanations of investigation results and refine work.*** ***Relate mathematical functions to data.***

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	charts to look for errors and make predictions. ***C-7.5***	***C-7.6***	***C-7.7***	***C-7.8***	***C-7.9***
C-8: Communicating Results	***Report the results of scientific investigations by using precise vocabulary to complete an appropriate lab report, journal, or response sheet or by using media and technology appropriate to purpose and content.*** ***Receive critical response from peers, defend the validity of the experimental design and results, and revise methods and explanations.*** ***C-8.5***	***Complete a lab report or journal.*** ***Share, defend, and revise results, explanations, and procedures using media and technology appropriate to purpose and content.*** ***C-8.6***	***Complete a lab report or journal.*** ***Share, defend, and revise results, explanations, and procedures using media and technology appropriate to purpose and content.*** ***C-8.7***	***Complete a lab report or journal.*** ***Share, defend, and revise results, explanations, and procedures using media and technology appropriate to purpose and content.*** ***C-8.8***	***Complete an appropriate lab report.*** ***Share, defend, and revise results, explanations, and procedures using media and technology appropriate to purpose and content.*** ***Evaluate physical and conceptual models for accuracy and completeness.*** ***C-8.9***
STANDARD D: PHYSICAL SCIENCE —STUDENTS WILL DEMONSTRATE AN UNDERSTANDING OF THE PHYSICAL AND CHEMICAL PROPERTIES OF MATTER, THE FORMS AND PROPERTIES OF ENERGY, AND THE WAYS IN WHICH MATTER AND ENERGY INTERACT.					
D-1: Properties of Matter	***Objects and materials have many observable and measurable properties such as color, size, shape, mass, weight, texture, hardness, flexibility, reactivity with other materials, etc.***		***A substance has characteristic chemical and physical properties, all of which are independent of the amount of the sample.*** ***There are groups of elements that have similar properties.***		***In living organisms, atoms are arranged n special molecules that function in the processes necessary to support life.***

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	Objects and materials can be sorted and ordered in terms of their properties. ***Solids, liquids, and gases have different properties.*** ***D-1.5***		***Elements can be solids, liquids, or gases.*** ***When elements are listed in order by the number of protons in their nucleus, the same sequence of properties appears over and over again in the list (periodic table).*** D-1.7		***D-1.9***
D-2: Structure of Matter	***All things are made of matter, which can exist as solids, liquids, or gases and some materials are mixtures of different types of matter.*** Air is a gas that surrounds us and takes up space. ***Living things are made of matter and have properties.*** ***Materials may be composed of parts that are too small to be seen without magnification.***		***All matter is made up of atoms, which are far too small to see directly through a microscope.*** ***A substance composed of a single kind of atom is called an element.*** Different arrangements of atoms compose all substances and atoms may be bonded together. A compound is formed when two or more kinds of atoms bind together chemically. ***An atom's nucleus is a tiny fraction of the volume of an atom.***	***Different arrangements of atoms compose all substance and atoms may be bonded together.*** ***A compound is formed when two or more kinds of atoms bind together chemically.*** ***Atoms may stick together in well-defined molecules or may be packed together n large arrays. Different arrangements of atoms compose all substances.*** ***Atoms and molecules are in constant motion.***	

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			Atoms are made of a positive nucleus surrounded by negative electrons. ***The nucleus of an atom consists of positively charged protons and neutrons which have no charge but which affect the mass and stability of the atom.*** Atoms may stick together in well-defined molecules or may be packed together in large arrays. Different arrangements of atoms compose all substances. ***Atoms and molecules are in constant motion.***		
	D-2.5		***D-2.7***	D-2.8	
D-3: Physical, Chemical and Nuclear Changes in Matter	***Heating and cooling cause changes in the properties of materials and may cause the material to change state.*** ***When a solid dissolves in a liquid, a physical change has occurred.***		***A mixture of substances often can be separated into the original substances using one or more physical properties.*** ***Increased temperature means greater average energy of motion, so most substances***	***Elements combine in a multitude of ways to produce compounds, which account for the living and nonliving sub-stances that we encounter. The properties of the new substances may be very different from those of the old.***	A wide variety of biological, chemical, and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.

