



**LAB-AIDS CORRELATIONS FOR THE ARIZONA MIDDLE LEVEL
(6-8) SCIENCE STANDARDS**

GRADES 6-8

With Assessment Guidelines information

Materials from the Science Education for Public Understanding Program (SEPUP) are developed at the Lawrence Hall of Science, at the University of California, Berkeley, and distributed nationally by LAB-AIDS, Inc. SEPUP materials are supported by grants from the National Science Foundation. All other materials developed by LAB-AIDS. This correlation is intended to show selected locations in SEPUP 2nd Edition programs that support the Arizona 6-8 Science Standards. It is not an exhaustive list; other locations may exist that are not listed here.

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Key to SEPUP Core Science Programs:

SEPUP programs are available as full year courses, or separately, as units, each taking 3-9 weeks to complete, as listed below.

Issues and Earth Science, Second Edition (IAES)

Unit Title	Activity Number
Studying Soil Scientifically	1-11
Rocks and Minerals	12-23
Erosion and Deposition	24-35
Plate Tectonics	36-49
Weather and Atmosphere	50-70
The Earth in Space	71-84
Exploring Space	85-98

Issues and Life Science, Second Edition (IALS)

Unit Title	Activity Number
Experimental Design: Studying People Scientifically	1-10
Body Works	11-29
Cell Biology and Disease	30-53
Genetics	54-71
Ecology	72-88
Evolution	89-101
Bioengineering	102-109

Issues and Physical Science, Second Edition (IAPS)

Unit Title	Activity Number
Studying Materials Scientifically	1-11
The Chemistry of Materials	12-29
Water	30-52
Energy	53-72
Force and Motion	73-88
Waves	89-99

Each of the full year programs begins with a “starter” unit sequence on the scientific method in the context of each particular discipline. For example, the Issues and Life Science (IALS) course contains a ten-activity unit called “Experimental Design: Studying People Scientifically,” which uses the science behind clinical trials on human subjects, to frame the study of the life sciences. These are listed first in each course.

Recommended Scope and Sequence

Grade 6 – Cell Biology and Disease, Ecology, Energy, Weather and Atmosphere

Grade 7 – Ecology, Rocks and Minerals, Plate Tectonics, Earth in Space

Grade 8 – Genetics, Evolution, The Chemistry of Materials, Force and Motion

<i>SEPUP Course/Activity Numbers</i>	<i>Main Unit Issue</i>
IAES Issues and Earth Science	
Studying Soils Scientifically, 1-11	Why don't plants grow in the school garden?
Rocks and Minerals, 12-23	How do diamonds made in a lab compare to diamonds mined from the earth?
Erosion and Deposition, 24-35	Where should Boomtown construct the new buildings?
Plate Tectonics, 36-49	Which site would you recommend for storing nuclear waste?
Weather and Atmosphere, 50-70	Is the growth of Sunbeam City affecting its weather, atmosphere, and water availability?
The Earth in Space, 71-84	Why are there many different calendars?
Earth and the Solar System, 85-98	What kinds of future space missions should we conduct?
IALS Issues and Life Science	
Studying People Scientifically, 1-10	Which proposals have an experimental design worth funding?
Body Works, 11-29	How can you convince people to make choices that reduce their level of heart disease risk?
Cell Biology and Disease, 30-53	How is an emerging disease spread? What can you do to stop it?
Genetics, 54-71	What are the ethical issues involved in using genetic information?
Ecology, 72-88	What are the trade-offs of introducing a species into a new environment?
Evolution, 89-101	What are the trade-offs in deciding whether to save an endangered species or to re-create an extinct one?
Bioengineering, 102-108	How are new solutions to problems in life science developed?
IAPS Issues and Physical Science	
Studying Materials Scientifically, 1-11	How should unidentified materials be handled?
The Chemistry of Materials, 12-29	When you buy a new product, do you think about what materials it is made of? What will happen to it when you no longer have a use for it?
Water, 30 - 52	What does your community do to make its water safe to drink? Whose responsibility is it?
Energy, 53-72	Can you help a family decide what energy improvements they should invest in?
Force and Motion, 73-88	Should noncommercial vehicles be more alike?
Waves, 89-99	Are there situations in which some waves are harmful to your health?

SEPUP Support for Engineering Design

The Next Generation Science Standards (NGSS) note that science and engineering are somewhat parallel practices and have many similar elements. Scientists ask questions, make observations, and collect and analyze data, in an attempt to make sense of the natural world. Similarly, engineers create, test, and redesign as they respond with solutions to human needs. And just as we use scaffolds in teaching of scientific inquiry to improve student learning and practice, so do we use scaffolds in teaching about engineering for our students. The NGSS emphasize three major phases of the engineering design process.

- DESIGN: Creates design, prototype or plan, noting constraints of proposed use
- TEST: Tests design, prototype or plan, collecting qualitative or quantitative data
- REDESIGN: Evaluates prototype, design or plan, suggests further changes as needed

In addition, the NGSS emphasize the role of design in solving human problems, and of designers in developing criteria for solutions, evaluating solutions, and determining the tradeoffs involved in a design or solution.

The table below shows SEPUP activities that support major elements of engineering design. Some support the initial stages of design, criteria development, and evaluation that precede the full design cycle by suggesting or evaluating scientific or technological solutions to real-world problems. Others involve students in one or all steps of the design cycle as they build, test, and/or redesign prototypes.

Engineering and Design Practices in SEPUP

Course activity with description	Students suggest or evaluate a solution	Students engage in the engineering process		
		Design	Test	Re-design
IAES11: Recommend a soil improvement plan	X			
IAES 32: Design a coastal breakwater		X	X	X
IAES 35: Recommend a site plan for housing development		X		
IAES 49: Evaluate sites for nuclear waste disposal	X			
IAES 67: Design/build wind vane/ anemometer		X	X	X
IAES 98: Recommend a space	X			

mission				
IALS 48: Design an improved hand-washing procedure		X	X	X
IALS 88: Suggest a plan for preventing zebra mussel spread	X			
IALS 104: Design artificial heart valve		X		
IALS 105: Design an artificial bone		X	X	X
IALS 107: Design an energy bar		X	X	X
IALS 108: Design a prosthetic limb		X	X	X
IAPS 12: Recommend a material for a drink container	X			
IAPS 13: Construct a product life cycle for a drink container	X			
IAPS 29: Evaluate options to recommend a "green" computer	X			
IAPS 60: Design an ice preservation chamber		X	X	X
IAPS 63: Improve a calorimeter design			X	X
IAPS 69: Design a better solar collector		X	X	X
IAPS 70: Design a warm & cool home		X		
IAPS 72: Recommend an energy-improvement plan for a home	X	X	X	X
IAPS 73: Evaluate vehicle safety features		X		
IAPS 85: Design a crash test dummy		X		

Key to SEPUP Assessment System:

SEPUP materials include research-based assessment system developed by SEPUP and the Berkeley Evaluation and Assessment Research Group (BEAR) in the University of California Graduate School of Education. Forming the core of the SEPUP Assessment System are the **assessment variables** (content and process skills to be assessed), **assessment questions or tasks** used to gather evidence and **scoring guides** for interpreting students' responses (correspond to assessment variables).

