Lab-Aids Correlations for
OHIO LEARNING STANDARDS FOR SCIENCE
Middle School Level – Grades 6-8

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This document is intended to show how the SEPUP curriculum materials align with the *Ohio Learning Standards for Science, Grades 6-8*.

ABOUT OUR PROGRAMS

Lab-Aids has maintained its home offices and operations in Ronkonkoma, NY, since 1963. We publish over 200 kits and core curriculum programs to support science teaching and learning, grades 6-12. All core curricula support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and are able to do as a result of program use. All programs have extensive support for technology and feature comprehensive teacher support. For more information please visit www.lab-aids.com/middle-school and navigate to the program of interest.

SEPUP

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. Since 1987, development of SEPUP materials has been supported by grants from the National Science Foundation and other public and private sources. SEPUP programs include student books, equipment kits, teacher materials, and online digital content, and are available as full year courses, or separately, as units, each taking 3-8 weeks to complete, as listed below.

Ohio Model Curriculum Suggested Units from SEPUP, Middle Level, Grades 6-8

Grade 6	Grade 7	Grade 8
Studying Soils Scientifically[1]	Ecology	Reproduction
Rocks and Minerals[2]	Energy	Evolution
From Cells to Organisms	Chemical Reactions	Force and Motion
Body Systems	Waves	Fields and Interactions
Chemistry of Materials	Solar System and Beyond	Geological Processes
Extension for Engineering: Biomedical Engineering	Weather and Climate	Earth's Resources
Earth Science, Life Science, Physical Science		Extension: Land, Water, and Human Interactions

[1] *Unit title from 2nd Edition, all others from 3rd edition*
[2] *Unit title from 2nd Edition, all others from 3rd edition*

NATURE OF SCIENCE MIDDLE SCHOOL*

Nature of Science One goal of science education is to help students become scientifically literate citizens able to use science as a way of knowing about the natural and material world. All students should have sufficient understanding of scientific knowledge and scientific processes to enable them to distinguish what is science from what is not science and to make informed decisions about career choices, health maintenance, quality of life, community and other decisions that impact both themselves and others.		
Categories	**6-8**	
Scientific Inquiry, Practice and Applications All students must use these scientific processes with appropriate laboratory safety techniques to construct their knowledge and understanding in all science content areas.	• Apply knowledge of science content to real-world challenges. • Identify questions that can be answered through scientific investigations. • Design and conduct scientific investigations using appropriate safety techniques. • Use appropriate mathematics, tools and techniques to gather data and information. • Analyze and interpret data. • Develop descriptions, models, explanations and predictions. • Think critically and logically to connect evidence and explanations. • Recognize and analyze alternative explanations and predictions. • Communicate scientific procedures and explanations. • Design technological/engineering solutions.	SEPUP's *Issues and Science* is grounded in current understandings about cognitive development, the learning process, and the pedagogical methods that support construction of science knowledge. All aspects of the instructional materials— from the overall organization of the teaching–learning cycle to the design and sequencing of the activities to the detail of the suggested teaching strategies—have been tailored to support students' learning. The activities employ varied teaching strategies and learning opportunities, move from the concrete to the more abstract, target common misconceptions, emphasize guided inquiry, and balance a strong, guided-inquiry orientation with engineering design challenges, readings, and opportunities for practice. Sustained attention is applied to processing for meaning as students are often asked to apply what they have learned. During the "get started" phase of the SEPUP learning cycle, students review their initial ideas; in the "do the activity" phase, students collect and analyze data and talk about their experiences with other students and the teacher. In the "build understanding" phase,
Science is a Way of Knowing	• Science is a way of knowing about the world around us based on	