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	Many kinds of changes occur faster under hotter conditions. When a new material is made by combining two or more materials, it has properties that are different from the original materials. Chemical reactions occur all around us. ***D-3.5***		***expand when heated.*** Elements combine in a multitude of ways to produce com-pounds, which account for the living and non-living substances that we encounter. The properties of the new substances may be very different from those of the old. Atoms do not break down during normal laboratory reactions. D-3.7	***When substances interact chemically to form new substances, the elements composing them combine in new ways.*** ***Regardless of how substances within a closed system interact, the total mass of the system remains the same.*** ***Atoms do not break down during normal laboratory reactions.*** D-3.8	D-3.9
D-4: Position and Motion of Objects	***The motion of an object can be described by its position, direc-tion of motion, and speed. That motion can be measured and represented on a graph.***		***The motion of an object can be described by its position, direc-tion of motion, and speed. That motion can be measured and represented on a graph.*** ***An object will stay still or keep its direction of motion and its speed, unless an unbalanced force acts on it.*** ***Laws of motion are used to calculate precisely the effects of***		

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	D-4.5		***forces on the motion of objects.*** ***The forces that act on an object can reinforce or cancel one another depending on their direction and magnitude*** ***D-4.7***		
D-5: Forces of Nature	The earth's gravity pulls any object toward it without touching it.			***Everything on or anywhere near the earth is pulled toward the earth's center by gravitational force.*** ***Every object exerts gravitational force on every other object. The force depends on how much mass the objects have and on how far apart they are.*** ***The electric force is a universal force that exists between any two charged objects. There are two kinds of charges—positive and negative.*** ***Opposite charges attract, while like charges repel. Electric currents and magnets can exert a***	

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	D-5.5			***force on each other.*** ***Moving electric charges produce magnetic forces, and moving magnets produce electric forces.*** ***D-5.8***	
D-6: Interactions of Energy and Matter	Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another.	**Living things use energy.**	**Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.** **Heat can be transferred through materials by the collisions of atoms or across a space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat.** **All energy can be considered to be either kinetic energy, which is the energy of motion; potential energy, which depends on relative position; or energy contained by a field, such as electromagnetic waves.**	***Most of what goes on in the universe involves some form of energy being transformed into another.*** ***Energy in the form of heat is almost always one of the products of an energy transformation.*** ***The sun's energy arrives as light with a range of wavelengths, consisting of visible light infrared, and ultraviolet radiation.*** ***The visible light from the sun is made up of a mixture of many different colors of light, even though to the eye the light looks almost white.*** ***Light interacts with matter by transmission,***	***All living things use energy.*** ***The sun is a major source of energy for changes on the earth's surface.*** ***Plants convert light energy into stored chemical energy through photosynthesis, and animals get energy from cellular respiration (i.e. energy can change from one form to another in living things).***

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				absorption, or scattering. ***Vibrations in materials set up wavelike disturbances that transfer energy and spread away from the source.*** ***These and other waves move at different speeds in different materials.*** ***Electrical circuits provide a means of converting electrical energy into other forms of energy.***	
	D-6.5	**D-6.6**	D-6.7	D-6.8	***D-6.9***
D-7: Conservation of Energy		The total energy of the universe is constant. Energy can be transferred in many ways, but it can never be destroyed. D-7.6	The total energy of the universe is constant. Energy can be transferred in many ways, but it can never be destroyed. D-7.7	The total energy of the universe is constant. Energy can be transferred in many ways, but it can never be destroyed. D-7.8	The total energy of the universe is constant. Energy can be transferred in many ways, but it can never be destroyed. D-7.9
STANDARD E: EARTH SCIENCE—STUDENTS WILL DEMONSTRATE AN UNDERSTANDING OF THE STRUCTURE AND SYSTEMS OF EARTH AND THE UNIVERSE AND OF THEIR INTERACTIONS.					
E-1: Properties and Structures of the Earth and its Materials	***Water is a very important earth material that can be liquid, solid, or gas and can be made to change from one form to***	***The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.***	***Three-fourths of the earth's surface is covered by a relatively thin layer of water, and the entire planet is surrounded by a***	***Earth is the only body in the solar system that appears able to support life.*** ***Living organisms have***	

