SRA Life, Earth, and Physical Science Laboratories
correlation to
Maryland Voluntary State Curriculum—Science
Grade 6

SRA Life, Earth, and Physical Science Laboratories provide core science content in an alternate reading format. Each *SRA Science Lab* contains 180 Science Cards covering key science concepts and vocabulary. Each lab covers 90 different science topics presented at two different reading levels to meet varied student abilities. The *Teacher's Handbook* includes hands-on inquiry activities as well as vocabulary building exercises. The *Classroom Resource CD-ROM* includes Writing Strategies in Science along with tests and vocabulary games.

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
A. Constructing Knowledge
1. Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided. **a. Explain that scientists differ greatly in what phenomena they study and how they go about their work.** **b. Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.** **c. Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.** **d. Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.** **e. Explain that if more than one variable changes at the same in an investigation, the outcome of the investigation may not be clearly attributed to any one of the variables.** **f. Give examples of when further studies of the question being investigated may be necessary.** **g. Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.** **h. Use mathematics to interpret and communicate data.** **i. Explain why accurate recordkeeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.**
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
B. Applying Evidence and Reasoning
1. Review data from a single simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment. **a. Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.** **b. Explain that what people expect to observe often affects what they actually do observe and that scientists know about this danger to objectivity and take steps to try to avoid it when designing investigations and examining data.** **c. Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.** **d. Describe the reasoning that lead to the interpretation of data and conclusions drawn.** **e. Question claims based on vague statements or on statements made by people outside their area of expertise.**
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99 **Classroom Resource CD-ROM:** Writing Strategy 8, 11, 15, 18, 22

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

C. Communicate Scientific Information

1. Develop explanations that explicitly link data from investigations conducted, selected readings, and when appropriate, contributions from historical discoveries.

a. Organize and present data in tables and graphs and identify relationships they reveal.

b. Interpret tables and graphs produced by others and describe in words the relationships they show.

c. Give examples of how scientific knowledge is subject to modification as new information challenges theories and as a new theory leads to looking at old observations in a new way.

d. Criticize the reasoning in arguments in which:

- **a. Fact and opinion are intermingled.**
- **b. Conclusions do not follow logically from the evidence given.**
- **c. Existence of controlled groups and the relationships to experimental groups is not made obvious.**
- **d. Samples are too small, biased, or not representative.**

e. Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend in its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering.

f. Participate in group discussions on scientific topics be restating or summarizing accurately what others have said, asking for clarification of elaboration, and expressing alternative positions.

g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.

Life Science Lab, Level A: Cards 2, 5, 46, 59, 69
Life Science Lab, Level B: Cards 2, 5, 46, 59, 69
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103

Earth Science Lab, Level A: Cards 10, 68, 72, 78
Earth Science Lab, Level B: Cards 10, 68, 72, 78
Earth Science Lab Teacher's Handbook: Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103

Physical Science Lab, Level A: Cards 3, 7, 17, 55
Physical Science Lab, Level B: Cards 3, 7, 17, 55
Physical Science Lab Teacher's Handbook: Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

Classroom Resource CD-ROM: Writing Strategy 15, 16, 20, 22, 24

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

1. Explain that complex systems require control mechanisms.
a. Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.
b. Demonstrate that all control systems have inputs, outputs, and feedback.
c. Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)
d. Identify reasons that systems fail—they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.

Life Science Lab, Level A: Cards 5, 59, 64, 69, 83, 87, 88, 89, 90
Life Science Lab, Level B: Cards 5, 59, 64, 69, 83, 87, 88, 89, 90

Earth Science Lab, Level A: Cards 16, 20, 31, 37, 51, 54, 59, 70, 79, 80, 81, 88
Earth Science Lab, Level B: Cards 16, 20, 31, 37, 51, 54, 59, 60, 79, 08, 81, 88

Physical Science Lab, Level A: Cards 33, 35, 70, 71, 72, 73, 76, 81, 84, 90
Physical Science Lab, Level B: Cards 33, 35, 70, 71, 72, 73, 76, 81, 84, 90

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

2. Analyze, design, assemble and troubleshoot complex systems.
a. Provide evidence that a system can include processes as well as things.
b. Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system [which can include material, energy, or information] can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)
c. Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.

Life Science Lab, Level A: Cards 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Life Science Lab, Level B: Cards 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells*, pages 77-79; Hands-On Activity 4, *Your Cardiovascular System*, pages 89-91; Hands-On Activity 6, *How Much Does Energy Cost?*, pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain*, pages 101-103

Earth Science Lab, Level A: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Earth Science Lab, Level B: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Earth Science Lab Teacher's Handbook: Hands-On Activity 1, *Identifying Minerals with the Mohs Scale*, pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action*, pages 77-79; Hands-On Activity 4, *Using Sound Waves*, pages 85-87; Hands-On Activity 6, *Modeling a Tornado*, pages 93-95; Hands-On Activity 8, *Temperature, Salinity, and Water Density*, pages 101-103

Physical Science Lab, Level A: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab, Level B: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab Teacher's Handbook: Hands-On Activity 1, *Measuring pH of Acids and Bases*, pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates*, pages 81-83; Hands-On Activity 3, *Energy Conversion*, pages 85-87; Hands-On Activity 4, *Reducing Friction*, pages 89-91; Hands-On Activity 5, *Making a Potato Battery*, pages 93-95; Hands-On Activity 6, *Making Sound*, pages 97-99

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
D. Technology
3. Analyze the value and the limitations of different types of models in explaining real things and processes. **a. Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.** **b. Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.** **c. Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.**
Life Science Lab Teacher's Handbook: Hands-On Activity 4, *Your Cardiovascular System*, pages 89-91; Hands-On Activity 5, *Making Fossils*, pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?*, pages 97-99 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 6, *Modeling a Tornado*, pages 93-95; Hands-On Activity 7, *Sizes in the Solar System*, pages 97-99 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 5, *Making a Potato Battery*, pages 93-95; Hands-On Activity 6, *Making Sound*, pages 97-99 **Classroom Resource CD-ROM:** Writing Strategy 20

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
A. Materials and Processes That Shape a Planet
2. Cite evidence to demonstrate and explain that physical weathering and chemical weathering cause changes to Earth materials. **a. Identify examples of physical weathering, such as the effect of wind, ice, etc. and describe the changes caused in each.** **b. Describe the changes in materials caused by each of the chemical weathering processes listed:** **a. Rusting/tarnishing** **b. Dissolving by acid rain.** **c. Compare physical and chemical weathering and provide examples of changes caused in Earth materials or features by each of these processes.**
Earth Science Lab, Level A: Cards 22, 24, 25, 26, 27, 28 **Earth Science Lab, Level B:** Cards 22, 24, 25, 26, 27, 28

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
A. Materials and Processes That Shape a Planet
4. Differentiate among sedimentary, igneous, and metamorphic rocks based upon the processes by which they are formed. **a. Identify and describe the processes that form sedimentary rocks.** **a. Deposition** **b. Compaction** **c. Cementation.** **b. Identify and describe the processes that form igneous rocks.** **a. Volcanic eruptions** **b. Igneous intrusions.** **c. Identify and describe the processes that form metamorphic rocks.** **a. High temperature** **b. Pressure.** **d. Cite features that can be used as evidence to distinguish among the three types of rocks and relate these features to the processes that form each rock type.** **e. Describe the processes that change one form of rock into another (rock cycle).**
Earth Science Lab, Level A: Cards 6, 7, 8, 9, 17 **Earth Science Lab, Level B:** Cards 6, 7, 8, 9, 17

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.