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Categories	**6-8**	
Science assumes the universe is a vast single system in which basic laws are consistent. Natural laws operate today as they did in the past and they will continue to do so in the future. Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise and extend this knowledge.	evidence from experimentation and observations. • Science is a continual process and the body of scientific knowledge continues to grow and change. • Science assumes that objects and events occur in consistent patterns that are understandable through measurement and observation. • Science should carefully consider and evaluate all data including outliers. • Science is based on observable phenomena and empirical evidence. • Science disciplines share common rules for obtaining and evaluating empirical evidence.	students reflect on what they have learned and respond to analysis questions designed to think deeper. In teacher-guided discussions, students present their own ideas, listen to the ideas of other students, revise their thinking, and come to new understandings of the concepts being developed. Learning goals, assessment outcomes, and assessments are closely aligned and clearly delineated. Students are afforded multiple ways to express their understandings and level of mastery. This array of features allows students with a range of learning styles to achieve their optimal level of understanding. For all activities, the teacher edition gives detailed suggestions for teaching and assessment strategies, discusses the rationales for those strategies, and discusses possible student preconceptions. Literacy supports are embedded and use a variety of strategies to support student growth in reading comprehension, writing, oral presentations, and media viewing. The mixture of activity types (such as laboratory experiments, design, modeling, computer simulation, talking it over) provides the learner
Science is a Human Endeavor Science has been, and continues to be, advanced by individuals of various races, genders, ethnicities, languages, abilities, family backgrounds and incomes.	• Individuals from different social, cultural, and ethnic backgrounds work as scientists and engineers. • Scientists and engineers are guided by habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism and openness to ideas.	

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Categories	**6-8**	
	• Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination and creativity.	with multiple avenues to gather, analyze, and compare current data and thinking with that of the past. Through these experiences, learners have the opportunity to use data from a variety of sources to understand the changes that have occurred in scientific thinking, and how and why these changes came about.
Scientific Knowledge is Open to Revision in Light of New Evidence Science is not static. Science is constantly changing as we acquire more knowledge.	• Science explanations are subject to revision and improvement in light of additional scientific evidence or new understanding of scientific evidence.	

*Adapted from Appendix H – Understanding the Scientific Enterprise: The Nature of Science in the Next Generation Science Standards

Grade 6

EARTH AND SPACE SCIENCE (ESS)

Topic: Rocks, Minerals and Soil

This topic focuses on the study of rocks, minerals and soil, which make up the lithosphere. Classifying and identifying different types of rocks, minerals and soil can decode the past environment in which they formed.

CONTENT STATEMENT	Unit and Activity	Assessment Opportunities
6.ESS.1: Minerals have specific, quantifiable properties.		
Minerals are naturally occurring, inorganic solids that have a defined chemical composition. Minerals have properties that can be observed and measured. Minerals form in specific environments. *Note: The emphasis is on learning how to identify the mineral by conducting tests (not through memorization).*	**IAES Rocks and Minerals: 14, 15, 16, 17, 18, 23**	**14 AQ5 RE** **15 AQ 1,3-5 + Ext 2** **16 AQ 1-2, 3RE + Ext** **17 AQ 1-4** **18 AQ 1-4** **23 AQ 1-2, AQ3 ET** **[IB] B1-3, 7-9, 10**
6.ESS.2: Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.		
Most rocks are composed of one or more minerals, but there are a few types of sedimentary rocks that contain organic material, such as coal. The composition of the rock, types of mineral present, and/or mineral shape and size can be used to identify the rock and to interpret its history of formation, breakdown (weathering) and transport (erosion).	**IAES Rocks and Minerals: 17, 18, 19, 20, 22**	**17 AQ 1-2, 4** **19 AQ 1-4** **20 AQ 1-4 + Ext** **22 AQ 1-6, AQ7 UC** **[IB] B4, 6, 11**
6.ESS.3: Igneous, metamorphic and sedimentary rocks form in different ways.		
Magma or lava cools and crystallizes to form igneous rocks. Heat and pressure applied to existing rock forms metamorphic rocks. Sedimentary rock forms as existing rock weathers chemically and/or physically and the weathered material is compressed and then lithifies. Each rock type can provide information about the environment in which it was formed.	**IAES Rocks and Minerals: 19, 20, 22**	**19 AQ 1, 3-4** **20 AQ 1-2** **22 AQ 1-6, 7 UC** **[IB] B4-6, 11 UC**
6.ESS.4: Soil is unconsolidated material that contains organic matter and weathered rock. *Note: The emphasis should be on properties of soil rather than memorization.*		
Soil formation occurs at different rates and is based on environmental conditions, types of existing bedrock and rates of weathering. Soil forms in layers known as horizons. Soil horizons can be distinguished from	**IAES Studying Soil Scientifically: 5, 6, 7, 9**	**5 STT 1, 3-4** **5 AQ 1-4, 5 UC** **6 AQ1** **7 AQ 1-3** **9 AQ 1-3**