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	another. Air surrounds us and can move and cause changes. ***A landform is a shape of the earth's surface.***	***Lithospheric plates constantly move at rates of centimeters per year in response to movements in the mantle.*** ***Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from lithospheric plate motions.*** ***Landforms are the result of a combination of constructive forces (crystal deformation, volcanic eruption, deposition of sediment) and destructive forces (weathering, erosion).*** ***Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers.*** Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the	***relatively thin blanket of air.*** ***Water is a solvent. As it passes through the water cycle, it dissolves minerals and gases and carries them to the oceans.*** ***Fresh water is limited in supply and is essential for life and for most industrial processes.*** ***Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks and contributing to the weathering of rocks.***	***played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks and contributing to the weathering of rocks.***	

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		oceans. ***Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.*** ***E-1.6***	***E-1.7***	***E-1.8***	
E-2: History and Changes of the Earth	***The surface of the earth changes. Some changes are due to slow processes, such as erosions and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.*** ***Waves, wind, water, and ice shape and re-shape the earth's land surface by eroding rock and soil in some areas and de-positing them in other areas.*** Fossils provide evidence about the plants and animals that lived long ago and the nature of the	***The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past.*** ***Climates have sometimes changed abruptly in the past as a result of changes in the earth's crust.*** ***Thousands of layers of sedimentary rock confirm the long history of the changing surface of the earth and the changing life forms whose remains (fossils) are found in successive layers.***			

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	environment at that time. ***E-2.5***	***The youngest layers are not always found on top.*** ***Human activities have changed the earth's land, oceans, and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms.*** ***E-2.6***			
E-3: Cycles in the Earth System		***Some changes in the solid earth can be described as the "rock cycle."*** Water circulates through the crust, oceans, and atmosphere in what is known as the "water cycle."	***Water circulates through the crust, oceans, and atmosphere in what is known as the "water cycle."*** ***The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.*** ***The cycling of water in and out of the atmosphere plays an important role in cloud formation and determining weather and climatic patterns.***		

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			Seasons result from variations in the amount of the sun's energy hitting the sur-face due to the tilt of the earth's rotation on its axis and the length of the day. ***Global patterns of atmospheric movement influence local weather.*** ***Oceans have a major effect on climate. The pat-terns of stars in the sky stay the same, although they appear to move across the sky nightly. Dif-ferent stars can be seen in different seasons.***		
		E-3.6	***E-3.7***		
E4: The Earth, Our Solar System, and Space	Things on or near the earth are pulled toward it by the earth's gravity. The earth is approximately spherical in shape. The rotation of the earth on its axis every 24 hours pro-duces the night and day cycle. The number of stars		***The sun is the major source of energy for phenomena on the earth's surface such as weather and ocean currents.*** ***Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system.***	***The earth is the third planet from the sun in a sys-tem that includes the moon; the sun; seven other planets and their moons; and smaller objects, such as asteroids and comets.*** ***Most objects in the solar system are in regular and predictable***	

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	that can be seen through telescopes is dramatically greater than can be seen by the unaided eye. The earth is one of several planets that orbit the sun, and the moon orbits around the earth. Stars are like the sun, some being smaller and some larger, but so far away that they look like points of light. The sun appears to move across the sky in the same way every day, but its path changes slowly over the seasons.			***motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.*** ***The planets, having different sizes, surface features and compositions, move around the Sun in oval (elliptical) orbits, and some planets have a variety of moons and rings of particles orbiting around them.*** ***There are many different stars, and they have different properties.*** ***The sun is a medium-sized star and is the central and largest body in our solar system.*** ***The sun is the major source of energy for phenomena on the earth's surface, such as weather and ocean currents.*** ***Gravity explains the phenomena of the tides.***	