C. Plate Tectonics

1. Recognize and describe the internal and external structure of the Earth.

a. Recognize and describe that the Earth's mantle

- **a. Lies between the core and the crust**
- **b. Is very hot**
- **c. Has properties of both solids and liquid.**

b. Recognize and describe that the Earth's core

- **a. Is at the center of the Earth**
- **b. Is very hot**
- **c. Is dense and metallic.**

c. Identify and describe the Earth's crust.

- **a. The solid crust consists of separate plates.**
- **b. The plates constantly move at a slow pace in different directions.**
- **c. The plates interact with one another as a result of plate motion.**

Earth Science Lab, Level A: Cards 1, 2, 10, 11, 12, 13, 14, 15, 16, 17, 88
Earth Science Lab, Level B: Cards 1, 2, 10, 11, 12, 13, 14, 15, 16, 17, 88
Earth Science Lab Teacher's Handbook: Hands-On Activity 2, *Plate Boundaries in Action*, pages 77-79

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.

C. Plate Tectonics

2. Recognize and explain how geologic events are a result of the movement of Earth's crustal plates.

a. Recognize and describe the evidence for plate movement.

- **a. Shape of continents.**
- **b. Continuity of geologic features and fossils on the continents.**
- **c. Ocean rifts, seafloor spreading.**
- **d. Global patterns of earthquakes and volcanoes.**

b. Recognize and explain that major geologic events (earthquakes, volcanic activity, sea floor spreading) occur along crustal plate boundaries.

Earth Science Lab, Level A: Cards 10, 11, 12, 13, 14, 15, 16, 17, 88
Earth Science Lab, Level B: Cards 10, 11, 12, 13, 14, 15, 16, 17, 88

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.

D. Astronomy

1. Recognize that objects of our solar system are interrelated.

a. Recognize that Earth and its closest star, the Sun, are part of a disk-shaped galaxy of stars and that our galaxy is one of billions of galaxies.

b. Construct models with accurate scale that represent the position of the Earth relative to the sun and to other planets.

c. Identify and describe the general pattern of movement of all objects in our solar system.

d. Recognize that the pull of gravity causes the pattern of motion of celestial objects.

Earth Science Lab, Level A: Cards 62, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 77
Earth Science Lab, Level B: Cards 62, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 77
Earth Science Lab Teacher's Handbook: Hands-On Activity 7, *Sizes in the Solar System*, pages 97-99

Physical Science Lab, Level A: Card 59
Physical Science Lab, Level B: Card 59

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.
D. Evolution
1. Explain that in any particular environment, the growth and survival or organisms and species depend on the physical conditions. **a. Cite examples and describe that small differences between parents and offspring can accumulate (through selective breeding) in successive generations so that descendants are very different from their ancestors.** **b. Explain that in all environments—freshwater, marine, forest, desert, grassland, mountain, and others—organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter.** **c. Explain that in any particular environment individual organisms with certain traits are more likely than others to survive and have offspring.** **d. Explain, with examples, ways that people can control some characteristics of plants and animals they raise by selective breeding.** **e. Describe ways in which changes in environmental conditions can affect the survival of individual organisms and entire species.** **f. Describe how sediments of sand and smaller particles (sometimes containing the remains of organisms) are gradually buried and are cemented together by dissolved minerals to form solid rock; and describe that such fossils provide evidence for the long history of changing life forms whose remains are found in the rocks.** **g. Explain that he more recently deposited rock layers are likely to contain fossils resembling existing species.**
Life Science Lab, Level A: Cards 64, 65, 66, 67, 75, 81, 82, 84, 86, 87, 88, 89, 90 **Life Science Lab, Level B:** Cards 64, 65, 66, 67, 75, 81, 82, 84, 86, 87, 88, 89, 90 **Life Science Lab Teacher's Handbook:** Hands-On Activity 5, *Making Fossils*, pages 93-95 **Earth Science Lab, Level A:** Cards 30, 31, 33, 34, 59, 60, 61 **Earth Science Lab, Level B:** Cards 30, 31, 33, 34, 59, 60, 61

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.
F. Ecology
1. Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available. **a. Explain that populations increase or decrease relative to the availability of resources and the conditions of the environment.** **b. Identify and describe factors that could limit populations within any environment, such as disease, introduction of a nonnative species, depletion of resources, etc.** **c. Explain that within any environment organisms with similar needs may compete with one another for resources.** **d. Cite examples to illustrate that competition is reduced within organisms use different sets of resources, such as birds in a forest eat different kinds and sizes of seeds.**
Life Science Lab, Level A: Cards 71, 72, 73, 74, 75, 76, 77, 86 **Life Science Lab, Level B:** Cards 71, 72, 73, 74, 75, 76, 77, 86

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
C. States of Matter
1. Provide evidence and examples illustrating that many substances can exist as a solid, liquid, or gas depending on temperature. **a. Use evidence from investigations to describe the effect that adding heat energy to different types of matter has on the rate at which the matter changes from one state to another.** **b. Based on data from investigations describe the effect that removing heat energy from different types of matter has on the rate at which the matter changes from one state to another.** **c. Analyze data gathered and formulate a conclusion on the effects of temperature change on most substances.**
Physical Science Lab, Level A: Cards 5, 6, 7, 8, 42 **Physical Science Lab, Level B:** Cards 5, 6, 7, 8, 42

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
D. Physical and Chemical Changes
1. Cite examples to support the fact that some substances can be separated into the original substances from which they were made. **a. Investigate and identify ways to describe and classify mixtures using the observable and measurable properties of their components.** **a. Magnetism** **b. Boiling point** **c. Solubility in water.** **b. Based on data gathered, identify and describe various processes used to separate mixtures.** **a. Filtration** **b. Evaporation** **c. Paper chromatography.** **c. Use data gathered to provide a reasonable explanation for the idea that the mass of a mixture is equal to the sum of the masses of its components.**
Physical Science Lab, Level A: Cards 9, 12, 13 **Physical Science Lab, Level B:** Cards 9, 12, 13

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.
C. Electricity and Magnetism
2. Cite evidence supporting that electrical energy can be produced from a variety of energy sources and can itself be transformed into almost any other form of energy. **a. Research and identify various energy sources and the energy transforming devices used to produce electrical energy.** **a. Wind (generators, wind mills)** **b. Sun (solar cells)** **c. Water (turbines)** **d. Fossil fuels (engines).** **b. Cite examples that demonstrate the transformation of electrical energy into other forms of energy.** **c. Investigate and describe that some materials allow the quick, convenient, and safe transfer of electricity (conductors), while others prevent the transfer of electricity (insulators).** **d. Identify and describe the energy transformations in simple electric circuits.**
Physical Science Lab, Level A: Cards 34, 42, 45, 46, 47, 48, 49, 68, 69, 70, 71, 72, 73, 76 **Physical Science Lab, Level B:** Cards 34, 42, 45, 46, 47, 48, 49, 68, 69, 70, 71, 72, 73, 76 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 5, *Making a Potato Battery*, pages 93-95

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.

C. Electricity and Magnetism

3. Identify and describe magnetic fields and their relationship to electric current.

a. Investigate and describe the magnetic fields surrounding various types of magnets using materials, such as iron filings and small compasses.

- **a. A single bar magnet**
- **b. Two bar magnets with like poles facing**
- **two bar magnets with opposite poles facing**
- **d. A horseshoe magnet.**

b. Investigate and explain ways to change the strength of a simple electromagnet by varying the number of coils wrapped, the amount of electricity in the wire, the number of batteries used, and whether or not an iron core is used.

c. Describe how the electromagnet demonstrates the relationship of magnetism and electricity and identify common devices that demonstrate application of the relationship.

