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
Energy	Ecology	Geological Processes
Body Systems	Land, Water, and Human Interactions	Earth's Resources
From Cells to Organisms	Weather and Climate	Reproduction
Geological Processes	Solar System and Beyond	Evolution
Chemistry of Materials	Chemical Reactions	Force and Motion
Kit 402: Mineral Structure - Cleavage & Fracture	Waves	Fields and Interactions
Kit 403S: Classifying Sedimentary, Metamorphic, and Igneous Rocks	Kit 109S: Elements and the Periodic Table	
Kit 1102: Soil Composition and Structure	Kit 558S: Biomes and Biodiversity	

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Grade 6

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
Earth and Space Science	
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).*	Earth's Resources: 3 Kit 400: Introduction to Mineral Crystals Kit 402: Mineral Structure - Cleavage & Fracture
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).	Kit 403S: Classifying Sedimentary, Metamorphic, and Igneous Rocks
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.	Geological Processes: 15, 16
6.ESS.4: Soil is unconsolidated material that contains organic matter and weathered rock. 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 one another based on properties that can be measured. The terms dirt and soil are not synonymous, use the term "soil". **Note:** *The emphasis should be on properties of soil rather than memorization.*	Kit 1102: Soil Composition and Structure
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.	Earth's Resources: 1, 2, 4, 6, 7 Geological Processes: 16

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
Physical Science	
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. Elements are a class of substances composed of a single kind of atom. Molecules are the combination of two or more atoms that are joined together chemically.	 Chemistry of Materials: 2, 4, 7 Chemical Reactions: 7 Chemistry of Materials: 2, 6, 7 Chemistry of Materials: 6, 7, 11, 12 Chemical Reactions: 2, 4, 7
6.PS.2: Changes of state are explained by a model of matter composed of particles that are in motion. Temperature is a measure of the average motion of the particles in a substance. Heat is a process of energy transfer rather than a type of energy. Energy transfer can result in a change in temperature or a phase change. When substances undergo changes of state, atoms change their motion and position. **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.*	 Energy: 4, 7 Chemistry of Materials: 9, 10 Energy: 4, 7, 8, 10 Chemistry of Materials: 9, 10 Chemistry of Materials: 8, 10 Chemical Reactions: 3
6.PS.3: There are two categories of energy: kinetic and potential. Objects and substances in motion have kinetic energy. Objects and substances can have energy as a result of their position (potential energy). **Note:** *Chemical and elastic potential energy should not be included at this grade; this is found in PS grade 7.*	 Energy: 2, 3, 4, 6 Force and Motion: 3, 4, 5 Energy: 2, 3, 6 Force and Motion: 3
6.PS.4: An object's motion can be described by its speed and the direction in which it is moving. An object's position and speed can be measured and graphed as a function of time.	 Force and Motion: 2, 7, 8

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
Note: *Velocity and acceleration rates should not be included at this grade level; these terms are introduced in high school.*	
Life Science	
6.LS.1: Cells are the fundamental unit of life. 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. **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.*	From Cells to Organisms: 4, 6, 9, 10, 12, 13 Body Systems: 5
6.LS.2: All cells come from pre-existing cells. Cells repeatedly divide resulting in more cells and growth and repair in multicellular organisms. **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.*	From Cells to Organisms: 4, 6 Reproduction: 2, 3
6.LS.3: Cells carry on specific functions that sustain life. 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. Every cell is covered by a membrane that controls what can enter and leave the cell. Within the cell are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, information feedback and movement. **Note:** *Emphasis should be placed on the function and coordination of cell components, as well as on their roles in overall cell function.*	From Cells to Organisms: 5, 6, 8, 11, 12, 13 Body Systems: 5 From Cells to Organisms: 6, 7 From Cells to Organisms: 6, 8, 9, 10, 12, 13
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.	From Cells to Organisms: 10, 11 Body Systems: 2, 3, 8, 11, 12 From Cells to Organisms: 6, 8, 11

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
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. Organisms have diverse body plans, symmetry and internal structures that contribute to their being able to survive in their environments.	Body Systems: 5 From Cells to Organisms: 8, 9, 10 Body Systems: 6 Ecology: 2, 5

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Grade 7

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
Earth and Space Science	
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.	Weather and Climate: 14 Geological Processes: 2, 7, 8 Land, Water, and Human Interactions: 8
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.	Weather and Climate: 6, 7, 8, 9, 10, 14
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. 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 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. **Note:** ***The emphasis is on why the atmosphere has defined layers, not on naming the layers.***	Weather and Climate: 14, 15