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	E-4.5		***E-4.7***	***The universe contains billions of galaxies, each containing billions of stars.*** ***A light year is a unit of distance.*** ***E-4.8***	
STANDARD F: LIFE AND ENVIRONMENTAL SCIENCE —STUDENTS WILL DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND STRUCTURES OF LIVING THINGS, THE PROCESSES OF LIFE, AND HOW LIVING THINGS INTERACT WITH ONE ANOTHER AND THEIR ENVIRONMENT.					
F-1: Characteristics, Structure, and Function in Living Things	***Each kind of living thing has unique structures and behaviors, but different kinds of living things can have similar structures and behaviors.*** ***Living things have structures and behaviors that help them live in different environments.*** ***Living things have basic needs: food, water, air, light, and an appropriate environment in which to live.*** ***The behaviors of living things are influenced by internal and external cues.***	***Living systems at all levels demonstrate the complementary nature of structure and function.*** ***Organisms have a variety of body plans and internal structures to accomplish the functions required for life.*** All organisms are composed of cells. Many organisms are single cells; others are multicellular**.** Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.		***All organisms are composed of cells.*** ***Many organisms are single celled; others are multicellular.*** ***Cells continually divide to make more cells for growth and repair.*** ***Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.***	***Every cell is covered by a membrane that controls what can enter and leave the cell.*** ***A living cell is composed of a small number of chemical elements mainly carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur.*** ***Different molecules inside the cell form structures that carry out cell functions.*** ***Cell functions include transport of materials, energy capture and release, protein building, waste disposal, information feedback, and***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	Living things can be sorted into groups using a variety of characteristics.	***The functions that are required for life include obtaining and using resources, growing, reproducing, and maintaining stable internal conditions by sensing and responding to a constantly changing external environment.*** ***In classifying organisms, biologists consider details of internal and external structures and processes and the evidence of common ancestry to be more important than behavior or general appearance.*** ***Disease is a breakdown in structures or functions of an organism and can be caused by intrinsic failure of a system or infection by other organisms.***			***movement.*** ***The work of a cell is carried out by the many different proteins it assembles from 20 different amino acids.*** ***The function of each protein molecule depends on its sequence of amino acids.*** ***The genetic information in DNA molecules provides instructions for assembling protein molecules. The code used is virtually the same for all life forms.*** ***Complex interactions among the different kinds of molecules in the cell cause distinct cycles of activities, such as growth and division. Cell behavior can also be affected by molecules from other parts of the organism.*** ***Most cells function best within a narrow range of temperature and acidity.***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	F-1.5	***F-1.6***		F-1.8	***Plant cells contain chloroplasts, the site of photosynthesis.*** ***Plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water into complex, energy-rich compounds and release oxygen to the environment.*** ***Complex multicellular organisms are formed as a highly organized arrangement of differentiated cells.*** The complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organism. ***F-1.9***
F-2: Life Cycles and Heredity of Living Things		***Reproduction is essential to the continuation of every species.***		***Every organism requires a set of instructions for specifying its traits.***	***The information passed from parents to offspring is coded in DNA molecules.***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
		Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another. Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more that one trait. Some traits are inherited, and others result from interactions with the environment. Some organisms reproduce asexually, which means all the genes come from a single parent. In sexual reproduction, a single specialized cell		***Heredity is the passage of these instructions from one generation to another.*** ***Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be deter-mined by one or by many genes, and a single gene can influence more than one trait.*** ***Some traits are inherited, and others result from interactions with the environment.*** ***Some organisms reproduce asexually, which means all the genes come from a single parent.*** ***In sexual reproduction, a single specialized cell from a female merges with a specialized cell from a male. As the fertilized egg, carrying***	***The chemical and structural properties of DNA explain how the genetic information that underlies heredity is both encoded in genes and replicated.*** ***Genes are segments of DNA molecules.*** ***The sorting and recombination of genes in sexual reproduction results in a great variety of possible gene combinations from the off-spring of any two parents.*** ***Inserting, deleting, or substituting DNA segments can alter genes; and an altered gene may be passed on to every cell that develops from it. This may help, harm, or have little effect on the offspring's success in its environment.*** ***Behavior is one kind of response an organism can make to an internal or environmental***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
		from a female merges with a specialized cell from a male. As the fertilized egg, carrying genetic information from each parent, multiplies to form the complete organism, the same genetic information is copied in each cell. F-2.6		***genetic information from each parent, multiplies to form the complete organism, the same genetic information is copied in each cell.*** ***F-2.8***	***stimulus. Behavioral response is a set of actions deter-mined in part by heredity and in part from experience.*** ***F-2.9***
F-3: Organisms, Populations, and Ecosystems	***Living things are found almost everywhere in the world, and different environments support the life of different types of organisms.*** ***The behavior of living things is influenced by conditions in the environment.*** ***An organism's behavior can help it survive in a changing environment.*** ***Organisms interact with one another in various ways.*** ***When the environment changes, some living things survive and others die or move to***	***Millions of species of animals, plants, and microorganisms are alive today.***	***A population consists of all individuals of a species that occur together at a given place and time.*** ***For sexually reproducing organisms, a species comprises all organisms that can mate with one another to produce fertile offspring.*** Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics and	***Biological evolution accounts for the diversity of species developed through gradual processes over many generations.*** ***Species acquire many of their unique characteristics and behaviors through biological adaptations, which involve the selection of naturally occurring variations in populations.*** ***Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.***	***Organisms are classified into a hierarchy of groups and sub-groups based on anatomical similarities and the similarity of their DNA sequences.*** ***Organisms both cooperate and compete in ecosystems. The ecosystems may be stable for hundreds or thousands of years.*** ***Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite.*** ***Genetic variability of organisms due to***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	new locations. All organisms (including humans) cause changes in the environment.		behaviors through biological adaptations, which involve the selection of naturally occurring variations in populations. Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils provide evidence that many organisms that lived long ago are extinct. ***All populations living together and the physical factors with which they interact compose an ecosystem.*** ***Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.*** ***Organisms may interact with each other in relationships that may be beneficial or harmful to one or both organisms.***	***Fossils provide evidence that many organisms that lived long ago are extinct.***	***mutation and recombination of genes makes some organisms better able to survive and leave offspring.*** ***Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms as well as for the striking molecular similarities observed among the diverse species of living organisms.*** ***A great diversity of species increases the chance that at least some living things will survive in the face of large changes in the environment.*** ***Human beings are part of the earth's eco-systems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