CONTENT STATEMENT	Unit and Activity	Assessment Opportunities
one another based on properties that can be measured. The terms dirt and soil are not synonymous, use the term "soil".		
6.ESS.5: Rocks, minerals and soils have common and practical uses.		
Nearly all manufactured material requires some kind of geologic resource. Most geologic resources are considered nonrenewable. Rocks, minerals and soil are examples of geologic resources that are nonrenewable.	**IAES Studying Soil Scientifically: 8-9** **IAES Rocks and Minerals: 14, 16, 19, 23**	**8 AQ4** **9 AQ 1-2** **14 AQ 5-6** **16 AQ 4** **19 AQ 2** **23 AQ 1-2, 3 ET**

PHYSICAL SCIENCE (PS)

Topic: Matter and Motion

This topic focuses on the study of foundational concepts of the particulate nature of matter, linear motion, and kinetic and potential energy.

CONTENT STATEMENT	Unit and Activity	Assessment Opportunities
6.PS.1: Matter is made up of small particles called atoms.		
Matter has mass, volume and density and is made up of particles called atoms.	**IAS Chemistry of Materials: 2, 4, 7** **IAS Chemical Reactions: 7**	**2: AQ 2** **4: PS 5-10** **7: AQ 1, 5** **7: AQ 1**
Elements are a class of substances composed of a single kind of atom.	**IAS Chemistry of Materials: 2, 6, 7**	**6: AQ 1** **7: AQ 1**
Molecules are the combination of two or more atoms that are joined together chemically.	**IAS Chemistry of Materials: 6, 7, 11, 12** **IAS Chemical Reactions: 2, 4, 7**	**6: AQ 2, 5** **7: AQ 1, 2** **11: AQ 4** **12: AQ 3** **2: AQ 2** **4: AQ 1** **7: AQ 1**
6.PS.2: Changes of state are explained by a model of matter composed of particles that are in motion. *Note: It is not the intent of this standard to encourage vocabulary identification (matching definitions with heat, temperature, and thermal energy). Instead, these are provided as conceptual tools for understanding the role of energy in physical, biotic, atmospheric, oceanic, and geologic systems covered in grade 6 and subsequent grades and courses.*		
Temperature is a measure of the average motion of the particles in a substance.	**IAS Energy: 4, 7** **IAS Chemistry of Materials: 9, 10**	**4: AQ 3** **7: AQ 2** **9: AQ 2, 3** **10: AQ 1, 2, 3**
Heat is a process of energy transfer rather than a type of energy. Energy	**IAS Energy: 4, 7, 8, 10**	**4: AQ 3** **7: AQ 2, 3** **8: AQ 3, 4**

CONTENT STATEMENT	Unit and Activity	Assessment Opportunities
transfer can result in a change in temperature or a phase change.	**IAS Chemistry of Materials: 9, 10**	**10: AQ 1** **9: AQ 2, 3** **10: AQ 3**
When substances undergo changes of state, atoms change their motion and position.	**IAS Chemistry of Materials: 8, 10** **IAS Chemical Reactions: 3**	**8: AQ 1, 2** **10: AQ 1, 2, 3** **3: SS 3.1 Q 1**
6.PS.3: There are two categories of energy: kinetic and potential. *Note: Chemical and elastic potential energy should not be included at this grade; this is found in PS grade 7.*		
Objects and substances in motion have kinetic energy.	**IAS Energy: 2, 3, 4, 6** **IAS Force and Motion: 3, 4, 5**	**2: AQ 1, 6** **3: AQ 1 (+SS 3.1), 2, 3** **4: AQ 3** **6: AQ 1, 2, 3** **3: AQ 3** **4: AQ 3** **5: AQ 1, 2**
Objects and substances can have energy as a result of their position (potential energy).	**IAS Energy: 2, 3, 6** **IAS Force and Motion: 3** **IAS Fields and Interactions: 1-14**	**2: AQ 1, 2, 3, 5, 6** **3: AQ 1 (+SS 3.1), 2, 3** **6: AQ 1, 3** **3: AQ 3** **7: AQ 1**
6.PS.4: An object's motion can be described by its speed and the direction in which it is moving. *Note: Velocity and acceleration rates should not be included at this grade level; these terms are introduced in high school.*		
An object's position and speed can be measured and graphed as a function of time.	**IAS Force and Motion: 2, 7, 8**	**2: AQ 2-5; Ext 3** **8: AQ 1**