- **a. Electric motors (fans, hair dryers, can openers)**
- **b. Electrical generators (turbine).**

d. Based on investigations describe tat electricity moving through a wire produces a magnetic force on materials placed near the wire.

- **a. Iron filings**
- **b. Compasses.**

Physical Science Lab, Level A: Cards 74, 75, 76
Physical Science Lab, Level B: Cards 74, 75, 76

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.

D. Wave Interactions

1. Identify and describe the relationship among the various properties of waves.

a. Cite examples to show waves transfer energy from one place to another.

- **a. Light**
- **b. Sound**
- **c. Earthquakes waves.**

b. Measure and describe the wavelength, frequency, and amplitude of waves using:

- **a. Water**
- **b. Ropes**
- **c. Springs.**

c. Measure and describe the relationship between the frequency and the wavelength of a wave.

Earth Science Lab, Level A: Card 16
Earth Science Lab, Level B: Card 16

Physical Science Lab, Level A: Cards 77, 78, 79, 80, 82, 83, 85
Physical Science Lab, Level B: Cards 77, 78, 79, 80, 82, 83, 85
Physical Science Lab Teacher's Handbook: Hands-On Activity 6, *Making Sound,* pages 97-99

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.

D. Wave Interactions

2. Provide examples to demonstrate the relationship among the properties of waves using sound.

a. Investigate and describe the pitch of sounds can be varied by changing the rate of vibration.

b. Identify and describe the relationship among frequency, wavelength, and pitch.

c. Observe and describe the relationship between amplitude and loudness.

d. Cite evidence that sound waves transfer energy using observation of sympathetic tuning forks, tuned guitar strings, etc.

Physical Science Lab, Level A: Cards 79, 80, 81
Physical Science Lab, Level B: Cards 79, 80, 81
Physical Science Lab Teacher's Handbook: Hands-On Activity 6, *Making Sound,* pages 97-99

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.

D. Wave Interactions

3. Investigate and cite the rules that govern behaviors of light.
a. Based on data generalize the law of reflection.
b. Cite evidence from observations and research to support the fact that something can be "seen" when light waves emitted or reflected by it enter the eye.
c. Based on observations predict the change in the direction (refraction) of light as it travels from one material to another.
d. Cite evidence that the amount of light energy absorbed or reflected depends on the color of the object illuminated.

Physical Science Lab, Level A: Cards 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab, Level B: Cards 82, 83, 84, 85, 86, 87, 88, 89, 90

6.0 Environmental Science—Students will use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.

A. Natural Resources and Human Needs

1. Recognize and compare how different parts of the world have varying amounts and types of natural resources and how the use of those resources impacts the environmental quality.
a. Identify and describe natural resources as:
- **a. Land**
- **b. Fossil fuels**
- **c. Forests**
- **d. Water**
- **e. Wind**
- **f. Minerals**
- **g. Wildlife.**

b. Identify and describe the distribution of natural resources around the Earth.
c. Identify and describe how the natural change processes may be affected by human activities.
- **a. Agriculture**
- **b. Beach preservation**
- **c. Mining**
- **d. Development/construction**
- **e. Stream/river alteration.**

d. Identify and describe problems associated with obtaining, using, and distributing natural resources.
e. Identify possible solutions to problems associated with obtaining, using, and distributing natural resources.

Life Science Lab, Level A: Cards 84, 85, 86, 87, 88, 89, 90
Life Science Lab, Level B: Cards 84, 85, 86, 87, 88, 89, 90
Life Science Lab Teacher's Handbook: Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103

Earth Science Lab, Level A: Cards 5, 6, 7, 8, 29, 35, 37, 42, 59, 60, 61, 85, 86, 90
Earth Science Lab, Level B: Cards 5, 6, 7, 8, 29, 35, 37, 42, 59, 60, 61, 85, 86, 90
Earth Science Lab Teacher's Handbook: Hands-On Activity 5, *What is in the Air?,* pages 89-91

Physical Science Lab, Level A: Cards 38, 46, 47, 48, 49
Physical Science Lab, Level B: Cards 38, 46, 47, 48, 49

6.0 Environmental Science—Students will use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.
B. Environmental Issues
1. Recognize and explain that decisions influencing the use of natural resources may have benefits, drawbacks, unexpected consequences, and tradeoffs. **a. Identify and describe personal and community behaviors that waste natural resources and/or cause environmental harm and those behaviors that maintain or improve the environment.** **b. Identify and describe that individuals and groups assess and manage risk to the environment differently.**
Life Science Lab, Level A: Cards 84, 87, 88, 89, 90 **Life Science Lab, Level B:** Cards 84, 87, 88, 89, 90 **Earth Science Lab, Level A:** Cards 29, 37, 42, 59, 60, 61, 85, 86 **Earth Science Lab, Level B:** Cards 29, 37, 42, 59, 60, 61, 85, 86

6.0 Environmental Science—Students will use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.
B. Environmental Issues
1. Recognize and explain that human-caused changes have consequences for Maryland's environment as well as for other places and future times. **a. Identify and describe a range of local issues that have an impact on people in other places.** **b. Recognize and describe how environmental change in one part of the world can have consequences for other parts of the world.** **c. Identify and describe that ecosystems can be impacted by human activities.** **a. Protection of the Chesapeake bay watershed** **b. resource acquisition and use** **c. Land use decisions (agriculture, mining, and development)** **d. Recycling** **e. Use and disposal of toxic substances.**
Life Science Lab, Level A: Cards 84, 86, 87, 88, 89, 90 **Life Science Lab, Level B:** Cards 84, 86, 87, 88, 89, 90 **Life Science Lab Teacher's Handbook:** Hands-On Activity 7, *The Effects of Acid Rain*, pages 101-103 **Earth Science Lab, Level A:** Cards 37, 42, 59, 60, 61, 86 **Earth Science Lab, Level B:** Cards 37, 42, 59, 60, 61, 86 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 5, *What is in the Air?*, pages 89-91

SRA Life, Earth, and Physical Science Laboratories
correlation to
Maryland Voluntary State Curriculum—Science
Grade 7

SRA Life, Earth, and Physical Science Laboratories provide core science content in an alternate reading format. Each *SRA Science Lab* contains 180 Science Cards covering key science concepts and vocabulary. Each lab covers 90 different science topics presented at two different reading levels to meet varied student abilities. The *Teacher's Handbook* includes hands-on inquiry activities as well as vocabulary building exercises. The *Classroom Resource CD-ROM* includes Writing Strategies in Science along with tests and vocabulary games.

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
A. Constructing Knowledge
1. Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided. **a. Explain that scientists differ greatly in what phenomena they study and how they go about their work.** **b. Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.** **c. Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.** **d. Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.** **e. Explain that if more than one variable changes at the same in an investigation, the outcome of the investigation may not be clearly attributed to any one of the variables.** **f. Give examples of when further studies of the question being investigated may be necessary.** **g. Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.** **h. Use mathematics to interpret and communicate data.** **i. Explain why accurate recordkeeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.**
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
B. Applying Evidence and Reasoning
1. Review data from a single simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment. **a. Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.** **b. Explain that what people expect to observe often affects what they actually do observe and that scientists know about this danger to objectivity and take steps to try to avoid it when designing investigations and examining data.** **c. Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.** **d. Describe the reasoning that lead to the interpretation of data and conclusions drawn.** **e. Question claims based on vague statements or on statements made by people outside their area of expertise.**
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99 **Classroom Resource CD-ROM:** Writing Strategy 8, 11, 15, 18, 22

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

C. Communicate Scientific Information

1. Develop explanations that explicitly link data from investigations conducted, selected readings, and when appropriate, contributions from historical discoveries.

a. Organize and present data in tables and graphs and identify relationships they reveal.

b. Interpret tables and graphs produced by others and describe in words the relationships they show.

c. Give examples of how scientific knowledge is subject to modification as new information challenges theories and as a new theory leads to looking at old observations in a new way.

d. Criticize the reasoning in arguments in which:

- **a. Fact and opinion are intermingled.**
- **b. Conclusions do not follow logically from the evidence given.**
- **c. Existence of controlled groups and the relationships to experimental groups is not made obvious.**
- **d. Samples are too small, biased, or not representative.**

e. Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend in its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering.

f. Participate in group discussions on scientific topics be restating or summarizing accurately what others have said, asking for clarification of elaboration, and expressing alternative positions.

g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.

