



## Alignment Document State of Kentucky and Aventa Learning Physics

### Physics 2005-2007 Benchmark Blueprint

Big Ideas	Topics	Standards	Unit Name	Course Topic Description
<b>SC-H-MF</b> Motion and Forces (Physical Science)	<b>SC-H-MF-U</b> Enduring Knowledge - Understandings	<b>SC-H-MF-U-1</b> representing and describing motion in a variety of ways provides data that can be used to construct explanations and make predictions about real-life phenomena.	Physics and the Laws of Motion	Motion in One Dimension
		<b>SC-H-MF-U-2</b> the usefulness of a model can be tested by comparing its predictions to actual observations in the real world. But a close match does not necessarily mean that the model is the only "true" model or the only one that would work.	Physics and the Laws of Motion	Two Dimensional Motion and Vectors
		<b>SC-H-MF-U-3</b> all motion is relative to whatever frame of reference is chosen, for there is no motionless frame from which to judge all motion.	Physics and the Laws of Motion	Motion in One Dimension
		<b>SC-H-MF-U-4</b> the strength of the gravitational force between objects is proportional to the masses and weakens rapidly with increasing distance between them.	Energy and Motion	Circular Motion and Gravitation
		<b>SC-H-MF-U-5</b> electricity and magnetism are two inseparable aspects of the same force (electromagnetism). Moving electrical charges produce magnetic forces and moving magnetic fields	Waves Magnetism and Atomic Physics	Light Electromagnetic Induction

		produce electrical forces. Electrical current is due to the motion of charge and has a specific direction.	Magnetism and Atomic Physics Electricity	Magnetism Electrical Energy and Current
		<b>SC-H-MF-U-6</b> electromagnetic forces acting within and between atoms are vastly stronger than the gravitational forces acting between the atoms. At the atomic level, electric forces between oppositely charged electrons and protons hold atoms and molecules together and thus are involved in all chemical reactions. On a larger scale, these forces hold solid and liquid materials together and act between objects when they are in contact—as in sticking or sliding friction.		
		<b>SC-H-MF-U-7</b> the forces that hold the nucleus of an atom together are much stronger than the electromagnetic force. That is why such great amounts of energy are released from the nuclear reactions in the sun and other stars.		
	<b>SC-H-MF-S</b> Skills and Concepts	<b>SC-H-MF-S-1</b> design and conduct investigations involving the motion of objects and report the results in a variety of ways	Physics and the Laws of Motion Physics and the Laws of Motion	Free-Fall Acceleration Lab Projectile Motion Lab
		<b>SC-H-MF-S-2</b> investigate Newton's Laws of Motion and Gravitation. Experimentally test inertia and gravitational acceleration	Physics and the Laws of Motion Physics and the Laws of Motion	Free-Fall Acceleration Lab Forces and Friction Lab
		<b>SC-H-MF-S-3</b> experimentally test conservation of momentum. Use tables, charts and graphs in making arguments and claims in oral and written		

		presentations		
		<b>SC-H-MF-S-4</b> create and analyze graphs, ensuring that they do not misrepresent results by using inappropriate scales or by failing to specify the axes clearly	Physics and the Laws of Motion Heat and Thermodynamics Electricity Magnetism and Atomic Physics	Free-Fall Acceleration Lab Thermal Equilibrium Lab Current and Resistance Lab Electromagnetic Induction Lab
		<b>SC-H-MF-S-5</b> develop investigable questions that guide explorations of the interrelationship between electricity and magnetism	Magnetism and Atomic Physics Magnetism and Atomic Physics	Electromagnetic Induction Lab Magnetic Field of a Solenoid Lab
		<b>SC-H-MF-S-6</b> investigate the attraction and repulsion of electrical charges to predict the behavior of charged objects	Electricity	Electrostatics Lab
		<b>SC-H-MF-S-7</b> create conceptual and mathematical models of motion and test them against real-life phenomena		
		<b>SC-H-MF-S-8</b> explain why the strength of the nuclear force is responsible for the great energy release involved in nuclear reactions		
		<b>SC-H-MF-S-9</b> predict which forces would be predominant in a given system and explain	Physics and the Laws of Motion	Forces and Friction Lab
<b>SC-H-ET</b> Energy Transformations (Unifying Concepts)	<b>SC-H-ET-U</b> Enduring Knowledge - Understandings	<b>SC-H-ET-U-1</b> transformations that occur within the nuclei of atoms release vastly greater energy than those that involve only electrons, and result in the emission of radiation and/or transformation of elements. <b>SC-H-ET-U-2</b> while the total amount of		