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
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). 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). 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.	Solar System and Beyond: 2, 3, 4, 5 Solar System and Beyond: 5 Not covered
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.	Solar System and Beyond: 6, 7, 8, 9
Physical Science	
7.PS.1: Elements can be organized by properties. 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. **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.*	Chemistry of Materials: 2 Kit 109S: Elements and the Periodic Table
7.PS.2: Matter can be separated or changed, but in a closed system, the number and types of atoms remains constant. When substances interact and form new substances the properties of the new substances may be very different from	Chemical Reactions: 2, 3, 4, 5, 6, 7

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those of the original substances, but the amount of mass does not change. Physically combining two or more substances forms a mixture, which can be separated through physical processes. **Note:** *Under these standards, classifying specific changes as chemical or physical is not appropriate*.	Chemical Reactions: 3
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.	Chemical Reactions: 9, 10 Energy: 2, 3, 4, 5, 6, 7, 8, 9, 14
7.PS.4: Energy can be transferred through a variety of ways. Mechanical energy can be transferred when objects push or pull on each other over a distance. Mechanical and electromagnetic waves transfer energy when they interact with matter. Thermal energy can be transferred through radiation, convection and conduction. An electrical circuit transfers energy from a source to a device. **Note:** *Energy transfers should be experiential and observable at this grade level.*	Waves: 2, 3, 4, 5, 7 Energy: 2, 3 Force and Motion: 3, 4, 7, 10, 11, 12 Waves: 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14 Energy: 4, 5, 7, 8, 10, 11, 12, 13, 14, 15 Chemical Reactions 8
Life Science	
7.LS.1: Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments. 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.	Ecoloy: 8 Energy: 6, 9

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Energy can transform from one form to another in living things. Animals get energy from oxidizing food, releasing some of its energy as heat. The total amount of matter and energy remains constant, even though its form and location change. **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.*	Ecology: 7, 8 Energy: 6, 9 Ecology: 7, 8 Energy: 9
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). Biomes are regional ecosystems characterized by distinct types of organisms that have developed under specific soil and climatic conditions. 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.	Ecology 4, 5, 10, 13, 14, 15, 16 Kit 558S: Biomes and Biodiversity Kit 558S: Biomes and Biodiversity Ecology: 2, 9, 10, 11, 12, 16

Grade 8

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
Earth and Space Science	
8.ESS.1: The composition and properties of Earth's interior are identified by the behavior of seismic waves. 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. 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. **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.*	Geological Processes: 8 Earth's Resources: 5 Geological Processes: 14
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 seafloor 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. Convection currents in the asthenosphere cause movements of the lithospheric plates. The energy that forms convection currents comes from deep within the Earth. 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.	Geological Processes: 12, 13, 14 Geological Processes: 14 Geological Processes: 6, 7, 8, 10, 11
8.ESS.3: A combination of constructive and destructive geologic processes formed Earth's surface.	Geological Processes: 4, 5, 10, 11

Content Statement	Location where standard is found in *Issues and Science* Unit: Activity # or Single Concept Kit #: Kit Title
Earth's surface is formed from a variety of different geologic processes, including but not limited to plate tectonics.	Earth's Resources: 7, 9 Land, Water, and Human Interactions: 7, 12, 13
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.	Earth's Resources: 9, 10, 11, 12
Physical Science	
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.	Fields and Interactions: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
8.PS.2: Forces can act to change the motion of objects. The motion of an object is always measured with respect to a reference point. Forces can be added. The net force on an object is the sum of all of the forces acting on the object. If there is a nonzero net force acting on an object, its speed and/or direction will change. Kinetic friction and drag are forces that act in a direction opposite the relative motion of objects.	 Force and Motion: 2, 3, 4, 6, 10, 12, 13 Force and Motion:9, 10, 12 Force and Motion: 6, 7**,** 9, 10, 12 Force and Motion: 9, 13, 14
Life Science	
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. Fossils provide important evidence of how life and environmental conditions have changed.	Evolution: 9, 11, 12

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Changes in environmental conditions can affect how beneficial a trait will be for the survival and reproductive success of an organism or an entire species. 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. **Note:** *Population genetics and the ability to use statistic mathematics to predict changes in a gene pool are reserved for high school Biology.*	Evolution: 4, 5, 6, 7 Evolution: 8, 9, 11, 14
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.	Reproduction: 2, 3, 6, 9
8.LS.3: The characteristics of an organism are a result of inherited traits received from parent(s). 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. 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. **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.*	Reproduction: 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 Reproduction: 2, 3, 4, 5, 6, 8, 9