Introductory Physical Science (*IPS* 7th and 8th editions) & *Force, Motion, and Energy* (*FM&E*)
Alignment with Missouri's Framework for Curriculum Development in Science
Grades 5-8: Physical Science

Standard	Indicator	IPS7 IPS8 Ch. 1	IPS7 IPS8 Ch. 2	IPS7 IPS8 Ch. 3	IPS7 IPS8 Ch. 4	IPS7 IPS8 Ch. 5	IPS7 IPS8 Ch. 6	IPS7 IPS8 Ch. 7	IPS7 IPS8 Ch. 8	IPS7 IPS8 Ch. 9	IPS7 IPS8 Ch. 10	IPS7 Ch. 11	IPS7 Ch. 12	FM &E Ch. 1	FM &E Ch. 2	FM &E Ch. 3	FM &E Ch. 4	FM &E Ch. 5	FM &E Ch. 6	FM &E Ch. 7
I. Scientific Inquiry A. Processes of Scientific Inquiry	*By the end of grade 8, all students should know that* 1. Various statistical procedures are used to determine characteristics of sets of data as well as to determine the validity of experimental results.	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X
	2. The use of tools allows more sophisticated means of observation and data collection, analysis, storage, and retrieval.	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X
	3. The comprehensiveness and sophistication of science are dependent on the ability to determine and use appropriate tools and technologies.	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X
	4. Communication and the open sharing of information and knowledge are essential parts of scientific inquiry.	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X
I. Scientific Inquiry A. Processes of Scientific Inquiry	*By the end of grade 8, all students should be able to* a. apply mathematical procedures to investigations and data sets in order to determine patterns, relationships, and predictions (1.6)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X
	b. find the mean and median of sets of data, calculate percent and ratios, and determine the units in which the values should be expressed (1.8; 4.1)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X
	c. read analog and digital meters that measure length, volume, mass, time, and temperature; use microscopes, cameras, and tape recorders for capturing information; and use computers to locate, select, identify, collect, store, manipulate, and receive information (1.4; 1.8)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X

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	d. using appropriate technologies, inspect, disassemble, and reassemble simple mechanical devices; assess what the various parts are for and what the effect would be of removing or changing individual parts; predict the most likely sources of malfunctions; and select and apply appropriate strategies to correct or prevent such malfunctions (1.6; 3.1; 3.2; 3.3)																			
	e. locate, read, listen to, and view various forms of information to interpret and evaluate; organize information in text, tables, and graphs; and use a variety of methods, forms, and technologies to describe the meaning and implications of the information (1.4; 1.5; 1.6; 1.7; 1.8; 2.1; 2.7)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X
I. Scientific Inquiry B. Investigations	*By the end of grade 8, all students should know that* 1. A valid experiment, or "fair test," involves the manipulation of only one variable, while all others are held constant. Experiments should be repeated many times before accepting the results as true.	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X
	2. Critical analysis of procedures, data, evidence, and conclusions developed during an investigation can be used to judge the quality and validity of the work.	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X
I. Scientific Inquiry B. Investigations	*By the end of grade 8, all students should be able to* a. design and conduct investigations that include an adequate number of repeated trials, unbiased sampling, accurate measurement and recordkeeping, and a comparison to a control (1.3; 3.1; 3.2; 3.3; 3.4)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X
	b. analyze and evaluate arguments based on very small sets of data, experiments with few repeated trials, biased samples, or samples for which there was no control sample (1.5; 1.7; 3.4; 3.7)	X X	X X	X X	X X	X X	X X	X X	X X	X X	X	X	X	X	X	X	X	X	X	X

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II. Scientific Relevance A. The Nature of Technology	*By the end of grade 8, all students should know that* 1. The issues related to science, technology, and society are often complex and involve risk/benefit trade-offs.																			
	2. Breakthroughs in science often lead to advances in technology, and improved technological equipment leads to more accurate data collection in scientific inquiry.																			
II. Scientific Relevance A. The Nature of Technology	*By the end of grade 8, all students should be able to* a. analyze, evaluate, and communicate both benefits and possible risks to health, society, and the environment associated with investigations and technological advances reported in the media (1.1; 1.2; 1.7; 1.9; 2.1; 2.2; 2.3; 3.1; 3.5; 3.6; 3.8; 4.1; 4.3; 4.4; 4.6)																			
	b. identify and analyze ways in which advances in science and technology have affected each other and society (1.1; 1.2; 1.6; 1.7; 1.9; 3.8)																			
II. Scientific Relevance B. Historical Perspective	*By the end of grade 8, all students should know* 1. Important contributions in science have been made by many different people, in different cultures, and at different times. Their places of work include offices, classrooms, laboratories, farms, factories, and natural field settings everywhere.																			
	2. Some people (e.g., women and minorities) have sometimes been discouraged or denied the opportunity of participating in science because of education or employment prejudices and restrictions.																			