Life Science Lab, Level A: Cards 2, 5, 46, 59, 69
Life Science Lab, Level B: Cards 2, 5, 46, 59, 69
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103

Earth Science Lab, Level A: Cards 10, 68, 72, 78
Earth Science Lab, Level B: Cards 10, 68, 72, 78
Earth Science Lab Teacher's Handbook: Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103

Physical Science Lab, Level A: Cards 3, 7, 17, 55
Physical Science Lab, Level B: Cards 3, 7, 17, 55
Physical Science Lab Teacher's Handbook: Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

Classroom Resource CD-ROM: Writing Strategy 15, 16, 20, 22, 24

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

1. Explain that complex systems require control mechanisms.
a. Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.
b. Demonstrate that all control systems have inputs, outputs, and feedback.
c. Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)
d. Identify reasons that systems fail—they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.

Life Science Lab, Level A: Cards 5, 59, 64, 69, 83, 87, 88, 89, 90
Life Science Lab, Level B: Cards 5, 59, 64, 69, 83, 87, 88, 89, 90

Earth Science Lab, Level A: Cards 16, 20, 31, 37, 51, 54, 59, 70, 79, 80, 81, 88
Earth Science Lab, Level B: Cards 16, 20, 31, 37, 51, 54, 59, 60, 79, 08, 81, 88

Physical Science Lab, Level A: Cards 33, 35, 70, 71, 72, 73, 76, 81, 84, 90
Physical Science Lab, Level B: Cards 33, 35, 70, 71, 72, 73, 76, 81, 84, 90

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

2. Analyze, design, assemble and troubleshoot complex systems.
a. Provide evidence that a system can include processes as well as things.
b. Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system [which can include material, energy, or information] can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)
c. Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.

Life Science Lab, Level A: Cards 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Life Science Lab, Level B: Cards 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells*, pages 77-79; Hands-On Activity 4, *Your Cardiovascular System*, pages 89-91; Hands-On Activity 6, *How Much Does Energy Cost?*, pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain*, pages 101-103

Earth Science Lab, Level A: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Earth Science Lab, Level B: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Earth Science Lab Teacher's Handbook: Hands-On Activity 1, *Identifying Minerals with the Mohs Scale*, pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action*, pages 77-79; Hands-On Activity 4, *Using Sound Waves*, pages 85-87; Hands-On Activity 6, *Modeling a Tornado*, pages 93-95; Hands-On Activity 8, *Temperature, Salinity, and Water Density*, pages 101-103

Physical Science Lab, Level A: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab, Level B: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab Teacher's Handbook: Hands-On Activity 1, *Measuring pH of Acids and Bases*, pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates*, pages 81-83; Hands-On Activity 3, *Energy Conversion*, pages 85-87; Hands-On Activity 4, *Reducing Friction*, pages 89-91; Hands-On Activity 5, *Making a Potato Battery*, pages 93-95; Hands-On Activity 6, *Making Sound*, pages 97-99

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

3. Analyze the value and the limitations of different types of models in explaining real things and processes.
a. Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.
b. Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.
c. Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.

Life Science Lab Teacher's Handbook: Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99

Earth Science Lab Teacher's Handbook: Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99

Physical Science Lab Teacher's Handbook: Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

Classroom Resource CD-ROM: Writing Strategy 20

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.

A. Diversity of Life

1. Compile evidence to verify the claim of biologists that the features of organisms connect or differentiate them—these include external and internal structures (features) and processes.
a. Provide examples and explain that organisms sorted into groups share similarities in external structures as well as similarities in internal anatomical structures and processes which can be used to infer the degree of relatedness among organisms.
- **a. Vascular-nonvascular plants**
- **b. Closed-open circulatory systems**
- **c. Asexual-sexual reproduction**
- **d. Respiration (lungs-gills-skin)**
- **e. Digestion.**

b. Identify general distinctions among organisms that support classifying some things as plants, some as animals, and some that do not fit neatly into either group.
- **a. Animal consume food**
- **b. Plants make food.**

c. Use analogies, models, or drawings to represent that animals and plants have a great variety of body parts and internal structures that define the way into either group, survive, and reproduce.

Life Science Lab, Level A: Cards 1, 2, 3, 6, 7, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 60, 61
Life Science Lab, Level B: Cards 1, 2, 3, 6, 7, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 60, 61
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.

B. Cells

1. Gather and organize data to defend or argue the proposition that all living things are cellular (composed of cells) and that cells carry out the basic life functions.

a. Use microscopes or other magnifying instruments to observe, describe, and compare the cellular composition of different body tissues and organs in a variety of organisms (animals and plants).

b. Based on data from readings and designed investigations, cite evidence to illustrate that the life functions of multicellular organisms (plant and animal) are carried out within complex systems of different tissues, organs, and cells.

- **a. Extracting energy from food**
- **b. Getting rid of wastes**
- **c. Making raw materials.**

c. Based on research and examples from video technology explain that the repeated division of cells enables organisms to grow and make repairs.

d. Collect data from investigations using single celled organisms, such as yeast or algae to explain that a single cell carries out all the basic life functions of a multicellular organism.

- **a. Reproducing**
- **b. Extracting energy from food**
- **c. Getting rid of wastes.**

e. Based on data compiled from a number of lessons completed, take and defend a position on the statement "The way in which cells function is the same in all organisms."

Life Science Lab, Level A: Cards 1, 5, 6, 7, 8, 9, 10, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58
Life Science Lab, Level B: Cards 1, 5, 6, 7, 8, 9, 10, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.

B. Cells

2. Recognize and provide examples that human beings, like other organisms, have a complex body systems of cells, tissues, and organs that interact to support an organism's growth and survival.

a. Describe and explain that the complex set of systems found in multicellular organisms are made of different kinds of tissues and organs which are themselves composed of differentiated cells.

b. Select several body systems and explain the role of cells, tissues, and organs that effectively carry out a vital function for the organisms, such as:

- **a. Obtaining food and providing energy (digestive, circulatory, respiratory)**
- **b. Defense (nervous, endocrine, muscular, skeletal, immune)**
- **c. Reproduction (reproductive, endocrine, circulatory)**
- **d. Waste removal (excretory, respiratory, circulatory)**
- **e. Breathing (respiratory, circulatory).**

c. Develop a response that explains the meaning of this statement, "The specialization of cells serves the operation of the organs, and the organs serve the needs of the cells."

d. Investigate ways in which the various organs and tissues function to serve the needs of cells for food, air, and waste removal.