The nine assessment variables are:

Designing Investigations (DI)
Organizing Data (OD)
Analyzing Data (AD)
Understanding Concepts (UC)
Recognizing Evidence (RE)
Evidence and Trade-offs (ET)
Communication Skills (CS)
Organizing Scientific Ideas (SI)
Group Interaction (GI)

Types of assessment:

Quick Checks (✓) present opportunities for informal formative assessment and may be used prior to instruction to find out what students know or think. They may also be used to help teachers track students' knowledge of key information or progress in understanding a concept.

Some embedded questions and tasks and all item bank questions are all suitable for summative assessment. Analysis questions are included at the end of each activity.

Citations included in the correlation document are as follows:

IAES 40, 41, 42	40 Q1, 3, 4
IALS 2, 3, 37	41 Q3 UC; [IB] D2
IAPS 1, 2, 3	42 [IB] D4, 6, 8-10, 16

IAES 40, 41, 42

40 Q1, 3, 4

41 Q3 UC; [IB] D2

42 [IB] D4, 6, 8-10, 16

means that the standard or benchmark may be assessed using Issues and Earth Science (IAES) Activity 40 Analysis Questions 1, 3 and 4, IAES Activity 41 Analysis Question 3 using the Understanding Concepts scoring guide and Item Bank Questions D2, 4, 6, 8-10, and 16 from Unit D Plate Tectonics.

For more information on program assessment and using SEPUP rubrics, consult the Teacher's Guide, TR part III Assessment section.

GRADE 6

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
Strand 1: Inquiry Process		
Inquiry Process establishes the basis for students’ learning in science. Students use scientific processes: questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results.		
Concept 1: Observations, Questions, and Hypotheses Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.		
PO 1. Differentiate among a question, hypothesis, and prediction.	IAPS 2,8 ... IAES 2, 6... IALS 21, 27...	2 AQ2 UC 8 AQ6 UC; [IB] A9 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 21 [IB] B19 27 [IB] B32
PO 2. Formulate questions based on observations that lead to the development of a hypothesis. (See M06-S2C1-01)	IAES 2,8 ... IAPS 2, 6... IALS 21, 27...	2 AQ2 UC 8 AQ6 UC; [IB] A9 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 21 [IB] B19 27 [IB] B32
PO 3. Locate research information, not limited to a single source, for use in the design of a controlled investigation. (See W-E8-01)	IAES 7, 15, 30... IAPS 74, 82... Use SEPUP web pages, e.g., www.sepuplhs.org	7 [IB] A9 15 [IB] B1-3 74 Proc DI; [IB] E1-2, 5-6 82 AQ3 RE; [IB] E3, 9, 12
Concept 2: Scientific Testing (Investigating and Modeling) Design and conduct controlled investigations.		
<i>PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.</i>	All SEPUP programs have detailed safety notes for students	

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
	and teachers.	
PO 2. Design an investigation to test individual variables using scientific processes.	IAES 3, 10... IAPS 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
PO 3. Conduct a controlled investigation using scientific processes.	IAES 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers). (See M06-S4C4-02)	IAPS 6-11... IAES 3, 4, 6, 10... IALS 5, 14, 16...	6 AQ1 AD [IB] A3, A4 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 5 AQ5 UC; [IB] A3-4
PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.	All SEPUP programs features the use of journals and science notebooks.	
Concept 3: Analysis and Conclusions Analyze and interpret data to explain correlations and results; formulate new questions.		
PO 1. Analyze data obtained in a scientific investigation to identify trends. (See M06-S2C1-03)	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	2 AQ2 UC 6 AQ1 AD [IB] A3, A4 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).	IAPS 6, 7, 9-11... IAES 6, 9, 11... IALS 2, 3, 4...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
PO 3. Evaluate the observations and data reported by others.	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 4. Interpret simple tables and graphs produced by others.	IAPS 6, 7, 8... IAES 2, 6, 7, 10... IALS 3, 4 ,5...	6 AQ1 AD [IB] A3, A4 7 AQ 1 AD, AQ1 UC, [IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 5. Analyze the results from previous and/or similar investigations to verify the results of the current investigation.	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 6. Formulate new questions based on the results of a completed investigation.	IAPS 6-10... IAES 5, 7, 10, 11... IALS 2, 3, 4...	6 AQ1 AD [IB] A3, A4 5 AQ5 UC; [IB] A3-4 2 AQ2b ET, AQ4 UC, AQ5 ET
Concept 4: Communication Communicate results of investigations.		
PO 1. Choose an appropriate graphic representation for collected data: <ul style="list-style-type: none"> • line graph • double bar graph • stem and leaf plot • histogram (See M06-S2C2-02)	IAPS 6, 7, 8... IAES 2, 6, 7, 10... IALS 3, 4 ,5... (Stem and leaf plots not addressed in SEPUP)	6 AQ1 AD [IB] A3, A4 7 AQ 1 AD, AQ1 UC, [IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 2. Display data collected from a controlled investigation. (See M06-S2C1-02)	IAPS 6, 7, 8... IAES 2, 6, 7, 10... IALS 3, 4 ,5...	6 AQ1 AD [IB] A3, A4 7 AQ 1 AD, AQ1 UC,

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
		[IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 3. Communicate the results of an investigation with appropriate use of qualitative and quantitative information. (See W-E6-PO1)	IAPS 1-3, 6-11... IAES 1-9, 11... IALS 1, 2, 4, 5...	2 AQ2 UC 3 Proc DI; [IB] A16 1 [IB] A1, A10 2 AQ3 RE 1 [IB] A1-2 2 AQ2b ET, AQ4 UC, AQ5 ET
PO 4. Create a list of instructions that others can follow in carrying out a procedure (without the use of personal pronouns).	IAPS 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
PO 5. Communicate the results and conclusion of the investigation.	IAPS 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
Strand 2: History and Nature of Science		
Scientific investigation grows from the contributions of many people. History and Nature of Science emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures.		
Concept 1: History of Science as a Human Endeavor		
Identify individual, cultural, and technological contributions to scientific knowledge.		
<i>PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Jacques Cousteau</i>	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
<i>[inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).</i>		
PO 2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 3. Analyze the impact of a major scientific development occurring within the past decade.	IAES 36 IAPS 29 IALS 70-71	36 AQ2 ET 29 AQ1 ET; [IB] B22-23 70 AQ2 DCI [IB] D19
PO 4. Describe the use of technology in science-related careers.	IALS 10 IAPS 22, 29	10 Act UC, AQ 3 ET, [IB] A18-20 22 Proc OD