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II. Scientific Relevance B. Historical Perspective	*By the end of grade 8, all students should be able to* a. identify the background qualifications and training that are needed in order to have careers related to science and technology (4.8)																			
	b. describe some of the funding sources that can be used to finance education and training in science and technology (1.2; 1.4; 1.7)																			
II. Scientific Relevance C. Science as a Human Endeavor	*By the end of grade 8, all students should know that* 1. Scientific ethics require that scientists must not knowingly subject coworkers, students, human research subjects, the neighborhood, or the community to health or property risks without their knowledge and consent.																			
	2. Social, cultural, environmental, and economic factors all influence which science and technology will be undertaken and used. Society and the environment are directly influenced by the discoveries of science and products of technology.				X X			X X												
II. Scientific Relevance C. Science as a Human Endeavor	*By the end of grade 8, all students should be able to* a. evaluate possible risks to classmates, research subjects, or the community associated with their own independent investigations (1.2; 1.4; 1.7; 1.10; 4.3; 4.4; 4.7)							X X												
	b. analyze and evaluate the economic, political, social, ethical, and aesthetic constraints that might affect progress with specific scientific technological endeavors (3.1; 3.4; 3.5; 3.6; 3.8; 4.1)																			
III. Matter and Energy A. Properties, Characteristics and Structure of Matter	*By the end of grade 8, all students should know that* 1. In a closed system, matter is conserved during any physical or chemical change.	X X	X X																	

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	2. Some physical properties depend on the amount of matter present while other properties do not.	X X	X X	X X																
	3. Almost all matter is derived from naturally occurring elements. Each element is made of atoms that bond together to form molecules.	X X	X X	X X	X X	X X	X X	X X	X X	X X										
	4. The arrangement, motion, and interaction of molecules determine the physical state for the matter.																			
	5. Compounds can be analyzed and separated by making use of their unique chemical and physical properties.						X X													
III. Matter and Energy A. Properties, Characteristics and Structure of Matter	*By the end of grade 8, all students should be able to* a. identify chemical changes in common objects as a result of interactions with heat, light, air (1.6; 1.1; 3.1; 3.5)	X X		X X		X X	X X		X X		X	X	X							
	b. identify the components of a solution, demonstrating the use of ratios and percents in preparing different concentrations of the solution, and compare the properties of different concentrations of the solution (1.2; 1.6; 1.8; 3.1; 3.5)				X X															
III. Matter and Energy B. Characteristics, Forms and Sources of Energy	*By the end of grade 8, all students should know that* 1. Most processes involve energy transformation with the release of heat. However, the total amount of energy remains constant.																		X	X
	2. The electromagnetic spectrum consists of energy bands of visible and nonvisible wavelengths. White light from the sun consists of a mixture of wavelengths and energies in the visible part of the electromagnetic spectrum.																			

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	3. Electrical energy is transferred by the movement of electrons driven by a voltage through a complete circuit and is extremely useful to humankind.										X	X	X							
	4. Static electricity is potential energy stored in a collection of separated negative and positive charges.																			
	5. Chemical energy is stored in chemical bonds between atoms in the elements and compounds.																			
III. Matter and Energy B. Characteristics, Forms and Sources of Energy	*By the end of grade 8, all students should be able to* a. measure and quantitatively compare the heat changes involved in an energy transformation (1.2; 1.3; 1.6; 1.8; 2.4; 3.5)																		X	X
	b. identify the wavelengths and energies in the visible part of the electromagnetic spectrum (1.3; 1.6; 3.5)																			
	c. identify and discuss the use/misuse of the nonvisible part of the electromagnetic spectrum (1.7; 1.10, 2.4; 3.8; 4.7)																			
	d. understand the advantages and disadvantages of series and parallel circuits (1.2; 1.3; 1.4; 1.6; 1.10; 3.7)																			
	e. compare various sources of energy for the generation of electric power (1.10; 2.4; 3.8; 4.7)																			
	f. predict specific conditions that will cause static electricity (1.2; 1.6; 2.4; 3.5)																			
	g. understand applications and hazards of static electricity (1.10; 2.4; 3.8; 4.7)																			
	h. identify sources of chemical energy used in commercial and industrial activity and in life processes (1.7; 1.10; 2.4; 3.8; 4.7)					X X														