LIFE SCIENCE (LS)

Topic: Cellular to Multicellular

This topic focuses on the study of the basics of Modern Cell Theory. All organisms are composed of cells, which are the fundamental unit of life. Cells carry on the many processes that sustain life. All cells come from pre-existing cells.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
6.LS.1: Cells are the fundamental unit of life. *Note: Emphasis should be placed on the function and coordination of cell organelles as well as their roles in overall cell function. Specific information about the organelles that need to be addressed at this grade level will be found in the model curriculum.*		
All living things are composed of cells. Different body tissues and organs are made of different kinds of cells. The ways cells function are similar in all living organisms.	**IAS From Cells to Organisms: 4, 5, 6, 9, 10, 12**	**4: AQ 4** **6: AQ 2** **9: AQ 1, 2, 3** **10: AQ 1, 2, 4, 5** **12: AQ 2, 3**

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
	IAS Body Systems: 5	**5: AQ 1**
6.LS.2: All cells come from pre-existing cells. *Note: This is not a detailed discussion of the phases of mitosis or meiosis. The focus should be on reproduction as a means of transmitting genetic information from one generation to the next, cellular growth and repair.*		
Cells repeatedly divide resulting in more cells and growth and repair in multicellular organisms.	**IAS From Cells to Organisms: 4** **IAS Reproduction: 2, 3**	**4: AQ 4** **3: AQ 2, 3**
6.LS.3: Cells carry on specific functions that sustain life. *Note: Emphasis should be placed on the function and coordination of cell components, as well as on their roles in overall cell function.*		
Many basic functions of organisms occur in cells. Cells take in nutrients and energy to perform work, like making various molecules required by that cell or an organism.	**IAS From Cells to Organisms: 5, 6, 8, 10, 11, 12, 13** **IAS Body Systems: 5, 12**	**5: AQ 3-5** **6: AQ 3** **10: AQ 7** **11: AQ 1, 2, 4** **12: AQ 4** **13: AQ 2, 4, 5, 7** **5: AQ 1** **12: AQ 2**
Every cell is covered by a membrane that controls what can enter and leave the cell.	**IAS From Cells to Organisms: 6, 7**	**6: AQ 1-3** **7: AQ 1, 3-5**
Within the cell are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, information feedback and movement.	**IAS From Cells to Organisms: 6, 8, 9, 10, 12, 13**	**6: AQ 3** **8: PS 5; AQ 1, 2** **9: AQ 1** **12: AQ 2, 3** **13: AQ 5, 7**
6.LS.4: Living systems at all levels of organization demonstrate the complementary nature of structure and function.		
The level of organization within organisms includes cells, tissues, organs, organ systems and whole organisms.	**IAS From Cells to Organisms: 10, 11** **IAS Body Systems: 2, 3, 8, 11, 12**	**10: AQ 3, 6** **11: AQ 3, 4** **2: AQ 5** **3: AQ 1, 2** **8: AQ 4** **11: AQ 2-4** **12: AQ 4**
Whether the organism is single-celled or multicellular, all of its parts function as a whole to perform the tasks necessary for the survival of the organism.	**IAS From Cells to Organisms: 6, 8, 11** **IAS Body Systems: 5**	**6: AQ 2, 3** **8: PS 5; AQ 1-3** **11: AQ 1, 2** **5: AQ 1**
Organisms have diverse body plans, symmetry and internal structures that contribute to their being able to survive in their environments.	**IAS From Cells to Organisms: 8, 10** **IAS Body Systems: 6** **IAS Ecology: 2, 5**	**8: AQ 3** **10: AQ 1-3, 5** **6: AQ 4** **5: AQ 1-5**

Grade 7

EARTH AND SPACE SCIENCE (ESS)