	energy in the universe is constant, the amount that is available for useful transformations is always decreasing. Systems within the universe will cease to function once the energy differential becomes zero.		
	<b>SC-H-ET-U-3</b> waves, including electromagnetic radiation, are an important form of energy transfer. Waves are governed by rules that can be investigated and used to predict/explain their behavior.	Waves	Vibrations and Waves
	<b>SC-H-ET-U-4</b> many elements and compounds are involved in continuous cyclic processes where they are stored by and/or flow between organisms and the environment. These processes require a continuous supply of energy to occur.		
	<b>SC-H-ET-U-5</b> radiant energy from the sun is stored in a chemical form in plants as a result of photosynthesis. This energy transformation allows plants to use simple molecules, such as carbon dioxide and water, to assemble the complex molecules needed to increase their mass.		
	<b>SC-H-ET-U-6</b> energy stored in food is released by a series of internal chemical reactions that reorganize the molecules into a form useable by the organism.		
	<b>SC-H-ET-U-7</b> a variety of carbon compounds are essential to the processes that occur in all organisms.		
	<b>SC-H-ET-U-8</b> heat is a manifestation of the random motion and vibrations of atoms or molecules within a substance. Interactions between or among atoms or	Heat and Thermodynamics	Heat

	<p>molecules naturally move toward states of higher disorder.</p> <p><b>SC-H-ET-U-9</b> many different sources of energy are used for a variety of purposes, including powering machines designed to do useful work. Regardless of function or energy source, the useful energy output of any machine is always less than the total energy input.</p> <p><b>SC-H-ET-U-10</b> all Earth systems/processes require either an internal or external source of energy to function. Changes to any component, or to the quantity or type of energy input, may influence all components of the system.</p> <p><b>SC-H-ET-U-11</b> weather and climate are the direct or indirect result of transfer of solar energy, and changes in one part of the system may influence all of the others. The complexity of the system and the number of variables involved requires very complex mathematical models in order to make accurate predictions.</p> <p><b>SC-H-ET-U-12</b> technological problems often create a demand for new scientific knowledge, and new technologies make it possible for scientists to conduct their research more effectively or to conduct new lines of research. The availability of new technology often sparks scientific advances.</p> <p><b>SC-H-ET-U-13</b> technology affects society because it solves practical problems and serves human needs. Science affects society by stimulating thought or satisfying</p>		
		Energy and Motion	Machines and Efficiency Lab
		Magnetism and Atomic Physics	Atomic Physics
		Electricity Magnetism and Atomic Physics	Circuits and Circuit Elements Atomic Physics

		curiosity, or by influencing views of the world, or by providing knowledge necessary for new technological advances.		
	<b>SC-H-ET-S</b> Skills and Concepts	<b>SC-H-ET-S-1</b> classify and describe nuclear reactions and their products		
		<b>SC-H-ET-S-2</b> investigate the forces inside the nucleus and evaluate the risk/benefits of nuclear energy		
		<b>SC-H-ET-S-3</b> apply the law of conservation of energy and explore heat flow in real-life phenomena	Heat and Thermodynamics	Thermal Equilibrium Lab
		<b>SC-H-ET-S-4</b> investigate waves, the rules describing wave behavior and energy transfer via waves in real life phenomena (e.g., nuclear medicine, industrial applications)	Waves	Wave Lab
			Waves	Light
			Waves	Converging Lenses Lab
		<b>SC-H-ET-S-5</b> investigate the flow of matter and energy between organisms and the environment and model the cyclic nature of this process		
		<b>SC-H-ET-S-6</b> explain the metabolic process of photosynthesis and describe the molecules it assembles to store solar energy		
		<b>SC-H-ET-S-7</b> describe the metabolic processes that allow energy stored in food to be made available to the organism		
		<b>SC-H-ET-S-8</b> explore the composition and function of the carbon compounds involved in metabolism		
	<b>SC-H-ET-S-9</b> apply the concept of entropy to molecular interactions and to interactions within the universe			
	<b>SC-H-ET-S-10</b> analyze a variety of energy sources, their potential uses and their			