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III. Matter and Energy C. Interactions of Matter and Energy	*By the end of grade 8, all students should know that* 1. Energy is required to produce changes in matter and do to work.																		X	X
	2. Heat energy can be transferred by conduction, convection, or radiation.																		X	X
	3. The interaction between matter and energy can result in changes in electronic, atomic, and molecular motion.																			
	4. Different materials have different electrical resistance. Resistance converts electric energy into heat energy.																			
	5. Energy travels through matter as waves.																	X		
III. Matter and Energy C. Interactions of Matter and Energy	*By the end of grade 8, all students should be able to* a. design, conduct, and communicate about an investigation that shows the relationship between energy and changes in matter (1.3; 1.6; 2.1; 2.7; 3.8)				X X	X X	X X				X	X	X					X	X	X
	b. discuss the roles of radiation, convection, and conduction in weather changes (1.2; 1.6, 2.3; 2.4; 3.5; 4.6)																			
	c. explain how an energy source interacts with and causes changes in different materials (1.3; 2.1; 2.4; 3.5; 4.1)					X X	X X	X X	X X										X	X
	d. explain the characteristics of a substance that makes it a good conductor or insulator (1.3; 2.1;2.4; 3.5; 4.1)																			
	e. identify waves as mechanical or electromagnetic and identify common wave properties (1.2; 1.6;1.7; 3.5)																	X		
	f. discuss how waves interact with barriers and each other (1.6; 2.3; 3.5)																	X		

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IV. Force, Motion and Mechanical Energy A. Relative Motion	*By the end of grade 8, all students should know that* 1. The motion of an object can be described as a change in position, direction, and speed.															X	X	X		
	2. The motion of an object can be represented graphically in terms of direction over time, speed over time, or position over time.																X	X		
	3. Acceleration occurs when an object speeds up, slows down, or changes direction.															X	X	X		
IV. Force, Motion and Mechanical Energy B. Types and Properties of Force and Motion	*By the end of grade 8, all students should know that* 1. The overall effect of many forces acting on an object at the same time is called net force. The size and direction of this net force determines the change in motion of an object.													X	X	X				
	2. Whenever an object exerts a force on another, an equal but opposite force is exerted back on it.													X						
	3. Every object exerts a force on every other object. Its magnitude depends on the masses of the objects and the distance between them.																			
IV. Force, Motion and Mechanical Energy B. Types and Properties of Force and Motion	*By the end of grade 8, all students should be able to* a. use appropriate technologies to measure and compute the direction and magnitude of the forces causing the motions of common activities (1.1; 1.3; 1.4; 3.5)													X	X	X	X			
	b. organize data concerning the direction and position of a moving object with respect to time in graphical form (1.1; 1.2; 1.4; 1.8; 3.1; 3.5)																X	X		
	c. explain how an object's acceleration is affected by outside forces and its mass (3.1; 3.3; 4.1)													X	X	X	X			

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	d. use technologies to determine the direction of acceleration and the net force for an object moving in a circle (1.3; 1.4; 1.6; 1.10; 4.1)															X				
	e. recognize and define the forces necessary for an object to move or be in equilibrium (1.4; 1.7; 2.1; 3.5; 3.7; 4.1)													X	X	X				
	f. compare and describe the gravitational force between two objects (1.4; 1.7; 2.1; 3.1; 4.1)																			
IV. Force, Motion and Mechanical Energy C. Interactions of Force and Motions	*By the end of grade 8, all students should know that* 1. Mechanical energy comes from the motion (kinetic energy) and/or position (potential energy) of an object.																			X
	2. The work done on an object depends on both the applied force and the distance an object moves.																			
	3. Simple machines can be used to change the force on an object, its speed, or its direction of movement.															X				
IV. Force, Motion and Mechanical Energy C. Interactions of Force and Motions	*By the end of grade 8, all students should be able to* a. interpret and explain the relationship among kinetic energy, potential energy, and mechanical advantage (1.6; 1.8; 2.1; 2.3; 2.5; 4.1)																			X
	b. analyze the changes in kinetic and potential energy in common activities (1.5; 4.1; 4.10)																			X
	c. determine the amount of work done when an object is moved or when a task is performed (1.5; 4.1; 4.10)																			
	d. explain and demonstrate how common tools are simple machines and discuss the forces and motions involved (1.1; 1.6; 1.10; 3.1; 3.6; 4.1)																			