Topic: Cycles and Patterns of Earth and the Moon

This topic focuses on Earth's hydrologic cycle, patterns that exist in atmospheric and oceanic currents, the relationship between thermal energy and the currents, and the relative position and movement of the Earth, sun and moon.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
7.ESS.1: The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.		
Thermal energy is transferred as water changes state throughout the cycle. The cycling of water in the atmosphere is an important part of weather patterns on Earth. The rate at which water flows through soil and rock is dependent upon the porosity and permeability of the soil or rock.	**IAS Weather and Climate: 14** **IAS Geological Processes: 2** **IAS Land, Water & Human Interactions: 8, 12**	**14: AQ 1** **2: AQ 1, 2; Ext 1** **8: AQ 1-5** **12: AQ 4**
7.ESS.2: Thermal-energy transfers in the ocean and the atmosphere contribute to the formation of currents, which influence global climate patterns.		
The sun is the major source of energy for wind, air and ocean currents and the hydrologic cycle. As thermal energy transfers occur in the atmosphere and ocean, currents form. Large bodies of water can influence weather and climate. The jet stream is an example of an atmospheric current and the Gulf Stream is an example of an oceanic current. Ocean currents are influenced by factors other than thermal energy, such as water density, mineral content (such as salinity), ocean floor topography and Earth's rotation. All of these factors delineate global climate patterns on Earth.	**IAS Weather and Climate: 6, 7, 8, 9, 10, 14**	**6: AQ 4** **8: AQ 2, 3, 4, 5, 6** **9: AQ 3, 4, 5** **10: AQ 1, 2, 3, 4, 5** **14: AQ 1, 4**
7.ESS.3: The atmosphere has different properties at different elevations and contains a mixture of gases that cycle through the lithosphere, biosphere, hydrosphere and atmosphere. *Note: The emphasis is on why the atmosphere has defined layers, not on naming the layers.*		
The atmosphere is held to the Earth by the force of gravity. There are defined layers of the atmosphere that have specific properties, such as temperature, chemical composition and physical characteristics. Gases in the atmosphere include nitrogen, oxygen, water vapor, carbon dioxide	**IAS Weather and Climate: 14, 15**	**14: AQ 2** **15: AQ 1, 2, 3**

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
and other trace gases. Biogeochemical cycles illustrate the movement of specific elements or molecules (such as carbon or nitrogen) through the lithosphere, biosphere, hydrosphere and atmosphere.		
7.ESS.4: The relative patterns of motion and positions of Earth, moon and sun cause solar and lunar eclipses, tides and phases of the moon.		
The moon's orbit and its change of position relative to Earth and sun result in different parts of the moon being visible from Earth (phases of the moon).	**IAS Solar System and Beyond: 2, 3, 4, 5**	**3: AQ 3, 5, 6** **4: AQ 4** **5: AQ 1, 2, 3, 4**
A solar eclipse is when Earth moves into the shadow of the moon (during a new moon). A lunar eclipse is when the moon moves into the shadow of Earth (during a full moon).	**IAS Solar System and Beyond: 5**	**5: AQ 3; Ext**
Gravitational force between Earth and the moon causes daily oceanic tides. When the gravitational forces from the sun and moon align (at new and full moons) spring tides occur. When the gravitational forces of the sun and moon are perpendicular (at first and last quarter moons), neap tides occur.	**IAS Solar System and Beyond 15** *(only partial correlation)*	
7.ESS.5: The relative positions of Earth and the sun cause patterns we call seasons.		
Earth's axis is tilted at an angle of 23.5°. This tilt along with Earth's revolution around the sun, affects the amount of direct sunlight that the earth receives in a single day and throughout the year. The average daily temperature is related to the amount of direct sunlight received.	**IAS Solar System and Beyond: 6, 7, 8, 9**	**7: AQ 3, 4** **8: AQ 1, 2, 3, 4** **9: AQ 1**

PHYSICAL SCIENCE (PS)

Topic: Conservation of Mass and Energy

This topic focuses on the empirical evidence for the arrangements of atoms on the Periodic Table of Elements, conservation of mass and energy, transformation and transfer of energy.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
7.PS.1: Elements can be organized by properties. *Note 1: This is the conceptual introduction of the Periodic Table of Elements and should be limited to classifications based on observable properties; it should not include the names of the families.*		