Concept 2: Nature of Scientific Knowledge Understand how science is a process for generating knowledge.		
PO 1. Describe how science is an ongoing process that changes in response to new information and discoveries.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 3. Apply the following scientific processes to other problem solving or decision making situations: All SEPUP programs <ul style="list-style-type: none"> • observing • questioning • communicating • comparing • measuring • predicting • organizing data • inferring • generating hypotheses 	IAPS 6, 7, 9-11... IAES 6, 9, 11... IALS 2, 3, 4...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17

<ul style="list-style-type: none"> classifying 	<ul style="list-style-type: none"> identifying variables 		
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Strand 3: Science in Personal and Social Perspectives			
Science in Personal and Social Perspectives emphasizes developing the ability to design a solution to a problem, to understand the relationship between science and technology, and the ways people are involved in both. Students understand the impact of science and technology on human activity and the environment. This strand affords students the opportunity to understand their place in the world – as living creatures, consumers, decision makers, problem solvers, managers, and planners.			
Concept 1: Changes in Environments Describe the interactions between human populations, natural hazards, and the environment.			
PO 1. Evaluate the effects of the following natural hazards: <ul style="list-style-type: none"> sandstorm NC hurricane tornado ultraviolet light lightning-caused fire NC 	IAES 52 IALS 48	48 AQ 3 UC, [IB] C25	
PO 2. Describe how people plan for, and respond to, the following natural disasters: <ul style="list-style-type: none"> drought flooding tornadoes 	IAES 8, 30, 52	8 [IB] A5 30 [IB] C2, C10	
Concept 2: Science and Technology in Society Develop viable solutions to a need or problem.			
PO 1. Propose viable methods of responding to an identified need or problem.	IALS 102-109		

PO 2. Compare possible solutions to best address an identified need or problem.	IAES 11, 35, 49	11 AQ2 RE, ET; [IB] A11-14 35 AQ1 ET; [IB] C13 49 AQ2 ET
PO 3. Design and construct a solution to an identified need or problem using simple classroom materials.	IALS 1, 102-109	1 [IB] A1-2
PO 4. Describe a technological discovery that influences science.	IAES 93, 94, 97, 98	93 AQ4 UC, [IB] F8-11 94 AQ3 UC, [IB] F16, F26 97 AQ2 CM, [IB] F15, F22-25, F27-28, F30-31 98 [IB] F32-33
Strand 4: Life Science		
Life Science expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms and populations change over time in terms of biological adaptation and genetics. This understanding includes the relationship of structures to their functions and life cycles, interrelationships of matter and energy in living organisms, and the interactions of living organisms with their environment.		

Concept 1: Structure and Function in Living Systems Understand the relationships between structures and functions of organisms.		
PO 1. Explain the importance of water to organisms.	IALS 42	42 [IB] D3, D7, D16-10, C23
PO 2. Describe the basic structure of a cell, including: <ul style="list-style-type: none"> • cell wall • cell membrane • nucleus 	IALS 38-42	39 AQ2 DCI, [IB] C6 40 AQ3 DCI, [IB] C15, C18 42 [IB] D3, D7, D16-10, C23
PO 3. Describe the function of each of the following cell parts: <ul style="list-style-type: none"> • cell wall 	IALS 42	42 [IB] D3, D7, D16-10, C23

<ul style="list-style-type: none"> cell membrane nucleus 		
PO 4. Differentiate between plant and animal cells.	IALS 42, 82	42 [IB] D3, D7, D16-10, C23 82 [IB] E5, E13-14, E17
PO 5. Explain the hierarchy of cells, tissues, organs, and systems.	IALS 12	12 [IB] B12, B15
<p>PO 6. Relate the following structures of living organisms to their functions:</p> <p>Animals</p> <ul style="list-style-type: none"> respiration – gills, lungs digestion – stomach, intestines circulation – heart, veins, arteries, capillaries locomotion – muscles, skeleton <p>Plants</p> <ul style="list-style-type: none"> transpiration – stomata, roots, xylem, phloem absorption – roots, xylem, phloem response to stimulus (phototropism, hydrotropism, geotropism) – roots, xylem, phloem 	<p>IALS 12-24 (animals)</p> <p>IALS 80-82 (plants)</p>	<p>12 [IB] B12, B15 13 [IB] B3, B7 14 [IB] B16</p> <p>80 [IB] E2-3, E7-10, E15, E16, E25 81 AQ5 UC, [IB] E2, 3, E5, E13-14 82 [IB] E5, E13-14, E17</p>
<p>PO 7. Describe how the various systems of living organisms work together to perform a vital function:</p> <ul style="list-style-type: none"> respiratory and circulatory muscular and skeletal digestive and excretory 	IALS 12-24	12 [IB] B12, B15 13 [IB] B3, B7 14 [IB] B16
Concept 2: Reproduction and Heredity		
Understand the basic principles of heredity.		
No performance objectives at this grade level		
Concept 3: Populations of Organisms in an Ecosystem		
Analyze the relationships among various organisms and their environment.		
PO 1. Explain that sunlight is the major source of energy for most ecosystems. IALS 82 (See Strand 5 Concept 3 and Strand 6 Concept 2)	IALS 82	82 [IB] E5, E13-14, E17
PO 2. Describe how the following	IALS 83, 85, 86	83 AQ3 DCI

<p>environmental conditions affect the quality of life:</p> <ul style="list-style-type: none"> • water quality • climate • population density • smog 	(smog not covered)	85 AQ1 UC, [IB] E21-23 86 AQ1 CM
Concept 4: Diversity, Adaptation, and Behavior Identify structural and behavioral adaptations.		
No performance objectives at this grade level		

Strand 5: Physical Science		
Physical Science affords students the opportunity to increase their understanding of the characteristics of objects and materials they encounter daily. Students gain an understanding of the nature of matter and energy, including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings.		
Concept 1: Properties and Changes of Properties in Matter Understand physical and chemical properties of matter.		
No performance objectives at this grade level.		

Concept 2: Motion and Forces Understand the relationship between force and motion.		
No performance objectives at this grade level		
Concept 3: Transfer of Energy Understand that energy can be stored and transferred.		
PO 1. Identify various ways in which electrical energy is generated using renewable and nonrenewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).	IAPS 64	64 AQ3 ET, AQ4 AD, [IB] D7
PO 2. Identify several ways in which energy	IAPS 54, 58, 65	54 Proc DI; [IB] D1

may be stored.		58 AQ2 UC, [IB] D4-5, D8 65 Proc DI; D13
PO 3. Compare the following ways in which energy may be transformed: <ul style="list-style-type: none"> • mechanical to electrical • electrical to thermal 	IAPS 58	58 AQ2 UC, [IB] D4-5, D8
PO 4. Explain how thermal energy (heat energy) can be transferred by: <ul style="list-style-type: none"> • conduction • convection • radiation 	IAPS 58 IAES 46	58 AQ2 UC, [IB] D4-5, D8 46 [IB] D16

Strand 6: Earth and Space Science		
Earth and Space Science provides the foundation for students to develop an understanding of the Earth, its history, composition, and formative processes, and an understanding of the solar system and the universe. Students study the regularities of the interrelated systems of the natural world. In doing so, they develop understandings of the basic laws, theories, and models that explain the world (NSES, 1995). By studying the Earth from both a historical and current time frame, students can make informed decisions about issues affecting the planet on which they live.		

