

# Active Physics Correlations with Kentucky's Physical Science Standards

<b>Content Statements</b> <b>Conceptual Understandings:</b> <b>Physical Science</b> Grades 8 through 11 with Assessment at Grade 11	<b>Communication</b>			<b>Home</b>			<b>Medicine</b>			<b>Predictions</b>			<b>Sports</b>			<b>Transportation</b>		
Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3
<b>Structure of Atoms</b>																		
<p><b>SC-H-1.1.1</b> 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.</p>																		
<p><b>SC-H-1.1.2</b> 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.</p>																		

<b>Content Statements</b>  <b>Conceptual Understandings:</b> <b>Physical Science</b> <b>Grades 8 through 11</b> <b>with Assessment at</b> <b>Grade 11</b>	<b>Communication</b>			<b>Home</b>			<b>Medicine</b>			<b>Predictions</b>			<b>Sports</b>			<b>Transportation</b>		

<b>SC-H-1.1.3</b> 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.																			
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Structure and Properties of Matter**

<b>SC-H-1.2.1</b> Atoms interact with each other by transferring or sharing outermost electrons. These outer electrons govern the chemical properties of the element.																			
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

<b>Content Statements</b> <b>Conceptual Understandings:</b> <b>Physical Science</b> <b>Grades 8 through 11</b> <b>with Assessment at</b> <b>Grade 11</b>	<b>Communication</b>			<b>Home</b>			<b>Medicine</b>			<b>Predictions</b>			<b>Sports</b>			<b>Transportation</b>		
Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3

<b>SC-H-1.2.2</b> 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.																		
<b>SC-H-1.2.3</b> Bonds between atoms are created when outer electrons are paired by being transferred or shared. A compound is formed when two or more kinds of atoms bind together chemically.																		
<b>SC-H-1.2.4</b> 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.																		

<b>Content Statements</b>  <b>Conceptual Understandings:</b> <b>Physical Science</b> <b>Grades 8 through 11</b> <b>with Assessment at</b> <b>Grade 11</b>	<b>Communication</b>			<b>Home</b>			<b>Medicine</b>			<b>Predictions</b>			<b>Sports</b>			<b>Transportation</b>		

<b>SC-H-1.2.5</b> 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.																			
<b>SC-H-1.2.6</b> 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.																			

**Chemical Reactions**

<b>SC-H-1.3.1</b> Chemical reactions occur all around us and in every cell in our bodies. These reactions may release or consume energy.																			
<b>SC-H-1.3.2</b> Rates of chemical reactions vary. Reaction rates depend on concentration, temperature, and properties of reactants. Catalysts speed up chemical reactions.																			

Content Statements Conceptual Understandings: Physical Science Grades 8 through 11 with Assessment at Grade 11	Communication			Home			Medicine			Predictions			Sports			Transportation		
	Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2

Motions and Forces																			
<b>SC-H-1.4.1</b> 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.												X			X			X	
<b>SC-H-1.4.2</b> Gravity is a universal force that each mass exerts on every other mass.													X			X			X
<b>SC-H-1.4.3</b> The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.																			
<b>SC-H-1.4.4</b> 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.		X				X													
Conservation of Energy and Increase in Disorder																			
<b>SC-H-1.5.1</b> The total energy of the universe is constant. Energy can be transferred in many ways, but it can neither be created nor destroyed.		X												X	X	X			

Content Statements Conceptual Understandings: Physical Science Grades 8 through 11 with Assessment at Grade 11	Communication			Home			Medicine			Predictions			Sports			Transportation			
	Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3
<b>SC-H-1.5.2</b> All energy can be considered to be either kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational).		X												X	X	X			
<b>SC-H-1.5.3</b> 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.																			
<b>SC-H-1.5.4</b> 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.																			
<b>Interactions of Energy and Matter</b>																			
<b>SC-H-1.6.1</b> 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.	X		X				X		X			X							X

Content Statements Conceptual Understandings: Physical Science Grades 8 through 11 with Assessment at Grade 11	Communication			Home			Medicine			Predictions			Sports			Transportation			
	Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3
<b>SC-H-1.6.2</b> Electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays, result when a charged object is accelerated.			X																X
<b>Scientific Inquiry</b> Inquiry skills will be assessed only in the context of physical, Earth/space, and life sciences content.																			
<b>Academic Expectation: 2.1 Scientific Ways of Thinking and Working</b>																			
<b>Students will :</b>																			
• formulate testable hypotheses and demonstrate the logical connections between the scientific concepts guiding a hypothesis and the design of an experiment.	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	
• use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
• use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
• design and conduct different kinds of scientific investigations.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

<b>Content Statements</b> <b>Conceptual Understandings:</b> <b>Physical Science</b> <b>Grades 8 through 11</b> <b>with Assessment at</b> <b>Grade 11</b>	Communication			Home			Medicine			Predictions			Sports			Transportation			
	Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3
<ul style="list-style-type: none"> <li>communicate and defend the designs, procedures, observations, and results of scientific investigations.</li> </ul>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<ul style="list-style-type: none"> <li>review and analyze scientific investigations and explanations of other investigators, including peers.</li> </ul>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Applications/Connections</b> Applications/connections skills will be assessed only in the context of physical, Earth/space, and life sciences content.																			
<b>Students will :</b>																			
<b>Science and Technology</b>																			
<ul style="list-style-type: none"> <li>apply scientific theory and conceptual understandings to solve problems of technological design and examine the interaction between science and technology.</li> </ul>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Content Statements Conceptual Understandings: Physical Science Grades 8 through 11 with Assessment at Grade 11	Communication			Home			Medicine			Predictions			Sports			Transportation		
	Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2

Science in Personal and Social Perspectives																			
<ul style="list-style-type: none"> <li>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.</li> </ul>		X	X	X	X	X	X	X	X	X	X		X					X	X
<b>History and Nature of Science</b>																			
<ul style="list-style-type: none"> <li>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.</li> </ul>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

<b>Content Statements</b> <b>Conceptual Understandings:</b> <b>Physical Science</b> <b>Grades 8 through 11</b> <b>with Assessment at</b> <b>Grade 11</b>	<b>Communication</b>			<b>Home</b>			<b>Medicine</b>			<b>Predictions</b>			<b>Sports</b>			<b>Transportation</b>		
Chapter	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3