Life Science Lab, Level A: Cards 6, 7, 8, 9, 10, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58
Life Science Lab, Level B: Cards 6, 7, 8, 9, 10, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.
C. Genetics
1. Explain the ways that genetic information is passed from parent to offspring in different organisms. **a. Investigate and explain that in some kinds of organisms, all the genes come from a single parent, whereas in organisms that have sexes, typically half of the genes come from each parent.** **b. Investigate and explain that in sexual reproduction, a single specialized cells from a female (eggs) merges with a specialized cell from a male (sperm) and the fertilized egg now has genetic information from each parent, that multiplies to form the complete organism composed of about a trillion cells, each which contains the same genetic information.** **c. Investigate organisms that reproduce asexually to identify what traits they receive from the parent.** **d. Use information about how the transfer of traits from parent or parents to offspring occurs, to explain how selective breeding for particular traits has resulted in new varieties of cultivated plants and domestic animals.** **e. Identify evidence to support the idea that there is greater variation among offspring of organisms that reproduce sexually than among those that produce asexually.**
Life Science Lab, Level A: Cards 58, 60, 61, 62, 63, 64, 65 **Life Science Lab, Level B:** Cards 58, 60, 61, 62, 63, 64, 65

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.
E. Flow of Matter and Energy
1. Explain that the transfer and transformation of matter and energy links organisms to one another and to their physical setting. **a. Cite evidence from research and observations that food provides molecules that serve as fuel and building material for all organisms.** **b. Cite evidence from research and observations that organisms that eat plants or animals break down what they have consumed (food) to produce the materials and energy they need to survive or store for later use.** **c. Investigate and describe the processes that enable plants to use the energy from light to make sugars (food) from carbon dioxide and water.** **d. Provide evidence from research to explain how plants can use the food they make immediately for fuel or stored for later use.** **e. Ask and seek answers to questions about the fact that transfer of matter between organisms continues indefinitely because organisms are decomposed after death to return food materials to the environment.** **f. Provide evidence that supports the premise, "In the flow of matter system the total amount of matter remains constant even though its form and location change."**
Life Science Lab, Level A: Cards 1, 7, 16, 17, 73, 74, 75, 76, 77 **Life Science Lab, Level B:** Cards 1, 7, 16, 17, 73, 74, 75, 76, 77 **Life Science Lab Teacher's Handbook:** Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.

A. Structure of Matter

1. Cite evidence to support the fact that all matter is made up of atoms, which are far too small to see directly through a microscope.

a. Recognize and describe that the atoms of each element are alike but different from atoms of other elements.

b. Recognize and describe that different arrangements of atoms into groups compose all substances.

c. Provide evidence from the periodic table, investigations, and research to demonstrate that elements in the following groups have similar properties:

- **a. Highly reactive metals, such as magnesium and sodium**
- **b. Less-active metals, such as gold and silver**
- **c. Highly reactive non-metals, such as chlorine, fluorine and oxygen**
- **d. Almost non-reactive gases, such as helium and neon.**

d. Provide examples to illustrate that elements are substances that do not breakdown into smaller parts during normal investigations involving heating, exposure to electric current, or reactions with acids.

e. Cite evidence to explain that all living and non-living things can be broken down to a set of known elements.

Life Science Lab, Level A: Card 4
Life Science Lab, Level B: Card 4

Physical Science Lab, Level A: Cards 3, 4, 10, 11, 17, 18, 19, 20
Physical Science Lab, Level B: Cards 3, 4, 10, 11, 17, 18, 19, 20

6.0 Environmental Science—Students will use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.

A. Natural Resources and Human Needs

1. Recognize and explain the impact of a changing human population on the use of natural resources and on environmental quality.

a. Based on data identify and describe the positive and negative impacts of an increasing human population on the use of natural resources.

b. Recognize and describe the decreasing dependence on local resources due to the impact of available transportation.

Life Science Lab, Level A: Cards 84. 85, 86, 87, 88, 89
Life Science Lab, Level B: Cards 84, 85, 86, 87, 88, 89
Life Science Lab Teacher's Handbook: Hands-On Activity 7, *The Effects of Acid Rain*, pages 101-103

Earth Science Lab, Level A: Cards 29, 35, 37, 42, 59, 60, 61, 85, 86
Earth Science Lab, Level B: Cards 29, 35, 37, 42, 59, 60, 61, 85, 86
Earth Science Lab Teacher's Handbook: Hands-On Activity 5, *What is in the Air?*, pages 89-91

Physical Science Lab, Level A: Cards 38, 46, 47, 48, 49
Physical Science Lab, Level B: Cards 38, 46, 47, 48, 49

6.0 Environmental Science—Students will use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.
B. Environmental Issues
1. Recognize and describe that environmental changes can have local, regional, and global consequences. **a. Identify and describe a local, regional, or global environmental issue.** **b. Identify and describe that different individuals or groups are affected by an issue in different ways.**
Life Science Lab, Level A: Cards 84, 86, 87, 88, 89, 90 **Life Science Lab, Level B:** Cards 84, 86, 87, 88, 89, 90 **Life Science Lab Teacher's Handbook:** Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab, Level A:** Cards 29, 35, 37, 42, 59, 60, 61, 86 **Earth Science Lab, Level B:** Cards 29, 35, 37, 42, 59, 60, 61, 86 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 5, *What is in the Air?,* pages 89-91 **Physical Science Lab, Level A:** Card 38 **Physical Science Lab, Level B:** Card 38

SRA Life, Earth, and Physical Science Laboratories
correlation to
Maryland Voluntary State Curriculum—Science
Grade 8

SRA Life, Earth, and Physical Science Laboratories provide core science content in an alternate reading format. Each *SRA Science Lab* contains 180 Science Cards covering key science concepts and vocabulary. Each lab covers 90 different science topics presented at two different reading levels to meet varied student abilities. The *Teacher's Handbook* includes hands-on inquiry activities as well as vocabulary building exercises. The *Classroom Resource CD-ROM* includes Writing Strategies in Science along with tests and vocabulary games.

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
A. Constructing Knowledge
1. Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided. **a. Explain that scientists differ greatly in what phenomena they study and how they go about their work.** **b. Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.** **c. Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.** **d. Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.** **e. Explain that if more than one variable changes at the same in an investigation, the outcome of the investigation may not be clearly attributed to any one of the variables.** **f. Give examples of when further studies of the question being investigated may be necessary.** **g. Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.** **h. Use mathematics to interpret and communicate data.** **i. Explain why accurate recordkeeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.**
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
B. Applying Evidence and Reasoning
1. Review data from a single simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment. **a. Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.** **b. Explain that what people expect to observe often affects what they actually do observe and that scientists know about this danger to objectivity and take steps to try to avoid it when designing investigations and examining data.** **c. Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.** **d. Describe the reasoning that lead to the interpretation of data and conclusions drawn.** **e. Question claims based on vague statements or on statements made by people outside their area of expertise.**
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99 **Classroom Resource CD-ROM:** Writing Strategy 8, 11, 15, 18, 22

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

C. Communicate Scientific Information

1. Develop explanations that explicitly link data from investigations conducted, selected readings, and when appropriate, contributions from historical discoveries.

a. Organize and present data in tables and graphs and identify relationships they reveal.

b. Interpret tables and graphs produced by others and describe in words the relationships they show.

c. Give examples of how scientific knowledge is subject to modification as new information challenges theories and as a new theory leads to looking at old observations in a new way.

d. Criticize the reasoning in arguments in which:

- **a. Fact and opinion are intermingled.**
- **b. Conclusions do not follow logically from the evidence given.**
- **c. Existence of controlled groups and the relationships to experimental groups is not made obvious.**
- **d. Samples are too small, biased, or not representative.**

e. Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend in its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering.

f. Participate in group discussions on scientific topics be restating or summarizing accurately what others have said, asking for clarification of elaboration, and expressing alternative positions.

g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.