		relative costs/benefits		
		<b>SC-H-ET-S-11</b> investigate the relationship of energy input vs. useful energy output in mechanical systems	Energy and Motion	Machines and Efficiency Lab
		<b>SC-H-ET-S-12</b> model and explain the relationships and energy flow existing in various Earth systems		
		<b>SC-H-ET-S-13</b> use weather data to model the complex interactions responsible for weather and climate		
		<b>SC-H-ET-S-14</b> describe how science and technology interact. Research and investigate the impact of technology on society and how technological advances have driven scientific research	Electricity	Circuits and Circuit Elements
<b>SC-H-I</b> Interdependence (Unifying Concepts)	<b>SC-H-I-U</b> Enduring Knowledge - Understandings	<b>SC-H-I-U-1</b> human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.		
		<b>SC-H-I-U-2</b> unique among organisms, humans have the capability to impact other species on a global scale both directly (e.g. selective breeding, genetic engineering, foreign species introductions) and indirectly (e.g. habitat crowding, pollution, climate change).		
		<b>SC-H-I-U-3</b> the appearance of new species always impacts the environment. In some cases this impact can have global and profound significance (e.g. when ancient bacteria transformed the atmosphere to an oxygen-rich environment).		
		<b>SC-H-I-U-4</b> every ecosystem contains natural checks and balances, both biotic and abiotic, that serve to limit the size and		

		range of the populations contained within it.		
		<b>SC-H-I-U-5</b> human creativity, inventiveness and ingenuity have brought new risks as well as improvements to human existence. People control technology and are ultimately responsible for its effects.		
		<b>SC-H-I-U-6</b> science/technology occasionally provides the means to do questionable things. Decisions about doing these things require exercising a sense of responsibility. Just because something can be done does not mean it should be done.	Electricity	Circuits and Circuit Elements
		<b>SC-H-I-U-7</b> the critical assumptions behind any line of reasoning must be made explicit, so that the validity of the position being taken can be judged.		
	<b>SC-H-I-S</b> Skills and Concepts	<b>SC-H-I-S-1</b> explore ways to eradicate or lessen environmental problems caused by human interaction (e.g., examine programs for habitat restoration or wildlife protection, automotive/industrial emissions standards)		
		<b>SC-H-I-S-2</b> investigate changes in ecosystems and propose potential solutions to problems by documenting and communicating solutions to others through multi-media presentations		
		<b>SC-H-I-S-3</b> analyze and describe the effects of events (e.g., fires, hurricanes, deforestation, mining, population growth and municipal development) on environments from a variety of perspectives. Use data to propose ways		

		of lessening impacts perceived as negative		
		<b>SC-H-I-S-4</b> examine existing models of global population growth and the factors affecting population change (e.g., geography, diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change		
		<b>SC-H-I-S-5</b> analyze examples of environmental changes resulting from the introduction, removal, or reintroductions of indigenous or non-indigenous species to an ecosystem. Use information to predict future impacts of similar changes in other ecosystems		
		<b>SC-H-I-S-6</b> analyze and synthesize research, for questions about, theories and related technologies that have advanced our understanding of interdependence		
		<b>SC-H-I-S-7</b> explore the causes, consequences and possible solutions to persistent, contemporary and emerging global issues relating to environmental quality		
		<b>SC-H-I-S-8</b> Investigate controversial scientific proposals (e.g., human cloning, genetic modification of crops, nuclear waste storage), use scientific evidence/data to support or defend a position and debate the ethical merits of implementing the proposed actions		