INTRODUCTION AND KEY

As a complete course, *Issues and Physical Science (IAPS)* provides approximately one school year of science instruction. Each of the five units provides a focus on selected standards. To help you evaluate course or unit content, *Issues and Physical Science* activities have been correlated to the National Science Education Standards (NSES, 1996). The Standards are divided into three levels: K–4, 5–8, and 9–12. The NSES middle level standards are intended to help guide instruction for the four-year period covering grades 5–8. For this reason, *Issues and Physical Science* addresses many, but not all, of these standards. Other instructional materials, including those developed by SEPUP, may be used to help address these standards in their entirety. For each standard, information is provided as to whether the concept is introduced, covered or discussed briefly, taught significantly, or taught in depth.

This document contains correlations to all of the elements of the following NSES Science Content Standards: Science as Inquiry (A), Physical Science (B), Life Science (C), Earth Science (D), Science and Technology (E), Science in Personal and Social Perspectives (F), and History and Nature of Science (G). Because of the spiral nature of concept development in *Issues and Physical Science*, a specific activity may not address all aspects of a standard. However, all of the activities correlated to a particular standard work together to develop student understanding and mastery of the identified content. For more information on the content of a specific activity or unit, please consult the Teacher's Guide for the content in question.

NOTE: In the following tables, *Treatment* refers to whether the Standard is covered in depth (+), covered significantly (√), introduced or covered briefly (i), or not covered (NC).

The text for the individual Standards has been edited for space and format reasons. Please refer to the National Science Education Standards document for the complete text.

This Teacher Resource edition includes correlations by specific activity for Unit E, "Force and Motion" of the course. Correlations for Standard B, Physical Science, are also provided by unit for the other units of the course. The complete course will include specific activities for all units. In addition, standards that are addressed by other courses in the SEPUP middle school sequence are also indicated. Standards included in *Issues and Earth Science* are indicated by IAES and standards that are addressed in *Issues and Life Science* (formerly *Science and Life Issues*, or SALI) are indicated by IALS.

A: Science as Inquiry

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course*
Abilities necessary to do scientific inquiry	Identify questions that can be answered through scientific investigations.	+	2, 4, 5, 7, 9, 10, 13, 14
	Design and conduct a scientific investigation.	+	2, 5, 14
	Use appropriate tools and techniques to gather, analyze and interpret data.	+	2, 4, 5, 7, 9, 10, 14
	Develop descriptions, explanations, predictions, and models using evidence.	+	1, 2, 4, 7, 9, 10, 11, 13, 14
	Think critically and logically to make the relationships between evidence and explanations.	+	2, 4, 5, 6, 7, 9, 10, 11, 14, 15
	Recognize and analyze alternative explanations and predictions.	i	1
	Communicate scientific procedures and explanations.	+	2, 4, 5, 7, 9, 10, 11, 14
	Use mathematics in all aspects of scientific inquiry (Use relevant key skills math entries)	+	2, 3, 4, 5, 6, 9, 10, 11, 13, 15

* Some standards not addressed in IAPS are covered in SEPUP's two other middle school courses. When this is the case, IALS refers *Issues and Life Science* (also known as *Science and Life Issues* or SALI), and IAES refers to *Issues and Earth Science*.

A: Science as Inquiry

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Understandings about scientific inquiry	Different kinds of question suggest different kinds of scientific investigations.	i	13
	Current scientific knowledge and understanding guide scientific investigations.	+	12, 13
	Mathematics is important in all aspects of scientific inquiry.	+	2, 3, 4, 5, 6, 9, 10, 11, 13
	Technology used to gather data enhances accuracy and allows scientist to analyze and quantify results of investigations.	+	2, 12, 13, 15
	Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories	+	2, 4, 5, 7, 9, 10, 11, 14
	Science advances through legitimate skepticism.	nc	
	Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for investigation, or develop new technologies to improve collection of data.	i	13

B: Physical Science

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Property and changes of properties in matter	A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample.	nc	Units A, B, C
	Substances react chemically in characteristics ways with other substances to form new substances (compounds) with different characteristic properties.	nc	Units B, C
	Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current or reaction with acids.	nc	Unit B
Motions and forces	The motion of an object can be described by its position, direction of motion, and speed.	+	2, 3, 4, 5, 9, 10, 11, 12, 14
	An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.	+	4, 5, 7, 8, 9, 10, 12, 14
	If more than one force acts on an object along straight line, then forces will reinforce or cancel one another, depending on their direction and magnitude.	+	4, 5, 8, 9, 10, 11, 12