Life Science Lab, Level A: Cards 2, 5, 46, 59, 69
Life Science Lab, Level B: Cards 2, 5, 46, 59, 69
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells,* pages 77-79; Hands-On Activity 2, *Culturing Bacteria,* pages 81-83; Hands-On Activity 3, *Investigating Arthropods,* pages 85-87; Hands-On Activity 4, *Your Cardiovascular System,* pages 89-91; Hands-On Activity 5, *Making Fossils,* pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?,* pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103

Earth Science Lab, Level A: Cards 10, 68, 72, 78
Earth Science Lab, Level B: Cards 10, 68, 72, 78
Earth Science Lab Teacher's Handbook: Hands-On Activity 1, *Identifying Minerals with the Mohs Scale,* pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action,* pages 77-79; Hands-On Activity 3, *Interpreting a Topographic Map,* pages 81-83; Hands-On Activity 4, *Using Sound Waves,* pages 85-87; Hands-On Activity 5, *What is in the Air?,* pages 89-91; Hands-On Activity 6, *Modeling a Tornado,* pages 93-95; Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99; Hands-On Activity 8, *Temperature, Salinity, and Water Density,* pages 101-103

Physical Science Lab, Level A: Cards 3, 7, 17, 55
Physical Science Lab, Level B: Cards 3, 7, 17, 55
Physical Science Lab Teacher's Handbook: Hands-On Activity 1, *Measuring pH of Acids and Bases,* pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates,* pages 81-83; Hands-On Activity 3, *Energy Conversion,* pages 85-87; Hands-On Activity 4, *Reducing Friction,* pages 89-91; Hands-On Activity 5, *Making a Potato Battery,* pages 93-95; Hands-On Activity 6, *Making Sound,* pages 97-99

Classroom Resource CD-ROM: Writing Strategy 15, 16, 20, 22, 24

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

1. Explain that complex systems require control mechanisms.
a. Explain that the choice of materials for a job depends on their properties and on how they interact with other materials.
b. Demonstrate that all control systems have inputs, outputs, and feedback.
c. Realize that design usually requires taking constraints into account. (Some constraints, such as gravity or the properties of the materials to be used, are unavoidable. Other constraints, including economic, political, social, ethical, and aesthetic ones also limit choices.)
d. Identify reasons that systems fail—they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.

Life Science Lab, Level A: Cards 5, 59, 64, 69, 83, 87, 88, 89, 90
Life Science Lab, Level B: Cards 5, 59, 64, 69, 83, 87, 88, 89, 90

Earth Science Lab, Level A: Cards 16, 20, 31, 37, 51, 54, 59, 70, 79, 80, 81, 88
Earth Science Lab, Level B: Cards 16, 20, 31, 37, 51, 54, 59, 60, 79, 08, 81, 88

Physical Science Lab, Level A: Cards 33, 35, 70, 71, 72, 73, 76, 81, 84, 90
Physical Science Lab, Level B: Cards 33, 35, 70, 71, 72, 73, 76, 81, 84, 90

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.

D. Technology

2. Analyze, design, assemble and troubleshoot complex systems.
a. Provide evidence that a system can include processes as well as things.
b. Explain that thinking about things as systems means looking for how every part relates to others. (The output from one part of a system [which can include material, energy, or information] can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.)
c. Analyze any system to determine its connection, both internally and externally to other systems and explain that a system may be thought of as containing subsystems and as being a subsystem of a larger system.

Life Science Lab, Level A: Cards 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Life Science Lab, Level B: Cards 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Life Science Lab Teacher's Handbook: Hands-On Activity 1, *Examining Cells*, pages 77-79; Hands-On Activity 4, *Your Cardiovascular System*, pages 89-91; Hands-On Activity 6, *How Much Does Energy Cost?*, pages 97-99; Hands-On Activity 7, *The Effects of Acid Rain*, pages 101-103

Earth Science Lab, Level A: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Earth Science Lab, Level B: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Earth Science Lab Teacher's Handbook: Hands-On Activity 1, *Identifying Minerals with the Mohs Scale*, pages 73-75; Hands-On Activity 2, *Plate Boundaries in Action*, pages 77-79; Hands-On Activity 4, *Using Sound Waves*, pages 85-87; Hands-On Activity 6, *Modeling a Tornado*, pages 93-95; Hands-On Activity 8, *Temperature, Salinity, and Water Density*, pages 101-103

Physical Science Lab, Level A: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab, Level B: Cards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Physical Science Lab Teacher's Handbook: Hands-On Activity 1, *Measuring pH of Acids and Bases*, pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates*, pages 81-83; Hands-On Activity 3, *Energy Conversion*, pages 85-87; Hands-On Activity 4, *Reducing Friction*, pages 89-91; Hands-On Activity 5, *Making a Potato Battery*, pages 93-95; Hands-On Activity 6, *Making Sound*, pages 97-99

1.0 Skills and Processes—Students will demonstrate the thinking and acting inherent in the practice of science.
D. Technology
3. Analyze the value and the limitations of different types of models in explaining real things and processes. **a. Explain that the kind of model to use and how complex it should be depends on its purpose and that it is possible to have different models used to represent the same thing.** **b. Explain, using examples that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.** **c. Explain that models may sometimes mislead by suggesting characteristics that are not really shared with what is being modeled.**
Life Science Lab Teacher's Handbook: Hands-On Activity 4, *Your Cardiovascular System*, pages 89-91; Hands-On Activity 5, *Making Fossils*, pages 93-95; Hands-On Activity 6, *How Much Does Energy Cost?*, pages 97-99 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 6, *Modeling a Tornado*, pages 93-95; Hands-On Activity 7, *Sizes in the Solar System*, pages 97-99 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 5, *Making a Potato Battery*, pages 93-95; Hands-On Activity 6, *Making Sound*, pages 97-99 **Classroom Resource CD-ROM:** Writing Strategy 20

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
B. Earth History
1. Explain how sedimentary rock is formed periodically, embedding plant and animal remains and leaving a record of the sequence in which the plants and animals appeared and disappeared. **a. Explain how sedimentary rock buried deep enough may be reformed by pressure and heat and these reformed rock layers may be forced up again to become land surface and even mountains.** **b. Cite evidence to confirm that thousands of layers of sedimentary rock reveal the long history of the changing surface of the Earth.** **c. Explain why some fossils found in the top layers of sedimentary rock are older than those found beneath in lower layers.** **a. Folding** **b. Breaking** **c. Uplift** **d. Faulting** **e. Tilting.**
Life Science Lab, Level A: Card 67 **Life Science Lab, Level B:** Card 67 **Life Science Lab Teacher's Handbook:** Hands-On Activity 5, *Making Fossils*, pages 93-95 **Earth Science Lab, Level A:** Cards 7, 9, 13, 14, 30, 31, 33, 34 **Earth Science Lab, Level B:** Cards 7, 9, 13, 14, 30, 31, 33, 34

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
B. Earth History
2. Recognize and explain that fossils found in layers of sedimentary rock provide evidence of changing life forms. **a. Recognize how different types of fossils are formed, such as petrified remains, imprints, molds, and casts.** **b. Recognize and explain that the fossil record of plants and animals describes changes in life forms over time.**
Life Science Lab, Level A: Card 67 **Life Science Lab, Level B:** Card 67 **Life Science Lab Teacher's Handbook:** Hands-On Activity 5, *Making Fossils*, pages 93-95 **Earth Science Lab, Level A:** Cards 32, 33, 34 **Earth Science Lab, Level B:** Cards 32, 33, 34

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
D. Astronomy
1. Identify and describe the components of the universe. **a. Recognize that a galaxy contains billions of stars that cannot be distinguished by the unaided eye because of their great distance from Earth, and that there are billions of galaxies.** **b. Identify that our solar system is a component of the Milky Way Galaxy.** **c. Identify and describe the various types of galaxies.** **d. Identify and describe the type, size, and scale of the Milky Way Galaxy.**
Earth Science Lab, Level A: Cards 68, 75, 76, 77, 78 **Earth Science Lab, Level B:** Cards 68, 75, 76, 77, 78