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
Elements can be classified as metals, non-metals and metalloids, and can be organized by similar properties such as color, solubility, hardness, density, conductivity, melting point and boiling point, viscosity, and malleability.	**IAS Chemistry of Materials:** **2**	**2: AQ 1, 2, 3**
7.PS.2: Matter can be separated or changed, but in a closed system, the number and types of atoms remains constant. *Note: Under these standards, classifying specific changes as chemical or physical is not appropriate.*		
When substances interact and form new substances the properties of the new substances may be very different from those of the original substances, but the amount of mass does not change.	**IAS Chemical Reactions:** **2-7**	**2: AQ 2** **4: AQ 1, 2** **5: AQ 3, 4** **6: AQ 1, 2, 3** **7: AQ 1, 2, 3**
Physically combining two or more substances forms a mixture, which can be separated through physical processes.	**IAS Chemical Reactions:** **3**	**3: STT 1, 2**
7.PS.3: Energy can be transformed or transferred but is never lost.		
When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after transfer. When energy is transformed from one form to another, the total amount of energy remains the same.	**IAS Chemical Reactions:** **9, 10** **IAS Energy:** **2- 9, 14**	**9: AQ 2** **10: AQ 4** **2: AQ 4** **3: AQ 1, 3** **5: AQ 1, 2, 3** **6: AQ 3, 4** **8: AQ 3, 4** **14: AQ 1**
7.PS.4: Energy can be transferred through a variety of ways. *Note: Energy transfers should be experiential and observable at this grade level.*		
Mechanical energy can be transferred when objects push or pull on each other over a distance.	**IAS Waves:** **2, 3, 4, 5, 6, 7** **IAS Energy: 2, 3** **IAS Force and Motion:** **3, 4, 7, 10, 11, 12**	**2: AQ 1, 3** **6: AQ 1** **3: AQ 1** **3: AQ 3** **4: AQ 2** **7: AQ 1, 2** **10: AQ 1, 2** **11: PS 3; AQ 3** **12: AQ 1, 2**
Mechanical and electromagnetic waves transfer energy when they interact with matter.	**IAS Waves:** **2-5, 7-14**	**2: AQ 1, 2** **3: AQ 4, 5** **7: 5, 9** **10: AQ 3-6** **11: AQ 1** **12: AQ 1-3, 6** **13: AQ 1**

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
		14: AQ 4
Thermal energy can be transferred through radiation, convection and conduction.	**IAS Energy:** **4, 5, 7, 8, 10-15**	**12: AQ 2, 3** **13: AQ 1, 4** **15: AQ 2**
An electrical circuit transfers energy from a source to a device.	**IAS Chemical Reactions: 8** **IAS Energy: 14**	

LIFE SCIENCE (LS)

Topic: Cycles of Matter and Flow of Energy

This topic focuses on the impact of matter and energy transfer within the biotic component of ecosystems.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
7.LS.1: Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments. *Note: Chemical reactions in terms of subatomic structures of atoms are not appropriate at this grade level. Chemical reactions are presented as the rearrangement of atoms in molecules.*		
Plants use the energy in light to make sugars out of carbon dioxide and water (photosynthesis). These materials can be used or stored for later use. Organisms that eat plants break down plant structures to release the energy and produce the materials they need to survive. The organism may then be consumed by other organisms for materials and energy.	**IAS Ecology: 7, 8** **IAS Energy: 6, 9**	**7: AQ 1-4** **8: AQ 1-3** **6: AQ 2**
Energy can transform from one form to another in living things. Animals get energy from oxidizing food, releasing some of its energy as heat.	**IAS Ecology: 7, 8** **IAS Energy: 6, 9**	**7: AQ 3** **8: AQ 1-3** **6: AQ 2**
The total amount of matter and energy remains constant, even though its form and location change.	**IAS Ecology: 7, 8** **IAS Energy: 9**	**8: AQ 1-3**
7.LS.2: In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.		
The variety of physical (abiotic) conditions that exists on Earth gives rise to diverse environments (biomes) and allows for the existence of a wide variety of organisms (biodiversity).	**IAS Evolution: 14** *biomes not specifically addressed* **IAS Ecology: 15** *biomes not specifically addressed*	
Biomes are regional ecosystems characterized by distinct types of organisms that have developed under specific soil and climatic conditions.		

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
Ecosystems are dynamic in nature; the number and types of species fluctuate over time. Disruptions, deliberate or inadvertent, to the physical (abiotic) or biological (biotic) components of an ecosystem impact the composition of an ecosystem.	**IAS Ecology:** **1, 2, 6, 9, 10, 12-16**	**1: AQ 4-6** **2: AQ 1** **6: AQ 1, 2, 5** **9: AQ 2-4** **12: AQ 1, 2** **13: AQ 2, 3, 5** **14: AQ 1-4** **15: AQ 1, 3** **16: PS 1-3; AQ 2**

Grade 8

EARTH AND SPACE SCIENCE (ESS)