C: Life Science

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Structure and function in living systems	Living systems at all levels of organization demonstrate the complementary nature of structure and function.	nc	*See IALS*
	Cells carry on the many functions needed to sustain life.	nc	*See IALS*
	All organisms are composed of cells--the fundamental unit of life.	nc	*See IALS*
	Specialized cells perform specialized functions in multicellular organisms.	nc	*See IALS*
	The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease.	nc	*See IALS*
	Disease is a breakdown in structures or functions of an organism.	nc	*See IALS*
Reproduction and heredity	Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species.	nc	*See IALS*
	In many species, including humans, females produce eggs and males produce sperm.	nc	*See IALS*
	Every organism requires a set of instructions for specifying its traits.	nc	*See IALS*
	Hereditary information is contained in genes, located in the chromosomes of each cell.	nc	*See IALS*
	The characteristics of an organism can be described in terms of a combination of traits.	nc	*See IALS*

C: Life Science

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Regulation and behavior	All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.	nc	*See IALS*
	Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive.	nc	
	Behavior is one kind of response an organism can make to an internal or environmental stimulus.	nc	
	An organism's behavior evolves through adaptation to its environment.	nc	
Populations and ecosystems	A population consists of all individuals of a species that occur together at a given place and time.	nc	*See IALS*
	Populations of organisms can be categorized by the function they serve in an ecosystem.	nc	*See IALS*
	For ecosystems, the major source of energy is sunlight.	nc	*See IALS*
	The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition.	nc	*See IALS*
Diversity and adaptations of organisms	Millions of species of animals, plants, and microorganisms are alive today.	nc	*See IALS*
	Biological evolution accounts for the diversity of species developed through gradual processes over many generations.	nc	*See IALS*
	Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.	nc	*See IALS*

D: Earth and Space Science

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Structure of the earth system	The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.	nc	*See IAES*
	Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle.	nc	*See IAES*
	Landforms are the result of a combination of constructive and destructive forces.	nc	*See IAES*
	Some changes in the solid earth can be described as the "rock cycle."	nc	*See IAES*
	Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria.	nc	*See IAES*
	Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle."	nc	*See IAES*
	Water is a solvent.	nc	*IAPS* Water Unit
	The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor.	nc	*See IAES*
	Clouds, formed by the condensation of water vapor, affect weather and climate.	nc	*See IAES*
	Global patterns of atmospheric movement influence local weather.	nc	*See IAES*
	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.	nc	*See IAES*

D: Earth and Space Science

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Earth's history	Fossils provide important evidence of how life and environmental conditions have changed.	nc	*See IALS*
	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.	nc	*See IAES*
Earth in the Solar System	Earth is the third planet from the Sun in a system that includes Earth's moon, the Sun, eight other planets and their moons, and smaller objects, such as asteroids and comets.	nc	*See IAES*
	Most objects in the Solar System are in regular and predictable motion.	nc	*See IAES*
	Gravity is the force that keeps planets in orbit around the Sun and governs the rest of the motion in the Solar System.	nc	*See IAES*
	The Sun is the major source of energy for phenomena on the Earth's surface, such as growth of plants, winds, ocean currents, and the water cycle.	nc	*See IAES*

E: Science and Technology

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Abilities of technological design	Identify appropriate problems for technological design.	i	13
	Design a solution or product.	i	13
	Implement a proposed design.	nc	*See IALS*
	Evaluate completed technological designs or products.	nc	*See IALS*
	Communicate the process of technological design.	nc	*See IALS*
Understandings about science and technology	Scientific inquiry and technological design have similarities and differences.	nc	*See IALS*
	Many different people in different cultures have made and continue to make contributions to science and technology.	nc	*See IALS*
	Science and technology are reciprocal.	nc	*See IALS*
	Perfectly designed solutions do not exist.	√	1, 12, 13, 15
	Technological designs have constraints.	√	1, 12, 13, 15
	Technological solutions have intended benefits and unintended consequences	nc	

F: Science in Personal and Social Perspectives

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Personal health	Regular exercise is important to the maintenance and improvement of health.	nc	*See IALS*
	The potential for accidents and the existence of hazards imposes the need for injury prevention.	√	1, 13, 14
	The use of tobacco increases the risk of illness.	nc	*See IALS*
	Alcohol and other drugs are often abused substances.	nc	
	Food provides energy and nutrients for growth and development.	nc	*See IALS*
	Sex drive is a natural human function that requires understanding.	nc	
	Natural environments may contain substances (for example, radon and lead) that are harmful to human beings.	nc	
Populations, resources, environments	When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.	nc	*See IAES*
	Causes of environmental degradation and resource depletion vary from region to region and from country to country.	nc	*See IAES*
Natural hazards	Internal and external processes of the earth system cause natural hazards, events that change or destroy human and wildlife habitats, damage property, and harm or kill humans.	nc	*See IAES*
	Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal.	nc	Units B and C *See IAES*
	Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.	nc	