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
D. Astronomy
2. Identify and explain celestial phenomena using the regular and predictable motion of objects in the solar system. **a. Identify and describe the relationships among the period of revolution of a planet, the length of its solar year, and its distance from the sun.** **b. Identify and explain the relationship between the rotation of a planet or moon on its axis and the length of the solar day for that celestial body.** **c. Identify and explain the cause of the phases of the moon.** **d. Describe how lunar and solar eclipses occur.** **e. Identify and describe how the shape and location of the orbits of asteroids and comets affect their periods of revolution.**
Earth Science Lab, Level A: Cards 62, 64, 65, 68, 69, 70, 71, 72, 73 **Earth Science Lab, Level B:** Cards 62, 64, 65, 68, 69, 70, 71, 72, 73 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 7, *Sizes in the Solar System,* pages 97-99

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
D. Astronomy
3. Recognize and explain the effects of the tilt of Earth's axis. **a. Recognize and describe that Earth's axis is tilted about 23 ¼° from vertical with respect to the plane of its orbit and points in the same direction during the year.** **b. Recognize and describe that the tilt of Earth's axis causes:** **a. Changes in the angle of the sun in the sky during the year.** **b. Seasonal differences in the northern and southern latitudes.** **c. Recognize and describe how the tilt of Earth's axis affects climate in Maryland.**
Earth Science Lab, Level A: Cards 55, 62 **Earth Science Lab, Level B:** Cards 55, 62

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
D. Astronomy
4. Recognize and explain how the force of gravity causes the tides. **a. Identify and describe the cause of high and low tides.**
Earth Science Lab, Level A: Cards 66, 90 **Earth Science Lab, Level B:** Cards 66, 90 **Physical Science Lab, Level A:** Card 48 **Physical Science Lab, Level B:** Card 48

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
E. Interactions of Hydrosphere and Atmosphere
1. Cite evidence to explain the relationship between the hydrosphere and atmosphere. **a. Describe the composition of the atmosphere and hydrosphere.** **b. Recognize and describe the water cycle as the distribution and circulation of Earth's water through the glaciers, surface water, groundwater, oceans, and atmosphere.** **c. Identify and describe how the temperature and precipitation in a geographic area are affected by surface features and changes in atmospheric and ocean content.** **a. Relative location of mountains** **b. Volcanic eruptions** **c. Proximity to large bodies of water** **d. Heat energy of ocean currents.**
Earth Science Lab, Level A: Cards 17, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 56, 57, 58, 82, 83, 84, 87, 90 **Earth Science Lab, Level B:** Cards 17, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 56, 57, 58, 82, 83, 84, 87, 90 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 5, *What is in the Air?*, pages 89-91; Hands-On Activity 8, *Temperature, Salinity, and Water Density*, pages 101-103

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
E. Interactions of Hydrosphere and Atmosphere
2. Recognize and describe the various factors that affect climate. **a. Identify and describe how the temperature and precipitation of an area are affected by surface and ocean features.** **a. Relative location of mountains** **b. Proximity to large bodies of water** **c. Warm and cold ocean currents.** **b. Recognize and describe the global effects of volcanic eruptions, greenhouse gases, and El Niño.**
Earth Science Lab, Level A: Cards 17, 55, 56, 57, 58, 59, 60, 61, 87 **Earth Science Lab, Level B:** Cards 17, 55, 56, 57, 58, 59, 60, 61, 87

2.0 Earth/Space Science—Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles) of the environment, Earth, and the universe that occur over time.
E. Interactions of Hydrosphere and Atmosphere
3. Identify and describe the atmospheric and hydrospheric conditions related to weather systems. **a. Identify and describe weather patterns associated with high and low pressure systems and frontal systems.** **b. Identify and describe the atmospheric and hydrospheric conditions associated with the formation and development of hurricanes, tornadoes, and thunderstorms.** **c. Identify and describe how various tools are used to collect weather data and forecast weather conditions.** **a. Barometer** **b. Thermometer** **c. Anemometer** **d. Psychrometer.**
Earth Science Lab, Level A: Cards 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54 **Earth Science Lab, Level B:** Cards 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54 **Earth Science Lab Teacher's Handbook:** Hands-On Activity 6, *Modeling a Tornado*, pages 93-95

3.0 Life Science—The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interaction that occur over time.
D. Evolution
1. Recognize and describe the evolutionary change in species over time occurs as a result of natural variation in organisms and environmental changes. **a. Recognize and describe that gradual (climatic) and sudden (floods and fires) changes in environmental conditions affect the survival of organisms and populations.** **b. Recognize that adaptations may include variations in structures, behaviors, or physiology, such as spiny leaves on a cactus, bird calls, and antibiotic resistant bacteria.** **c. Recognize and describe that adaptation and speciation involve the selection of natural variations in a population.** **d. Recognize and describe that extinction occurs when the adaptive traits of a population do not support its survival.** **e. Recognize that evolution accounts for the diversity of species.**
Life Science Lab, Level A: Cards 23, 24, 40, 41, 43, 65, 66, 67, 68, 80, 86 **Life Science Lab, Level B:** Cards 23, 24, 40, 41, 43, 65, 66, 67, 68, 80, 86 **Earth Science Lab, Level A:** Cards 60, 61 **Earth Science Lab, Level B:** Cards 60, 61

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
A. Structure of Matter
1. Provide evidence to explain how compounds are produced. (No electron transfer) **a. Describe how elements form compounds and molecules.** **b. Investigate and describe what happens to the properties of elements when they react chemically with other elements.** **c. Based on data from investigations and research compare the properties of compounds with those of the elements from which they are made.**
Physical Science Lab, Level A: Cards 9, 10, 11, 27, 28, 29, 30, 31, 32 **Physical Science Lab, Level B:** Cards 9, 10, 11, 27, 28, 29, 30, 31, 32 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 2, *Chemical Reaction Rates*, pages 81-83

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
B. Conservation of Matter
1. Provide evidence to support the fact that the idea of atoms explains conservation of matter. **a. Use appropriate tools to gather data and provide evidence that equal volumes of different substances usually have different masses.** **b. Cite evidence from investigations that the total mass of a system remains the same throughout a chemical reaction because the number of atoms of each element remains the same.** **c. Give reasons to justify the statement, "If the number of atoms stays the same no matter how the same atoms are rearranged, then their total mass stays the same."**
Physical Science Lab, Level A: Cards 2, 9 **Physical Science Lab, Level B:** Cards 2, 9

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
C. States of Matter
1. Describe how the motion of atoms and molecules in solids, liquids, and gases changes as heat energy is increased or decreased. **a. Based on data from investigations and video technology, describe and give reasons for what happens to a sample of matter when heat energy is added to it (most substances expand).** **b. Describe what the temperature of a solid, or a liquid, or a gas reveals about the motion of its atoms and molecules.** **c. Formulate an explanation for the different characteristics and behaviors of solids, liquids, and gases using an analysis of the data gathered on the motion and arrangement of atoms and molecules.**
Physical Science Lab, Level A: Cards 5, 6, 7, 42 **Physical Science Lab, Level B:** Cards 5, 6, 7, 42

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
D. Physical and Chemical Changes
1. Compare compounds and mixtures based on data from investigations and research. **a. Cite evidence from investigations to explain how the components of mixtures can be separated.** **b. Use evidence from data gathered to explain why the components of compounds cannot be separated using physical properties.** **c. Analyze results of research completed to develop a comparison of compounds and mixtures.**
Physical Science Lab, Level A: Cards 8, 9, 11, 12, 13 **Physical Science Lab, Level B:** Cards 8, 9, 11, 12, 13

