

***Physics in Context* correlated with
Kentucky Core Content for Science Assessment
Physical Science Concepts: Grades 8 thru 11 (V3.0 September 1999)**

Conceptual Understandings: Physical Science

Standard No.	Standard Description	Correlation
Structure of Atoms		
SC-H-1.1.1	Matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together.	Student Text pp 49-50, 404-406, Teacher's Guide pp T49-50, T404-406, Assessment CD & web site
SC-H-1.1.2	The atom's nucleus is composed of protons and neutrons that are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	Student Text pp 405-407, Teacher's Guide pp T405-407, Lab Manual pp 9.13-9.30; Assessment CD & web site
SC-H-1.1.3	The forces that hold the nucleus together, at nuclear distances, are usually stronger than the forces that would make it fly apart. Nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions. Fission is the splitting of a large nucleus into smaller pieces. Fusion is the joining of two nuclei at extremely high temperature and pressure. Fusion is the process responsible for the energy of the Sun and other stars.	Student Text pp 407-420, Teacher's Guide pp T407-420, Lab Manual pp 9.13-9.30; Assessment CD & web site
Structure and Properties of Matter		
SC-H-1.2.1	Atoms interact with each other by transferring or sharing outermost electrons. These outer electrons govern the chemical properties of the element.	(chemistry course material)
SC-H-1.2.2	An element is composed of a single type of atom. When elements are listed according to the number of protons, repeating patterns of physical and chemical properties identify families of elements with similar properties. The periodic table is a consequence of the repeating pattern of outermost electrons.	(chemistry course material)
SC-H-1.2.3	Bonds between atoms are created when outer electrons are	(chemistry course

Conceptual Understandings: Physical Science

Standard No.	Standard Description	Correlation
	paired by being transferred or shared. A compound is formed when two or more kinds of atoms bind together chemically.	material)
SC-H-1.2.4	The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecule including the constituent atoms.	(chemistry course material)
SC-H-1.2.5	Solids, liquids, and gases differ in the distances between molecules or atoms and therefore the energy that binds them together. In solids, the structure is nearly rigid; in liquids, molecules or atoms move around each other but do not move apart; and in gases, molecules or atoms move almost independently of each other and are relatively far apart.	Student Text pp 277-294; Teachers Guide pp T277-294; Assessment CD & web site
SC-H-1.2.6	In conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons.	Student Text pp 200-215, Teacher's Guide pp T200-215, Lab Manual pp 4.15-.32 & Assessment CD & web site

Chemical Reactions

SC-H-1.3.1	Chemical reactions occur all around us and in every cell in our bodies. These reactions may release or consume energy. Rates of chemical reactions vary. Reaction rates depend on concentration, temperature, and properties of reactants. Catalysts speed up chemical reactions.	Implied in the Physics content of the student Text, Teacher's Guide, and/or Lab Manual
------------	---	--

Motions and Forces

SC-H-1.4.1	Objects change their motion only when a net force is applied. Laws of motion are used to describe the effects of forces on the motion of objects.	Student Text pp 1-26, 47-49, 170-183, 326-350; Teacher's Guide pp T1-23, T47-49, T170-183, T326-350; Lab Manual 1.1-10, 4.1-7, 7.1-12; Assessment CD & web-site
SC-H-1.4.2	Gravity is a universal force that each mass exerts on every other mass.	Student Text pp 47-49, 244-247; Teachers guide pp T47-49, T244-247; Lab Manual pp

Conceptual Understandings: Physical Science

Standard No.	Standard Description	Correlation
		1.1-1.11, Assessment CD & web-site
SC-H-1.4.3	The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.	Student Text pp 49-63, 106-117, 262-266; Teacher's Guide pp T49-63, T106-117, T262-266; Lab Manual pp 1.17-1.29; Assessment CD & web-site
SC-H-1.4.4	Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces. This idea underlies the operation of electric motors and generators.	Student Text pp 266-276, 316-323; 388-390; Teachers Guide pp T266-276, T316-323, T388-390; Lab Manual pp 2.27-2.33, 5.19-5.32, 6.3-6.11, 6.25-29; Assessment CD & web-site
Conservation of Energy and Increase in Disorder		
SC-H-1.5.1	The total energy of the universe is constant. Energy can be transferred in many ways, but it can neither be created nor destroyed.	Student text pp 228-229, 251-252; Teacher's Guide pp T228-229, T251-252; Lab Manual 5.1; Assessment CD & web-site
SC-H-1.5.2	All energy can be considered to be either kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational).	Student Text pp 228-295; Teacher's Guide pp T228-T295; Lab Manual 5.1-5.40; Assessment CD & web-site
SC-H-1.5.3	Heat is the manifestation of the random motion and vibrations of atoms, molecules, and ions. The greater the atomic or molecular motion, the higher the temperature.	Student Text pp 64-79, 157-165, 216-227, 277-294; Teacher's Guide pp T64-79, T157-165, T216-227

Conceptual Understandings: Physical Science

Standard No.	Standard Description	Correlation
		T277-294; Lab Manual 1.31-1.36, 3.29-3.34, 4.33-4.38, 5.35-5.40; Assessment CD & web-site
SC-H-1.5.4	The universe becomes less orderly and less organized over time. Thus, the overall effect is that the energy is spread out uniformly. For example, in the operation of mechanical systems, the useful energy output is always less than the energy input; the difference appears as heat.	Student Text pp 168-227, 277-294; Teachers Guide pp T168-227, T277-T294; Lab Manual pp 5.1-5.40; Assessment CD & web-site:

Interactions of Energy and Matter

SC-H-1.6.1	Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter. Apparent changes in frequency can provide information about relative motion.	Student Text pp 352-368; Teachers Guide pp T352-368, Lab Manual pp 8.1-8.15; Assessment CD & web site
SC-H-1.6.2	Electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays, result when a charged object is accelerated.	Student Text pp 384-403, Teachers Guide pp T384-403, Lab Manual pp 9.1-9.11 & Assessment CD & web site

Standard Description	Correlation
Scientific Inquiry	
Inquiry skills will be assessed only in the context of physical, Earth/space, and life sciences content.	
Formulate testable hypotheses and demonstrate the logical connections between the scientific concepts guiding a hypothesis and the design of an experiment.	Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site
Use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications.	Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site
Use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models.	Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site
Design and conduct different kinds of scientific investigations.	Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site
Communicate and defend the designs, procedures, observations, and results of scientific investigations.	Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site
Review and analyze scientific investigations and explanations of other investigators, including peers.	Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site

Standard Description	Correlation
Applications/Connections	
Applications/connections skills will be assessed only in the context of physical, Earth/space, and life sciences content.	
<p>Science and Technology: Apply scientific theory and conceptual understandings to solve problems of technological design and examine the interaction between science and technology.</p>	<p>Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site</p>
<p>Science in Personal and Social Perspectives: Explore the impact of scientific knowledge and discoveries on personal and community health; recognize how science influences human population growth, use science to analyze the use of natural resources by an increasing human population; investigate how science can be used to solve environmental quality problems, use science to investigate natural and human-induced hazards; and analyze how science and technology are necessary but not sufficient for solving local, national, and global issues.</p>	<p>Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site</p>
<p>History and Nature of Science: Analyze the role science plays in everyday life and compare different careers in science; recognize that scientific knowledge comes from empirical standards, logical arguments, and skepticism, and is subject to change as new evidence becomes available; and investigate advances in science and technology that have important and long-lasting effects on science and society.</p>	<p>Embedded in Student Text, Teachers Guide, Lab Manuals, Assessment CD & web-site</p>