Concept 1: Structure of the Earth		
Describe the composition and interactions between the structure of the Earth and its atmosphere.		
PO 1. Describe the properties and the composition of the layers of the atmosphere.	IAES 64-65	64 [IB] E5
PO 2. Explain the composition, properties, and structure of the Earth's lakes and rivers.	IAES 28-29, 56-57	28 Proc GI; [IB] C2, C7 29 AQ2 UC; [IB] C1, C3 56 Proc GI 57 [IB] E10
PO 3. Explain the composition, properties, and	IAES 56-57	56 Proc GI

structures of the oceans' zones and layers.		57 [IB] E10
PO 4. Analyze the interactions between the Earth's atmosphere and the Earth's bodies of water (water cycle).	IAES 60-62	60 [IB] E3, E8-9 62 AQ4 SI; [IB] E3, 9, 11, 15
PO 5. Describe ways scientists explore the Earth's atmosphere and bodies of water. (See Strand 2 Concept 1)	IAES 60-62, 63, 67-68	60 [IB] E3, E8-9 62 AQ4 SI; [IB] E3, 9, 11, 15 63 AQ4 UC; [IB] E4 67 Proc DI
Concept 2: Earth's Processes and Systems Understand the processes acting on the Earth and their interaction with the earth systems.		
PO 1. Explain how water is cycled in nature.	IAES 60, 62	60 [IB] E3, E8-9 62 AQ4 SI; [IB] E3, 9, 11, 15
PO 2. Identify the distribution of water within or among the following: <ul style="list-style-type: none"> • atmosphere • lithosphere • hydrosphere 	IAES 60-62	60 [IB] E3, E8-9 62 AQ4 SI; [IB] E3, 9, 11, 15
PO 3. Analyze the effects that bodies of water have on the climate of a region.	IAES 57	57 [IB] E10
PO 4. Analyze the following factors that affect climate: <ul style="list-style-type: none"> • ocean currents • elevation • location 	IAES 56-58, 64	56 Proc GI 58 [IB] E6 64 [IB] E5
PO 5. Analyze the impact of large-scale weather systems on the local weather.	IAES 50-51	50 [IB] E1 51 Proc OD
PO 6. Create a weather system model that includes: <ul style="list-style-type: none"> • the Sun • the atmosphere • bodies of water 	IAES 69	69 Proc CS; [IB] E14
Concept 3: Earth in the Solar System Understand the relationships of the Earth and other objects in the solar system.		
No performance objectives at this grade level		

GRADE 7

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
Strand 1: Inquiry Process		
Inquiry Process establishes the basis for students' learning in science. Students use scientific processes: questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results.		
Concept 1: Observations, Questions, and Hypotheses Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.		
<i>PO 1. Formulate questions based on observations that lead to the development of a hypothesis. (See M07-S2C1-01)</i>	IAES 2,8 ... IAPS 2, 6... IALS 21, 27...	2 AQ2 UC 8 AQ6 UC; [IB] A9 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 21 [IB] B19 27 [IB] B32
PO 2. Select appropriate resources for background information related to a question, for use in the design of a controlled investigation. (See W-E8-01)	IAES 7, 15, 30... IAPS 74, 82... Use SEPUP web pages, e.g., www.sepuplhs.org	7 [IB] A9 15 [IB] B1-3 74 Proc DI; [IB] E1-2, 5-6 82 AQ3 RE; [IB] E3, 9, 12
PO 3. Explain the role of a hypothesis in a scientific inquiry.	IAES 2, 6... IAPS 2, 8...	2 AQ3 RE 6 AQ3 AD, [IB] A8-9 2 AQ2 UC 8 AQ6 UC; [IB] A9

Concept 2: Scientific Testing (Investigating and Modeling) Design and conduct controlled investigations.		
<i>PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms)</i>	All SEPUP programs have detailed safety	

<i>in all science inquiry.</i>	notes for students and teachers.	
<i>PO 2. Design an investigation to test individual variables using scientific processes.</i>	IAES 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
PO 3. Conduct a controlled investigation, utilizing multiple trials, to test a hypothesis using scientific processes.	IAES 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
<i>PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes probes, micrometers).</i>	IAPS 6-11... IAES 3, 4 ,6, 10... IALS 5, 14, 16...	6 AQ1 AD [IB] A3, A4 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 5 AQ5 UC; [IB] A3-4
<i>PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.</i>	All SEPUP programs features the use of journals and science notebooks.	
Concept 3: Analysis and Conclusions Analyze and interpret data to explain correlations and results; formulate new questions.		
<i>PO 1. Analyze data obtained in a scientific investigation to identify trends. (See M07-S2C1-08)</i>	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	2 AQ2 UC 6 AQ1 AD [IB] A3, A4 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
<i>PO 2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).</i>	IAPS 6, 7, 9-11... IAES 6, 9, 11.... IALS 2, 3, 4...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 3. Analyze results of data collection in order	IAPS 2, 6-11...	6 AQ3 AD, [IB] A8-9

to accept or reject the hypothesis.	IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 4. Determine validity and reliability of results of an investigation.	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ1 AD [IB] A3, A4 7 AQ 1 AD, AQ1 UC, [IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 5. Formulate a conclusion based on data analysis.	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 6. Refine hypotheses based on results from investigations.	IAPS 6-10... IAES 5, 7, 10, 11... IALS 2, 3, 4...	6 AQ1 AD [IB] A3, A4 5 AQ5 UC; [IB] A3-4 2 AQ2b ET, AQ4 UC, AQ5 ET
PO 7. Formulate new questions based on the results of a previous investigation.	IAPS 6-10... IAES 5, 7, 10, 11... IALS 2, 3, 4...	6 AQ1 AD [IB] A3, A4 5 AQ5 UC; [IB] A3-4 2 AQ2b ET, AQ4 UC, AQ5 ET
Concept 4: Communication Communicate results of investigations.		
PO 1. Choose an appropriate graphic representation for collected data: <ul style="list-style-type: none"> • line graph • double bar graph • stem and leaf plot • histogram (See M07-S2C1-03)	IAPS 6, 7, 8... IAES 2, 6, 7, 10... IALS 3, 4 ,5... (Stem and leaf plots not addressed in SEPUP)	6 AQ1 AD [IB] A3, A4 7 AQ 1 AD, AQ1 UC, [IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 2. Display data collected from a controlled	IAPS 6, 7, 8...	6 AQ1 AD [IB] A3,

investigation. (See M07-S2C1-03)	IAES 2, 6, 7, 10... IALS 3, 4, 5...	A4 7 AQ 1 AD, AQ1 UC, [IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 3. Communicate the results of an investigation with appropriate use of qualitative and quantitative information. (See W-E6-PO1)	IAPS 1-3, 6-11... IAES 1-9, 11... IALS 1, 2, 4, 5...	2 AQ2 UC 3 Proc DI; [IB] A16 1 [IB] A1, A10 2 AQ3 RE 1 [IB] A1-2 2 AQ2b ET, AQ4 UC, AQ5 ET
PO 4. Write clear, step-by-step instructions for following procedures (without the use of personal pronouns).	IAPS 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
PO 5. Communicate the results and conclusion of the investigation.	IAPS 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16