Topic: Physical Earth

This topic focuses on the physical features of Earth and how they formed. This includes the interior of Earth, the rock record, plate tectonics and landforms.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
8.ESS.1: The composition and properties of Earth's interior are identified by the behavior of seismic waves. *Note 1: Radioactive decay is not the focus; this will be discussed in Physical Science and Chemistry.* *Note 2: At this grade level, analyzing seismograms (e.g., amplitude and lag time) and reading a travel time curve are not the focus. At this grade the properties of seismic waves should be addressed.*		
The refraction and reflection of seismic waves as they move through one type of material to another is used to differentiate the layers of Earth's interior. Earth has a core, a mantle, and a crust. Impacts during planetary formation generated heat.	**IAS Geological Processes:** **8** **IAS Earth's Resources:** **5**	**8: AQ 1, 2, 3; Ext 1, 2** **5: AQ 1**
These impacts converted gravitational potential energy to heat. Earth's core is also able to generate its own thermal energy because of decaying atoms. This continuously releases thermal energy. Thermal energy generated from Earth's core drives convection currents in the asthenosphere.	**IAS Geological Processes:** **14**	**14: AQ 2, 3**
8.ESS.2: Earth's lithosphere consists of major and minor tectonic plates that move relative to each other.		
Historical data and observations such as fossil distribution, paleomagnetism, continental drift and sea-floor spreading contributed to the theory of plate tectonics. The rigid tectonic plates move with the molten rock and magma beneath them in the upper mantle.	**IAS Geological Processes:** **12, 13, 14**	**12: AQ 2, 3, 4** **13: AQ 2, 3, 4** **14: AQ 3, 4**
Convection currents in the asthenosphere cause movements of the lithospheric plates. The energy that forms convection currents comes from deep within the Earth. .	**IAS Geological Processes:** **14**	**14: AQ 2, 3**
There are three main types of plate boundaries: divergent, convergent and transform. Each type of boundary results in specific motion and causes events (such as earthquakes or volcanic activity) or features (such as mountains or trenches) that are indicative of the type of boundary.	**IAS Geological Processes:** **6, 7, 8, 10, 11**	**6: AQ 1, 3** **10: AQ 2, 3, 4** **11: AQ 1, 2, 3**

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
8.ESS.3: A combination of constructive and destructive geologic processes formed Earth's surface.		
Earth's surface is formed from a variety of different geologic processes, including but not limited to plate tectonics.	**IAS Geological Processes:** **4, 5, 10, 11** **IAS Earth's Resources:** **7, 9** **IAS Land, Water, and Human Interactions:** **7, 11, 12, 13**	**5: AQ 2** **10: AQ 2, 3, 4** **11: AQ 1, 2, 3** **7: AQ 2, 3, 5** **9: AQ 2, 5** **7: AQ 1, 2, 5, 6** **11: AQ 4, 5** **12: AQ 1, 4** **13: AQ 1-6; Ext**
8.ESS.4: Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.		
Earth is approximately 4.6 billion years old. Earth history is based on observations of the geologic record and the understanding that processes observed at present day are similar to those that occurred in the past (uniformitarianism). There are different methods to determine relative and absolute age of some rock layers in the geologic record. Within a sequence of undisturbed sedimentary rocks, the oldest rocks are at the bottom (superposition). The geologic record can help identify past environmental and climate conditions.	**IAS Earth's Resources:** **9, 10, 11, 12**	**9: AQ 1, 3, 4** **11: AQ 2, 4** **12: AQ 3, 4, 5**

PHYSICAL SCIENCE (PS)

Topic: Forces and Motion

This topic focuses on forces and motion within, on and around the Earth and within the universe.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
8.PS.1: Objects can experience a force due to an external field such as magnetic, electrostatic, or gravitational fields.		
Magnetic, electrical and gravitational forces can act at a distance.	**IAS Fields and Interactions: 1-14**	**4: AQ 1-4** **5: AQ 1-4** **7: AQ 2, 3** **8: AQ 5** **9: AQ 1-3** **10: AQ 3, 5** **12: AQ 3**
8.PS.2: Forces can act to change the motion of objects.		