			The number of organisms an ecosystem can support depends on the available biotic and abiotic resources.		
	F-3.5	***F-3.6***	***F-3.7***	***F-3.8***	***F-3.9***
F-4: Matter and Energy in Living Systems	All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants. Over the whole earth, organisms are growing, dy-ing and decaying and new organ-isms are being produced. Some source of energy is needed for organisms to live and grow.		***The major source of energy for ecosystems is sunlight.*** ***Populations of organisms can be categorized by the function they serve in an ecosystem—producers, consumers, and decomposers.*** ***Energy entering ecosystems as sunlight is transferred by producers (plants and some micro-organisms) into chemical energy through photosynthesis.*** ***Most consumers are animals, which depend on producers for en-ergy in the form of food. Some consumers eat plants for food. Others eat animals that eat the plants.***		***Living systems require a continuous input of energy to maintain their chemical and physical organizations.*** ***The atoms and molecules on the earth cycle among the living and nonliving components of the biosphere.*** ***Energy flows through eco-systems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.*** ***Plants capture energy by absorbing light and using it to form strong chemical bonds between the atoms of carbon-containing molecules. The energy***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
			Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. ***The energy contained in food is released through chemical processes.*** ***Matter and energy change form and are transferred from one organism to another repeatedly.*** ***Matter and energy are transferred between organisms and their physical environment.*** ***The total amount of matter and energy remains constant, even though its form and location change.***		***stored in bonds between the atoms (chemical energy) can be used as sources of energy for life processes.*** ***At each link in a food web, some energy is stored in newly made structures; but much is dissipated into the environment as heat. Continual input of energy from sunlight keeps the process going.*** ***The amount of life any environment can support is limited by the available energy, water, oxygen, and minerals and by the ability of ecosystems to recycle the residue of dead organic materials. Human activities and technology can change the flow.***
	F-4.5		***F-4.7***		***F-4.9***
STANDARD G: SCIENCE APPLICATIONS—STUDENTS WILL DEMONSTRATE AN UNDERSTANDING OF THE RELATIONSHIP BETWEEN SCIENCE AND TECHNOLOGY AND THE WAYS IN WHICH THAT RELATIONSHIP INFLUENCES HUMAN ACTIVITIES.					
G-1: The Process of Technological Design	***Explain a simple problem; propose a product or de-sign to solve the problem;***	***Identify appropriate problems for technological design, design a solution or***	***Identify appropriate problems for technological design, design a solution or***	***Identify appropriate problems for technological design, design a solution or***	***Identify a problem or an opportunity to improve a design; propose designs and***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	implement the proposed solution; evaluate the product or design; and communicate the problem, design, and solution.	***product, implement a proposed design, evaluate completed technological designs or products, and communicate the process of technological design.***	***product, implement a proposed design, evaluate completed technological designs or products, and communicate the process of technological design.***	***product, implement a proposed design, evaluate completed technological designs or products, and communicate the process of technological design.***	***choose between alternative solutions; implement a proposed solution; evaluate the solution and its conse-quences; and communicate the problem, process, and solution.*** ***Science and technology are pursued for different purposes. Scientific inquiry is driven by the desire to under-stand the natural world, and technology is driven by the need to meet human needs and solve human problems.***
	G-1.5	***G-1.6***	***G-1.7***	***G-1.8***	***G-1.9***
G-2: Abilities to Distinguish Between Natural Objects and Objects Made by Humans	***Some objects occur in nature; others have been designed and made by people to solve human problems and enhance the quality of life.***	Propose a design (or redesign) of an applied science model or a machine that will have an impact in the community or elsewhere in the world.	Propose a design (or redesign) of an applied science model or a machine that will have an impact in the community or elsewhere in the world; and show how the design (or redesign) might work, including potential side effects.	Design, build, evaluate, and revise models and explanations related to the earth and space, life and environ-mental, and physical sciences.	Design, build, evaluate, and revise models and explanations related to the earth and space, life and environ-mental, and physical sciences.
	G-2.5	G-2.6	G-2.7	G-2.8	G-2.9
G-3: Understanding About Science and	***People have always invented tools and***	***Technology impacts trends in science and***	***Technology impacts trends in science and***	***Technology impacts trends in science and***	***Science often advances with the introduction***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
Technology	***ways of doing things to solve problems, but most tools of today are modifications of tools from the past.*** ***Tools are used to do things better or more easily and to do some things that could not otherwise be done at all. Tools are used to observe, measure, and make things.*** ***Scientists and engineers often work together in teams to solve problems and develop new technology.*** ***G-3.5***	***scientific research.*** ***Science and technology have both positive and negative impacts on our culture.*** Scientists rely on technology to enhance the gathering and manipulation of data. G-3.6	***scientific research.*** ***Science and technology have both positive and negative impacts on our culture.*** Scientists rely on technology to enhance the gathering and manipulation of data. G-3.7	***scientific research.*** ***Scientific knowledge can be used to make real-life decisions.*** Scientists rely on technology to enhance the gathering and manipulation of data. G-3.8	***of new technologies, and solving technological problems often results in new scientific knowledge.*** ***Scientists rely on technology to enhance the gathering and manipulation of data.*** ***The accuracy and precision of data depends on the technology used.*** ***G-3.9***
STANDARD H: SCIENCE IN SOCIAL AND PERSONAL PERSPECTIVES—STUDENTS WILL USE SCIENCE INFORMATION AND SKILLS TO MAKE INFORMED DECISIONS ABOUT THEMSELVES, THEIR COMMUNITY, AND THE WORLD IN WHICH THEY LIVE.					
H-1: Personal and Community Health		***Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.***	***Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.***	***Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.***	***Scientific knowledge can be used to make real-life decisions.***