Strand 2: History and Nature of Science		
Scientific investigation grows from the contributions of many people. History and Nature of Science emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures.		
Concept 1: History of Science as a Human Endeavor Identify individual, cultural, and technological contributions to scientific knowledge.		
<i>PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific</i>	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11

<i>innovations (e.g., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).</i>		
PO 2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 3. Analyze the impact of a major scientific development occurring within the past decade.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	36 AQ2 ET 29 AQ1 ET; [IB] B22-23 70 AQ2 DCI [IB] D19
PO 4. Describe the use of technology in science-related careers.	IAES 36 IAPS 29 IALS 70-71	36 AQ2 ET 29 AQ1 ET; [IB] B22-23 70 AQ2 DCI [IB] D19 71 AQ1 GI, AQ2 ET

Concept 2: Nature of Scientific Knowledge Understand how science is a process for generating knowledge.		
PO 1. Describe how science is an ongoing process that changes in response to new information and discoveries.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 3. Apply the following scientific processes to other problem solving or decision making situations: <ul style="list-style-type: none"> • observing • questioning • communicating • comparing • measuring • classifying • predicting • organizing data • inferring • generating hypotheses • identifying 	IAPS 6, 7, 9-11... IAES 6, 9, 11.... IALS 2, 3. 4...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17

variables		
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Strand 3: Science in Personal and Social Perspectives		
Science in Personal and Social Perspectives emphasizes developing the ability to design a solution to a problem, to understand the relationship between science and technology, and the ways people are involved in both. Students understand the impact of science and technology on human activity and the environment. This strand affords students the opportunity to understand their place in the world – as living creatures, consumers, decision makers, problem solvers, managers, and planners.		
Concept 1: Changes in Environments Describe the interactions between human populations, natural hazards, and the environment.		
PO 1. Analyze environmental risks (e.g., pollution, destruction of habitat) caused by human interaction with biological or geological systems.	IAES 36 IAPS 29, 52 IALS 72-73	36 AQ2 ET 29 AQ1 ET; [IB] B22-23 52 AQ1 ET 72 AQ5 UC, [IB] E2, 3, E5, E13-14 73 [IB] E1, E12, E24
PO 2. Analyze environmental benefits of the following human interactions with biological or geological systems: <ul style="list-style-type: none"> • reforestation • habitat restoration • construction of dams 	IALS 87, 88 (habitat restoration only)	87 AQ1 ET 88 AQ3 ET, [IB] E28-32
PO 3. Propose possible solutions to address the environmental risks in biological or geological systems.	IAES 36 IALS 73	36 AQ2 ET 73 [IB] E1, E12, E24

Concept 2: Science and Technology in Society Develop viable solutions to a need or problem.		
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<i>PO 1. Propose viable methods of responding to an identified need or problem.</i>	IALS 102-109	
<i>PO 2. Compare solutions to best address an identified need or problem.</i>	IAES 11, 35, 49,	11 AQ2 RE, ET; [IB] A11-14 35 AQ1 ET; [IB] C13 49 AQ2 ET
<i>PO 3. Design and construct a solution to an identified need or problem using simple classroom materials.</i>	IALS 1, 102-109	1 [IB] A1-2
PO 4. Describe a scientific discovery that influences technology.	IAES 93, 94, 97, 98	93 AQ4 UC, [IB] F8-11 94 AQ3 UC, [IB] F16, F26 97 AQ2 CM, [IB] F15, F22-25, F27-28, F30-31 98 [IB] F32-33

Strand 4: Life Science		
Life Science expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms and populations change over time in terms of biological adaptation and genetics. This understanding includes the relationship of structures to their functions and life cycles, interrelationships of matter and energy in living organisms, and the interactions of living organisms with their environment.		
Concept 1: Structure and Function in Living Systems Understand the relationships between structures and functions of organisms.		
No performance objectives at this grade level		

Concept 2: Reproduction and Heredity Understand the basic principles of heredity.		
No performance objectives at this grade level		

<p>Concept 3: Populations of Organisms in an Ecosystem Analyze the relationships among various organisms and their environment.</p>		
<p>PO 1. Compare food chains in a specified ecosystem and their corresponding food web.</p>	IALS 79-80	<p>79 AQ1 UC, [IB] E2-3, E7-11, E16, E35 80 [IB] E2-3, E7-10, E15, E16, E25</p>
<p>PO 2. Explain how organisms obtain and use resources to develop and thrive in:</p> <ul style="list-style-type: none"> • niches • predator/prey relationships 	IALS 79-80	<p>79 AQ1 UC, [IB] E2-3, E7-11, E16, E35 80 [IB] E2-3, E7-10, E15, E16, E25</p>
<p>PO 3. Analyze the interactions of living organisms with their ecosystems:</p> <ul style="list-style-type: none"> • limiting factors • carrying capacity 	IALS 79-80, 85	<p>79 AQ1 UC, [IB] E2-3, E7-11, E16, E35 80 [IB] E2-3, E7-10, E15, E16, E25 85 AQ1 UC, [IB] E21-23</p>
<p>PO 4. Evaluate data related to problems associated with population growth (e.g., overgrazing, forest management, invasion of non-native species) and the possible solutions.</p>	IALS 77, 85	<p>77 AQ4 DCI, AQ7 DCI 85 AQ1 UC, [IB] E21-23</p>
<p>PO 5. Predict how environmental factors (e.g., floods, droughts, temperature changes) affect survival rates in living organisms.</p>	IALS 77, 85	<p>77 AQ4 DCI, AQ7 DCI 85 AQ1 UC, [IB] E21-23</p>
<p>PO 6. Create a model of the interactions of living organisms within an ecosystem.</p>	IALS 79-80, 85	<p>79 AQ1 UC, [IB] E2-3, E7-11, E16, E35 80 [IB] E2-3, E7-10, E15, E16, E25 85 AQ1 UC, [IB] E21-23</p>
<p>Concept 4: Diversity, Adaptation, and Behavior Identify structural and behavioral adaptations.</p>		
<p>No performance objectives at this grade level</p>		

<p>Strand 5: Physical Science</p>		
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Physical Science affords students the opportunity to increase their understanding of the characteristics of objects and materials they encounter daily. Students gain an understanding of the nature of matter and energy, including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings.		
Concept 1: Properties and Changes of Properties in Matter Understand physical and chemical properties of matter.		
No performance objectives at this grade level		

Concept 2: Motion and Forces Understand the relationship between force and motion.		
No performance objectives at this grade level		
Concept 3: Transfer of Energy Understand that energy can be stored and transferred.		
No performance objectives at this grade level		

Strand 6: Earth and Space Science		
Earth and Space Science provides the foundation for students to develop an understanding of the Earth, its history, composition, and formative processes, and an understanding of the solar system and the universe. Students study the regularities of the interrelated systems of the natural world. In doing so, they develop understandings of the basic laws, theories, and models that explain the world (NSES, 1995). By studying the Earth from both a historical and current time frame, students can make informed decisions about issues affecting the planet on which they live.		