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
D. Physical and Chemical Changes
2. Cite evidence and give examples of chemical properties of substances. **a. Based on data from investigations and research, identify and describe chemical properties of common substances.** **a. Reacts with oxygen (rusting/tarnishing and burning)** **b. Reacts with acids** **c. Reacts with bases.** **b. Use information gathered from investigations using indicators to classify materials as acidic, basic, or neutral.**
Physical Science Lab, Level A: Cards 1, 9, 10, 11, 14, 15, 16, 27, 28, 29, 30 **Physical Science Lab, Level B:** Cards 1, 9, 10, 11, 14, 15, 16, 27, 28, 29, 30 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 1, *Measuring pH of Acids and Bases*, pages 77-79; Hands-On Activity 2, *Chemical Reaction Rates*, pages 81-83

4.0 Chemistry—Students will use scientific skills and processes to explain the composition, structure, and interaction of matter in order to support the predictability of structure and energy transformations.
D. Physical and Chemical Changes
3. Provide evidence to support the fact that common substances have the ability to change into new substances. **a. Investigate and describe the occurrence of chemical reactions using the following evidence:** **a. Color change** **b. Formation of a precipitate or gas** **c. Release of heat or light.** **b. Use evidence from observations to identify and describe factors that influence reaction rates.** **a. Change in temperature** **b. Acidity.** **c. Identify the reactants and products involved in a chemical reaction given a symbolic equation, a word equation, or a description of the reaction.** **d. Provide data from investigations to support the fact that energy is transformed during chemical reactions.** **e. Provide examples to explain the difference between a physical change and a chemical change.**
Physical Science Lab, Level A: Cards 8, 9, 27, 28, 29, 30 **Physical Science Lab, Level B:** Cards 8, 9, 27, 28, 29, 30 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 2, *Chemical Reaction Rates*, pages 81-83

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.
A. Mechanics
1. Develop an explanation of motion using the relationships among time, distance, velocity, and acceleration. **a. Observe, describe, and compare the motions of objects using position, speed, velocity, and the direction.** **b. Based on data given or collected, graph and calculate average speed using distance and time.** **c. Compare accelerated and constant motions using time, distance, and velocity.** **d. Describe and calculate acceleration using changes in the speed and time.**
Physical Science Lab, Level A: Cards 50, 51, 52 **Physical Science Lab, Level B:** Cards 50, 51, 52

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.
A. Mechanics
2. Identify and relate formal ideas (Newton's Laws) about the interaction of force and motion to real world experiences. **a. Investigate and explain the interaction of force and motion that causes objects that are at rest to move.** **b. Demonstrate and explain, through a variety of examples, that moving objects will stay in motion at the same speed and in the same direction unless acted on by an unbalanced force.** **c. Investigate and collect data from multiple trials, about the motion that explains the motion that results when the same force acts on objects of different mass; and when different amounts of force act on objects of the same mass.** **d. Based on data collected and organized, explain qualitatively the relationship between net force applied to an object and its mass for a given acceleration.** **e. Calculate the net force given the mass and acceleration.**
Physical Science Lab, Level A: Cards 54, 55, 56, 58 **Physical Science Lab, Level B:** Cards 54, 55, 56, 58 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 4, *Reducing Friction*, pages 89-91

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.
A. Mechanics
3. Recognize and explain that every object exerts gravitational force on every other object. **a. Explain the difference between mass and weight.** **a. Mass is a measure of inertia** **b. Weight is a measure of the force of gravity.** **b. Describe the relationship between gravitational force and the masses of the attracting objects.** **c. Describe the relationship between the gravitational force and the distance between the attracting objects.** **d. Recognize and cite examples showing that mass remains the same in all locations while weight may vary with a change in location (weight on Earth compared to weight on moon).** **e. Recognize that gravity is the force that holds planets, moons, and satellites in their orbits.**
Physical Science Lab, Level A: Cards 57, 59 **Physical Science Lab, Level B:** Cards 57, 59

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.
A. Mechanics
4. Recognize and explain that energy can neither be created nor destroyed: rather it changes form or is transferred through the action of forces. **a. Observe and describe the relationship between the distance an object is moved by a force and the change in its potential energy or kinetic energy, such as in a slingshot, in mechanical toys, the position of an object and its potential energy.** **b. Identify the relationship between the amount of energy transferred (work) to the product of the applied force and the distance moved in the direction of that force.** **c. Identify and describe that simple machines (levers and inclined planes) may reduce the amount of effort required to do work.** **a. Calculate input and output work using force and distance** **b. Demonstrate that input work is always greater than output work.**
Physical Science Lab, Level A: Cards 36, 37, 39, 40, 41, 62, 63, 64, 65 **Physical Science Lab, Level B:** Cards 36, 37, 39, 40, 41, 62, 63, 64, 65 **Physical Science Lab Teacher's Handbook:** Hands-On Activity 3, *Energy Conversion*, pages 85-87

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.
B. Thermodynamics
1. Describe and cite examples that heat can be transferred by conduction, convection, and radiation. **a. Based on observable phenomena, identify and describe examples of heat being transferred through conduction and through convection.** **b. Based on observable phenomena, identify examples to illustrate that radiation does not require matter to transfer heat energy.** **c. Research and identify the types of insulators that best reduce heat loss through conduction, convection, or radiation.**
Earth Science Lab, Level A: Card 38 **Earth Science Lab, Level B:** Card 38 **Physical Science Lab, Level A:** Cards 42, 43, 44, 46 **Physical Science Lab, Level B:** Cards 42, 43, 44, 46

5.0 Physics—Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.

B. Thermodynamics

2. Identify and explain that heat energy is a product of the conversion of one form of energy to another.

a. Identify and describe the various forms of energy that are transformed in order for systems (living and non-living) to operate.

- **a. Chemical-flashlight-light**
- **b. Mechanical-pulleys-motion**
- **c. Solar/Radiant-solar calculator**
- **d. Chemical-plant cells.**

b. Explain that some heat energy is always lost from a system during energy transformations.

Life Science Lab, Level A: Cards 1, 9, 76
Life Science Lab, Level B: Cards 1, 9, 76

Earth Science Lab, Level A: Card 38
Earth Science Lab, Level B: Card 38

Physical Science Lab, Level A: Cards 28, 30, 33, 38, 45, 46, 47, 48, 49, 67, 70, 71, 72, 73, 83
Physical Science Lab, Level B: Cards 28, 30, 33, 38, 45, 46, 47, 48, 49, 67, 70, 71, 72, 73, 83

6.0 Environmental Science—Students will use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.

B. Environmental Issues

1. Recognize and explain how human activities can accelerate or magnify many naturally occurring changes.

a. Based on data from research identify and describe how natural processes change the environment.

- **a. Cyclic climate change**
- **b. Sedimentation in watersheds**
- **c. Population cycles**
- **d. Extinction.**

b. Identify and describe how human activities produce changes in natural processes:

- **a. Climate change**
- **b. Loss of habitat**
- **c. Introduction of nonnative species**
- **d. Cycling of matter.**

Life Science Lab, Level A: Cards 84, 86, 87, 88, 89, 90
Life Science Lab, Level B: Cards 84, 86, 87, 88, 89, 90
Life Science Lab Teacher's Handbook: Hands-On Activity 7, *The Effects of Acid Rain,* pages 101-103

Earth Science Lab, Level A: Cards 35, 37, 42, 59, 60, 61, 86
Earth Science Lab, Level B: Cards 35, 37, 42, 59, 60, 61, 86
Earth Science Lab Teacher's Handbook: Hands-On Activity 5, *What is in the Air?,* pages 89-91