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
		H-1.6	***H-1.7***	***H-1.8***	***H-1.9***
H-2: Human Population Growth	Human populations are groups of people living in a particular location. The size of a population can increase or decrease. H-2.5	When an area becomes over-populated, the environment will become degraded due to the increased use of resources. H-2.6	When an area becomes over-populated, the environment will become degraded due to the increased use of resources. H-2.7	When an area becomes over-populated, the environment will become degraded due to the increased use of resources. H-2.8	
H-3: Types of Resources	***Resources are things we get from the living and nonliving environment to meet the needs and wants of a population.*** ***Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials.*** ***The supply of many resources is limited, but their availability can be extended through recycling and decreased use.*** ***H-3.5***	***Humans have used renewable and nonrenewable natural resources through history.*** ***The global environment is affected by national policies and practices relating to energy use, waste disposal, ecological management, manufacturing, and population.*** ***H-3.6***	***Humans have used renewable and nonrenewable natural resources through history.*** ***The global environment is affected by national policies and practices relating to energy use, waste disposal, ecological management, manufacturing, and population.*** ***H-3.7***	***Humans have used renewable and nonrenewable natural resources through history.*** ***The global environment is affected by national policies and practices relating to energy use, waste disposal, ecological management, manufacturing, and population.*** ***H-3.8***	
H-4: Quality of and Changes in Environments	***Environments are the space, conditions, and factors that affect an individual's and a***	***Internal and external processes of the earth system cause natural hazards (earthquakes,***	***Internal and external processes of the earth system cause natural hazards (earthquakes,***	***Internal and external processes of the earth system cause natural hazards (earthquakes,***	