<p>Concept 1: Structure of the Earth Describe the composition and interactions between the structure of the Earth and its atmosphere.</p>		
<p>PO 1. Classify rocks and minerals by the following observable properties:</p> <ul style="list-style-type: none"> • grain • color • texture • hardness 	IAES 3-4	3 [IB] A2
<p>PO 2. Describe the properties and the composition of the following major layers of the Earth:</p> <ul style="list-style-type: none"> • crust • mantle • core 	IAES 38	38 AQ5 UC; [IB] D1, D15
<p>PO 3. Explain the following processes involved in the formation of the Earth's structure:</p> <ul style="list-style-type: none"> • erosion • deposition • plate tectonics • volcanism 	IAES 28-29, 37, 42	28 Proc GI; [IB] C2, C7 29 AQ2 UC; [IB] C1, C3 42 [IB] D4, 6, 8-10, 16
<p>PO 4. Describe how the rock and fossil record show that environmental conditions have changed over geologic and recent time.</p>	IAES 39 IALS 90-91	39 [IB] D5, D13 90 AQ3 CM, [IB] F5 91 AQ4 UC, [IB] F12-14

<p>Concept 2: Earth's Processes and Systems Understand the processes acting on the Earth and their interaction with the earth systems.</p>		
<p>PO 1. Explain the rock cycle.</p>	IAES 22	22 AQ7 UC; [IB] B4-6, B11
<p>PO 2. Distinguish the components and characteristics of the rock cycle for the following types of rocks:</p> <ul style="list-style-type: none"> • igneous • metamorphic • sedimentary 	IAES 22	22 AQ7 UC; [IB] B4-6, B11
<p>PO 3. Analyze the evidence that lithospheric</p>	IAES 40-41, 47-48	41 AQ3 UC; [IB]

plate movements occur.		D2 47 [IB] D16 48 AQ4 UC; [IB] D14, D16
PO 4. Explain lithospheric plate movement as a result of convection.	IAES 46	46 [IB] D16
PO 5. Relate plate boundary movements to their resulting landforms, including: <ul style="list-style-type: none"> • mountains • faults • rift valleys • trenches • volcanoes 	IAES 47-48	47 [IB] D16 48 AQ4 UC; [IB] D14, D16
PO 6. Describe how earthquakes are measured.	IAES 43	43 Proc GI
Concept 3: Earth in the Solar System Understand the relationships of the Earth and other objects in the solar system.		
PO 1. Explain the phases of the Moon in terms of the relative positions of the Earth, Sun, and Moon.	IAES 79-81	79 [IB] F10-12, F14-16 80 [IB] F4-9 81 AQ5 UC; [IB] F5, F8
PO 2. Construct a model for the relative positions of the Earth, Sun, and Moon as they relate to corresponding eclipses.	IAES 81	81 AQ5 UC; [IB] F5, F8
PO 3. Explain the interrelationship between the Earth's tides and the Moon.	IAES 82	82 AQ5 UC, [IB] F5, F8
PO 4. Explain the seasons in the Northern and Southern Hemispheres in terms of the tilt of the Earth's axis relative to the Earth's revolution around the Sun.	IAES 75-77	76 AQ4 AD 77 [IB] F10-12
PO 5. Identify the following major constellations visible (seasonally) from the Northern Hemisphere: <ul style="list-style-type: none"> • Orion • Ursa Major (Great Bear) • Cygnus • Scorpius • Cassiopeia 	Not covered	
PO 6. Explain the relationship among common objects in the solar system, galaxy, and	IAES 88	88 AQ2 UC, [IB] G3, G13, G17

the universe.		
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GRADE 8

AZ SCIENCE STANDARD	SEPUP	
	LOCATION	ASSESSMENT
Strand 1: Inquiry Process		
Inquiry Process establishes the basis for students’ learning in science. Students use scientific processes: questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results.		
Concept 1: Observations, Questions, and Hypotheses Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.		
PO 1. Formulate questions based on observations that lead to the development of a hypothesis. (See M08-S2C1-01)	IAES 2,8 ... IAPS 2, 6... IALS 21, 27...	2 AQ2 UC 8 AQ6 UC; [IB] A9 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 21 [IB] B19 27 [IB] B32
PO 2. Use appropriate research information, not limited to a single source, to use in the development of a testable hypothesis. (See R08-S3C2-03 and W-E8-01)	IAES 7, 15, 30... IAPS 74, 82... Use SEPUP web pages, e.g., www.sepuplhs.org	7 [IB] A9 15 [IB] B1-3 74 Proc DI; [IB] E1-2, 5-6 82 AQ3 RE; [IB] E3, 9, 12
PO 3. Generate a hypothesis that can be tested.	IAES 2, 6, IAPS 2, 8...	2 AQ3 RE 6 AQ3 AD, [IB] A8-9 2 AQ2 UC 8 AQ6 UC; [IB] A9

Concept 2: Scientific Testing (Investigating and Modeling) Design and conduct controlled investigations.		
<i>PO 1. Demonstrate safe behavior and</i>	All SEPUP	

<p><i>appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.</i></p> <p>PO 2. Design a controlled investigation to support or reject a hypothesis.</p> <p>PO 3. Conduct a controlled investigation to support or reject a hypothesis.</p> <p>PO 4. <i>Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).</i></p> <p>PO 5. <i>Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.</i></p>	<p>programs have detailed safety notes for students and teachers.</p> <p>IAES 3, 10... IAES 16, 20... IALS 5, 8...</p> <p>IAES 3, 10... IAES 16, 20... IALS 5, 8...</p> <p>IAPS 6-11... IAES 3, 4 ,6, 10... IALS 5, 14, 16...</p> <p>All SEPUP programs features the use of journals and science notebooks.</p>	<p>3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16</p> <p>3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16</p> <p>6 AQ1 AD [IB] A3, A4 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 5 AQ5 UC; [IB] A3-4</p>
<p>Concept 3: Analysis and Conclusions Analyze and interpret data to explain correlations and results; formulate new questions.</p>		
<p>PO 1. <i>Analyze data obtained in a scientific investigation to identify trends. (See M08-S2C1-08)</i></p>	<p>IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3. 4 ...</p>	<p>2 AQ2 UC 6 AQ1 AD [IB] A3, A4 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17</p>
<p>PO 2. <i>Form a logical argument about a correlation between variables or</i></p>	<p>IAPS 6, 7, 9-11... IAES 6, 9, 11....</p>	<p>6 AQ3 AD, [IB] A8-9</p>