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
The motion of an object is always measured with respect to a reference point.	**IAS Force and Motion:** **2, 3, 4, 6, 10, 12, 13, 14**	**2: AQ 1-5** **3: PS 1-11; AQ 1** **4: PS 1-5** **6: AQ 1-3** **12: AQ 1, 2** **13: PS 10-15** **14: PS 4-5**
Forces can be added. The new force on an object is the sum of all of the forces acting on the object.	**IAS Force and Motion:** **6, 7, 8, 9, 10, 11, 12**	**7: AQ 1** **8: AQ 1, 5** **9: AQ 3** **10: AQ 1, 2** **11: PS 2-5; AQ 1, 2** **12: AQ 1-3**
If there is a nonzero net force acting on an object, its speed and/or direction will change.	**IAS Force and Motion:** **6, 7, 8, 9, 10, 11, 12** **IAS Fields and Interactions:** **1, 4-6, 9-12**	**7: AQ 1** **8: AQ 1, 5** **9: AQ 2, 3** **10: AQ 1, 2** **11: PS 2-5; AQ 1, 2** **12: AQ 1-3** **1: AQ 1** **4: AQ 5** **5: AQ 2** **6: AQ 1, 2** **9: AQ 1-3** **10: AQ 3** **11: AQ 2-4** **12: AQ 3**
Kinetic friction and drag are forces that act in a direction opposite the relative motion of objects.	**IAS Force and Motion:** **9, 13, 14**	**13: AQ 1** **14: AQ 1**

LIFE SCIENCE (LS)

Topic: Species and Reproduction

This topic focuses on continuation of the species.

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
8.LS.1: Diversity of species, a result of variation of traits, occurs through the process of evolution and extinction over many generations. The fossil records provide evidence that changes have occurred in number and types of species. *Note: Population genetics and the ability to use statistic mathematics to predict changes in a gene pool are reserved for high school Biology.*		
Fossils provide important evidence of how life and environmental conditions have changed.	**IAS Evolution:** **8-12**	**8: AQ 1-4** **9: AQ 1-2** **10: AQ 1, 4** **11: AQ 1-4** **12: AQ 1, 4-6**
Changes in environmental conditions can affect how beneficial a trait will	**IAS Evolution:** **2-7**	**2: AQ 1e, 3** **3: AQ 1, 3**

CONTENT STATEMENT	Unit and Activity *(Content may be found in both the Student Edition or Teacher Edition)*	Assessment Opportunities
be for the survival and reproductive success of an organism or an entire species.		**4: AQ 1, 3** **5: AQ 4** **6: AQ 2-4** **7: AQ 1, 2**
Throughout Earth's history, extinction of a species has occurred when the environment changes and the individual organisms of that species do not have the traits necessary to survive and reproduce in the changed environment. Most species (approximately 99 percent) that have lived on Earth are now extinct.	**IAS Evolution:** **8, 9, 11, 12, 14**	**8: AQ 2** **9: AQ 2** **12: AQ 5** **14: AQ 1-4**
8.LS.2: Every organism alive today comes from a long line of ancestors who reproduced successfully every generation.		
Reproduction is the transfer of genetic information from one generation to the next. It can occur with mixing of genes from two individuals (sexual reproduction). It can occur with the transfer of genes from one individual to the next generation (asexual reproduction). The ability to reproduce defines living things.	**IAS Reproduction:** **2- 6, 8, 9**	**3: AQ 2, 3** **4: AQ 5, 8** **5: AQ 4** **8: AQ 3** **9: AQ 1, 7**
8.LS.3: The characteristics of an organism are a result of inherited traits received from parent(s). Note 1: The focus should be the link between DNA and traits without being explicit about the mechanisms involved. Note 2: The ways in which bacteria reproduce is beyond the scope of this content statement. Note 3: The molecular structure of DNA is not appropriate at this grade level.		
Expression of all traits is determined by genes and environmental factors to varying degrees. Many genes influence more than one trait, and many traits are influenced by more than one gene.	**IAS Reproduction:** **2-10, 12**	**3: AQ3** **4: AQ 8** **5: AQ 2-5** **6: AQ 1, 5** **7: AQ 1-5** **9: AQ 1-8** **10: AQ 2**
During reproduction, genetic information (DNA) is transmitted between parent and offspring. In asexual reproduction, the lone parent contributes DNA to the offspring. In sexual reproduction, both parents contribute DNA to the offspring.	**IAS Reproduction:** **2-6, 8, 9**	**3: AQ 2, 3** **4: AQ 5, 8** **5: AQ 4** **8: AQ 3** **9: AQ 1, 7**