	GRADE 5	GRADE 6	GRADE 7	GRADE 8	GRADES 9 BIOLOGY
	population's ability to survive and their quality of life. ***Changes in environments can be natural or influenced by humans. Some changes are good; and some, like pollution, can influence the health, survival, or activities of living things, including humans.*** ***Some environmental changes occur slowly, and others occur rapidly.*** ***H-4.5***	***landslides, wild-fires, volcanic eruptions, floods, storms, asteroid impact) that change or destroy human and wildlife habitats, damage property, and harm or kill living organisms.*** ***Human activities (resource acquisition, urban growth, land-use decisions, and waste disposal) can induce hazards and can accelerate many natural changes.*** ***H-4.6***	***landslides, wild-fires, volcanic eruptions, floods, storms, asteroid impact) that change or destroy human and wildlife habitats, damage property, and harm or kill living organisms.*** ***Human activities (resource acquisition, urban growth, land-use decisions, and waste disposal) can induce hazards and can accelerate many natural changes.*** ***H-4.7***	***landslides, wild-fires, volcanic eruptions, floods, storms, asteroid impact) that change or destroy human and wildlife habitats, damage property, and harm or kill living organisms.*** ***Human activities (resource acquisition, urban growth, land-use decisions, and waste disposal) can induce hazards and can accelerate many natural changes.*** ***H-4.8***	
H-5: Science and Technology in Society	***Science and technology have improved our food quality and quantity, transportation, health, sanitation, and communication; but these benefits are not equally available to all people in the world.*** ***H-5.5***	***Societal challenges often inspire questions for scientific research.*** ***Technology influences society through its products and processes.*** ***Social needs, attitudes and values influence the direction of technological development.*** ***H-5.6***	***Societal challenges often inspire questions for scientific research.*** ***Technology influences society through its products and processes.*** ***Social needs, attitudes and values influence the direction of technological development.*** ***H-5.7***	***Societal challenges often inspire questions for scientific research.*** ***Technology influences society through its products and processes.*** ***Social needs, attitudes and values influence the direction of technological development.*** ***H-5.8***	