<i>sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events)</i>	IALS 2, 3, 4...	6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 3. Interpret data that show a variety of possible relationships between two variables, including: All SEPUP programs <ul style="list-style-type: none"> • positive relationship • negative relationship • no relationship 	IAPS 6, 7, 9-11... IAES 6, 9, 11... IALS 2, 3, 4...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 4. Formulate a future investigation based on the data collected.	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 5. Explain how evidence supports the validity and reliability of a conclusion.	IAPS 2, 6-11... IAES 2, 6, 7... IALS 2, 3, 4 ...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 6. Identify the potential investigational error that may occur (e.g., flawed investigational design, inaccurate measurement, computational errors, unethical reporting).	IAES 21, 28, 31... IAPS 20, 36, 39... IALS 12, 14, 15...	28 Proc GI; [IB] C2, C7 36 AQ8 UC 12 [IB] B12, B15 14 [IB] B16
PO 7. Critique scientific reports from periodicals, television, or other media.	NC	
<i>PO 8. Formulate new questions based on the results of a previous investigation.</i>	IAPS 6-10... IAES 5, 7, 10, 11... IALS 2, 3, 4...	6 AQ1 AD [IB] A3, A4 5 AQ5 UC; [IB] A3-

		4 2 AQ2b ET, AQ4 UC, AQ5 ET
Concept 4: Communication		
Communicate results of investigations.		
PO 1. Communicate the results of an investigation.	IAPS 1-3, 6-11... IAES 1-9, 11... IALS 1, 2, 4, 5...	2 AQ2 UC 3 Proc DI; [IB] A16 1 [IB] A1, A10 2 AQ3 RE 1 [IB] A1-2 2 AQ2b ET, AQ4 UC, AQ5 ET
PO 2. Choose an appropriate graphic representation for collected data: <ul style="list-style-type: none"> line graph double bar graph stem and leaf plot histogram (See M08-S2C1-03)	IAPS 6, 7, 8... IAES 2, 6, 7, 10... IALS 3, 4, 5... (Stem and leaf plots not addressed in SEPUP)	6 AQ1 AD [IB] A3, A4 7 AQ 1 AD, AQ1 UC, [IB] A5, A7, A8 2 AQ3 RE 6 AQ3 AD, [IB] A8-9 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17 4 AQ 5 UC, [IB] A17
PO 3. Present analyses and conclusions in clear, concise formats. (See W-E6-PO1)	IAPS 1-3, 6-11... IAES 1-9, 11... IALS 1, 2, 4, 5...	2 AQ2 UC 3 Proc DI; [IB] A16 1 [IB] A1, A10 2 AQ3 RE 1 [IB] A1-2 2 AQ2b ET, AQ4 UC, AQ5 ET
PO 4. Write clear, step-by-step instructions for conducting investigations or operating equipment (without the use of personal pronouns).	IAPS 3, 10... IAES 16, 20... IALS 5, 8...	3 [IB] A2 10 Proc GI 16 [IB] B7-11 5 [IB] A11-14 8 [IB] A11-16
PO 5. Communicate the results and conclusion of the investigation.	IAPS 1-3, 6-11... IAES 1-9, 11... IALS 1, 2, 4, 5...	2 AQ2 UC 3 Proc DI; [IB] A16 1 [IB] A1, A10 2 AQ3 RE 1 [IB] A1-2 2 AQ2b ET, AQ4 UC, AQ5 ET

Strand 2: History and Nature of Science		
Scientific investigation grows from the contributions of many people. History and Nature of Science emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures.		
Concept 1: History of Science as a Human Endeavor Identify individual, cultural, and technological contributions to scientific knowledge.		
<i>PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson and Crick [scientists], support Strand 4; Benjamin Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 5; Sir Frances Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5).</i>	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 2. Evaluate the effects of the following major scientific milestones on society: <ul style="list-style-type: none"> • Mendelian Genetics • Newton’s Laws 	IALS 67-71 IAPS 78, 87-88	67 AQ2 UC, AQ3, ET, [IB] D20 69 [IB] D19 71 AQ1 GI, AQ2 ET 78 [IB] E2, 3, 8 87 AQ5 AD; [IB] E19
PO 3. Evaluate the impact of a major scientific development occurring within the past decade.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 4. Evaluate career opportunities related to life and physical sciences.	IAES 36 IAPS 29 IALS 70-71	36 AQ2 ET 29 AQ1 ET; [IB] B22-23

		70 AQ2 DCI [IB] D19
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Concept 2: Nature of Scientific Knowledge Understand how science is a process for generating knowledge.		
PO 1. Apply the following scientific processes to other problem solving or decision making situations: All SEPUP programs <ul style="list-style-type: none"> • observing • questioning • communicating • comparing • measuring • classifying • predicting • organizing data • inferring • generating hypothesis • identifying variables 	IAPS 6, 7, 9-11... IAES 6, 9, 11... IALS 2, 3, 4...	6 AQ3 AD, [IB] A8-9 6 AQ1 AD [IB] A3, A4 2 AQ2b ET, AQ4 UC, AQ5 ET 3 AQ1 ET, AQ4 UC, [IB] A3, A7, A17
PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.	IALS 37, 60, 94... IAES 41, 42... IAPS 16, 80...	37 Act UC, [IB] C14 41 AQ3 UC; [IB] D2 16 [IB] B7-11
PO 3. Defend the principle that accurate record keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society.	Throughout SEPUP	
PO 4. Explain why scientific claims may be questionable if based on very small samples of data, biased samples, or samples for which there was no control.	IALS 8, 10	8 [IB] A11-16 10 Act UC, AQ 3 ET, [IB] A18-20

Strand 3: Science in Personal and Social Perspectives		
Science in Personal and Social Perspectives emphasizes developing the ability to design a solution to a problem, to understand the relationship between science and technology, and the ways people are involved in both. Students understand the impact of science and technology on human activity and the environment. This strand affords students the		

opportunity to understand their place in the world – as living creatures, consumers, decision makers, problem solvers, managers, and planners.		
Concept 1: Changes in Environments Describe the interactions between human populations, natural hazards, and the environment.		
PO 1. Analyze the risk factors associated with natural, human induced, and/or biological hazards, including: <ul style="list-style-type: none"> waste disposal of industrial chemicals greenhouse gases 	IAPS 22, 24, 26 (greenhouse gas is not addressed)	22 Proc OD 24 [IB] B14-16
<ul style="list-style-type: none"> PO 2. Analyze possible solutions to address the environmental risks associated with chemicals and biological systems. 	IAPS 2, 24, 26, 45, 51	2 AQ2 UC 24 [IB] B14-16 45 [IB] C8, C20 51 AQ4 DI, DI; AQ5 ET, [IB] C24