F: Science in Personal and Social Perspectives

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Risks and benefits	Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences.	√	12, 13, 15, 16
	Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).	nc	Unit C *See IALS, IAES*
	Individuals can use a systematic approach to thinking critically about risks and benefits.	√	1, 16
	Important personal and social decisions are made based on perceptions of benefits and risks.	+	1, 12, 13, 14, 15, 16
Science and technology in society	Science influences society through its knowledge and world view.	√	12, 13, 15
	Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.	nc	
	Technology influences society through its products and processes.	√	12, 13, 15
	Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.	nc	
	Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.	nc	
	Scientists and engineers have ethical codes requiring that human subjects involved with research be fully informed about risks and benefits associated with the research before the individuals choose to participate.	nc	*See IALS*
	Science cannot answer all questions and technology cannot solve all human problems or meet all human needs.	nc	

G: History and Nature of Science

Guide to the Content Standards		Treatment in IAPS	IAPS Unit E Activity or other SEPUP course
Science as a human endeavor	Women and men of various social and ethnic backgrounds—and with diverse interests, talents, qualities, and motivations—engage in the activities of science, engineering, and related fields such as medicine.	nc	
	Science requires different abilities, depending on such factors as the field of study and type of inquiry.	nc	
Nature of science	Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.	nc	
	In areas where active research is being pursued and in which there is not a great deal of experimental or observational evidence and understanding, it is normal for scientists to differ with one another about the interpretation of the evidence or theory being considered.	i	*See IAES*
	It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists.	nc	
History of science	Many individuals have contributed to the traditions of science.	i	8
	In historical perspective, science has been practiced by different individuals in different cultures.	i	8
	Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.	nc	*See IAES, IALS*

KEY SKILLS MATRIX

Inquiry Skills

	Unit A	Unit B	Unit C	Unit D	Unit E
Makes observations					2–5, 7, 9, 10
Identifies data					1, 2, 4–7, 9–11, 14, 15
Analyzes data					1–7, 9, 11, 14, 15
Makes/interprets data tables					1, 4–7, 9–11, 14, 15
Makes/interprets graphs					3, 6, 11
Identifies/controls a variable					2, 4, 5, 9, 10, 14
Makes a prediction/hypothesis					2, 4–7, 9, 11, 14
Designs an investigation					2, 5, 14
Creates/uses models					2, 4, 5, 7, 9, 10, 13, 14
Evaluates models					5, 10, 13
Makes evidence-based decisions					1, 10, 11, 14, 16
Revises predictions or explanations based on evidence					1, 2, 4, 5, 7, 9, 11

Literacy and Communication Skills

	Unit A	Unit B	Unit C	Unit D	Unit E
Reads for information					1, 3–5, 8, 12, 16
Communicates orally					1, 4, 5, 7, 8, 13, 16
Communicates in writing					1, 4, 5, 8, 13
Describes observations					2–5, 7, 9–11, 14
Writes explanations					1–16
Makes presentations					13
Uses diagrams or sketches					7, 9, 13, 14
Formulates operational definitions					6, 9
Listens to others					1–5, 7–11, 13–16
Works collaboratively					1–5, 7–11, 13–16
Keeps a science journal					1–10, 12–14, 16

Information Organizing and Processing Skills

	Unit A	Unit B	Unit C	Unit D	Unit E
Categorizes/sorts information					1, 14–16
Sequences information					3
Summarizes information					1, 2, 4, 5, 7–16
Differentiates observations/ inferences					
Differentiates evidence/opinion					
Draws/analyzes concept maps					11
Creates/uses other graphic organizers					16

Laboratory/Math Skills

	Unit A	Unit B	Unit C	Unit D	Unit E
Uses tools correctly					2, 4, 5, 9, 10
Uses appropriate tools to measure					2, 4, 5, 9, 10
Uses SI measurements					2, 4–6, 8–11
Calculates mean, median, mode					2
Determines a scale					
Uses graphs appropriately					3, 5, 11
Follows procedures					2, 4, 5, 7, 9–11, 14

Computer Skills

	Unit A	Unit B	Unit C	Unit D	Unit E
Gathers information or conducts research					2, 10
Uses a simulation of scientific phenomena					13