Concept 2: Science and Technology in Society Develop viable solutions to a need or problem.		
PO 1. Propose viable methods of responding to an identified need or problem	IALS 102-109	
PO 2. Compare solutions to best address an identified need or problem.	IAES 11, 35, 49,	11 AQ2 RE, ET; [IB] A11-14
PO 3. Design and construct a solution to an identified need or problem using simple classroom materials.	IALS 1, 102-109	
PO 4. Compare risks and benefits of the following technological advances: <ul style="list-style-type: none"> radiation treatments genetic engineering (See Strand 4 Concept 2) airbags (See Strand 5 Concept 2) 	IALS 57 IAPS 85	85 Proc CS; [IB] E16

Strand 4: Life Science		
Life Science expands students’ biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms and populations change over time in terms of biological adaptation and genetics. This understanding		

includes the relationship of structures to their functions and life cycles, interrelationships of matter and energy in living organisms, and the interactions of living organisms with their environment.		
Concept 1: Structure and Function in Living Systems Understand the relationships between structures and functions of organisms.		
No performance objectives at this grade level		

Concept 2: Reproduction and Heredity Understand the basic principles of heredity.		
PO 1. Explain the purposes of cell division <ul style="list-style-type: none"> • growth and repair • reproduction 	IALS 57	
PO 2. Explain the basic principles of heredity using the human examples of: <ul style="list-style-type: none"> • eye color • widow’s peak • blood type 	IALS 54	54 Act DCI, [IB] D2
PO 3. Distinguish between the nature of dominant and recessive traits in humans.	IALS 54, 63, 66	54 Act DCI, [IB] D2 63 [IB] D1, D2-5, D8-11, D18, D22-24 66 [IB] D7, D21, D25
Concept 3: Populations of Organisms in an Ecosystem Analyze the relationships among various organisms and their environment.		
No performance objectives at this grade level		
Concept 4: Diversity, Adaptation, and Behavior Identify structural and behavioral adaptations.		
PO 1. Explain how an organism’s behavior allows it to survive in an environment.	IALS 83, 84	83 AQ3 DCI 84 [IB] E19-20, E26-27, E34
PO 2. Describe how an organism can maintain a stable internal environment while living in a constantly changing external environment.	NC	

PO 3. Determine characteristics of organisms that could change over several generations.	IALS 89, 95, 96	89 AQ4 ET, [IB] F1-4, F29 95 [IB] F18-21 96 AQ2 DCI
PO 4. Compare the symbiotic and competitive relationships in organisms within an ecosystem (e.g., lichen, mistletoe/tree, clownfish/sea anemone, native/non-native species).	IALS 76	76 AQ 1-2
PO 5. Analyze the following behavioral cycles of organisms: <ul style="list-style-type: none"> • hibernation • migration • dormancy (plants) 	NC	
PO 6. Describe the following factors that allow for the survival of living organisms: <ul style="list-style-type: none"> • protective coloration • beak design • seed dispersal 	IALS 95, 96	95 [IB] F18-21 96 AQ2 DCI

Strand 5: Physical Science		
Physical Science affords students the opportunity to increase their understanding of the characteristics of objects and materials they encounter daily. Students gain an understanding of the nature of matter and energy, including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings.		
Concept 1: Properties and Changes of Properties in Matter Understand physical and chemical properties of matter.		
PO 1. Identify different kinds of matter based on the following physical properties: <ul style="list-style-type: none"> • states • density • boiling point 	IAPS 8-10, 14	8 AQ6 UC; [IB] A9 9 AQ3 UC, [IB] A10-12 10 AQ1 AD, Proc DI; [IB] A10-12

<ul style="list-style-type: none"> • melting point • solubility 		14 [IB] B4-6
PO 2. Identify different kinds of matter based on the following chemical properties: <ul style="list-style-type: none"> • reactivity • pH • oxidation (corrosion) 	IAPS 14, 47, 50	14 [IB] B4-6 47 [IB] C10-12 50 AQ5 UC, [IB] C23
PO 3. Identify the following types of evidence that a chemical reaction has occurred: <ul style="list-style-type: none"> • formation of a precipitate • generation of gas • color change • absorption or release of heat 	IAPS 14, 19, 27	14 [IB] B4-6 19 [IB] B12-14 27 AQ2 CS, AQ3 ET
PO 4. Classify matter in terms of elements, compounds, or mixtures.	IAPS 16	16 [IB] B7-11
PO 5. Classify mixtures as being homogeneous or heterogeneous.	IAPS 3	3 Proc DI; [IB] A16
PO 6. Explain the systematic organization of the periodic table.	IAPS 15-16	15 AQ5 UC [IB] B7-11 16 [IB] B7-11

Concept 2: Motion and Forces		
Understand the relationship between force and motion.		
PO 1. Demonstrate velocity as the rate of change of position over time.	IAPS 74, 76	74 Proc DI; [IB] E1-2, 5-6 76 [IB] E2
PO 2. Identify the conditions under which an object will continue in its state of motion (Newton's 1 st Law of Motion).	IAPS 80, 82	80 AQ2; [IB] E2, 3, 11, 20 82 AQ3 RE; [IB] E3, 9, 12
PO 3. Describe how the acceleration of a body is dependent on its mass and the net applied force (Newton's 2 nd Law of Motion).	IAPS 78, 80	78 [IB] E2, 3, 8 80 AQ2; [IB] E2, 3, 11, 20
PO 4. Describe forces as interactions between bodies (Newton's 3 rd Law of Motion).	IAPS 80	80 AQ2; [IB] E2, 3, 11, 20
PO 5. Create a graph devised from measurements of moving objects and their interactions, including: <ul style="list-style-type: none"> • position-time graphs 	IAPS 74-75	74 Proc DI; [IB] E1-2, 5-6 75 AQ2 UC, [IB] E2, 4-6, 7, 14

• velocity-time graphs		
Concept 3: Transfer of Energy Understand that energy can be stored and transferred.		
No performance objectives at this grade level		

Strand 6: Earth and Space Science		
Earth and Space Science provides the foundation for students to develop an understanding of the Earth, its history, composition, and formative processes, and an understanding of the solar system and the universe. Students study the regularities of the interrelated systems of the natural world. In doing so, they develop understandings of the basic laws, theories, and models that explain the world (NSES, 1995). By studying the Earth from both a historical and current time frame, students can make informed decisions about issues affecting the planet on which they live.		
Concept 1: Structure of the Earth Describe the composition and interactions between the structure of the Earth and its atmosphere.		
No performance objectives at this grade level		

Concept 2: Earth's Processes and Systems Understand the processes acting on the Earth and their interaction with the earth systems.		
No performance objectives at this grade level		
Concept 3: Earth in the Solar System Understand the relationships of the Earth and other objects in the solar system.		
No performance objectives at this grade level		