



**LJ Group**



Educational  
Solutions

**Living with Science Supporting  
Missouri Science Standards**

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# Contents

**Section 1 – Missouri Science Standards**

**Section 2 – Missouri School District Science Scores**

**Section 3 – LWS Correlation at a Glance**

**Section 4 – LWS Assignment Correlation**

**Section 5 – LWS Objectives Correlation**

**Section 6 – LWS Objective Lists**

**Section 7 – ClassAct Student Report**



## **Section 1.**

# **Missouri Science Standards**

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# MISSOURI'S

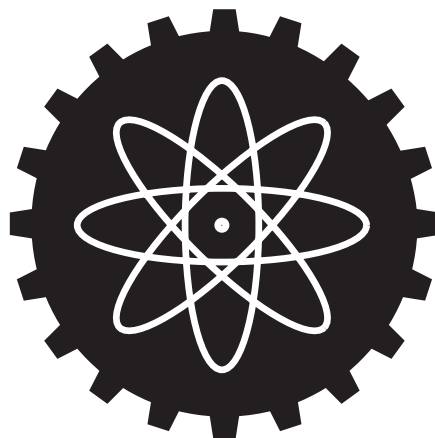
Framework for  
Curriculum Development

in

# Science

K-12

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Missouri Department of Elementary and Secondary Education  
Robert E. Bartman, Commissioner of Education

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*Missouri's Frameworks for Curriculum Development* have been reviewed by over 200 district Professional Development Committees, members of professional organizations of the various disciplines, vocational and special education teachers, members of the State Board of Education, and board members of the Missouri School Boards Association and the Missouri Congress of PTA. Subsequently, many of the suggestions offered by these reviewers have been incorporated into the Frameworks.

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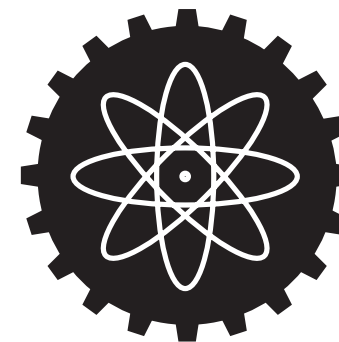
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# Table of Contents

<b>I. Scientific Inquiry: A. Processes of Scientific Inquiry .....</b>	<b>5</b>
K-4 .....	5
5-8 .....	8
9-12 .....	10
<b>II. Scientific Relevance .....</b>	<b>12</b>
5-8 .....	15
9-12 .....	18
<b>III. Matter and Energy A. Properties, Characteristics and Structures of Matter .....</b>	<b>22</b>
K-4 .....	22
5-8 .....	28
9-12 .....	32
<b>IV. Force, Motion and Mechanical Energy A. Relative Motion ...</b>	<b>38</b>
K-4 .....	38
5-8 .....	41
9-12 .....	43
<b>V. Universe A. Characteristics of the Universe .....</b>	<b>46</b>
K-4 .....	46
5-8 .....	50
9-12 .....	52
<b>VI. Earth Systems A. Physical Systems.....</b>	<b>55</b>
K-4 .....	55
5-8 .....	59
9-12 .....	62
<b>VII. Living Systems A. Structure/Function/Characteristics .....</b>	<b>66</b>
K-4 .....	66
5-8 .....	71
9-12 .....	75
<b>VIII. Ecology A. Interactions.....</b>	<b>81</b>
K-4 .....	81
5-8 .....	85
9-12 .....	86

# I. SCIENTIFIC INQUIRY (SHOW-ME STANDARDS, SCIENCE 7)

- A. Processes of Scientific Inquiry
- B. Investigations



## K-12 Content Overview:

Scientific inquiry refers to the skills, habits of mind, and attitudes that promote lifelong scientific learning and the ability to apply scientific processes in all facets of life. Traditional approaches to teaching students scientific inquiry often do not give students an accurate perception of the true nature of the processes involved. The result is that many people have the impression that science is nothing more than “doing experiments,” and following a rigid sequence of steps referred to as “the scientific method.” In reality, the process is far from rigid. More imagination and inventiveness are involved in scientific inquiry than many people realize.

The best way for students to appreciate the true nature of scientific inquiry is for them to participate in scientific investigations based on real-life questions that progressively approximate good science. This approach, however, will require major changes in typical school laboratory activities. Traditional laboratory activities are very unlike real science. They are often teacher-initiated, with the teacher not only specifying the question to be investigated, but also the experimental design, the data to be collected, and ways of organizing and interpreting the data. If students are to understand the process of science, they must make these decisions themselves. Time must be made for revision and repetition of experiments, for presentations of results to other investigators, and even for response to criticism.

Science requires the use of mathematical skills and formulas. Mathematics and science programs should be coordinated so each enhances the learning of the other. By using data from actual science investigations, students will gain experience in dealing with the inconsistencies and errors that occur. Scientific explanations are often clarified through accurate measurements. The metric system should be used consistently throughout the K-12 science experience with emphasis on using the metric system and not the conversion between the metric and other systems.

In addition to in-class laboratory activities that approximate good science, it is important to introduce student investigations. These investigations should become more sophisticated so that before graduating from high school, students should conduct at least one major investigation. Such investigations, whether individual or group, might take weeks or months to conduct, and may take place in or out of school.

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Tools, especially measuring, magnifying, and photographic ones, can give more information than by observing only using the senses.</li> <li>2. Sometimes two people can observe the same object or event and describe it differently.</li> <li>3. Words, pictures, numbers, models, and sounds can be used to describe objects and events.</li> <li>4. Using tools, following directions, and asking for suggestions are helpful in building something or getting something to work better.</li> <li>5. Objects and events are often observed and described quantitatively.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. use magnifiers and accurate simple metric measuring tools to observe and measure things in new situations and tasks (1.4; 1.6)</li> <li>a. carefully distinguish actual observations from ideas and speculations about what was observed; use information-processing skills to develop and clarify ideas and perspectives (1.5; 1.7)</li> <li>a. create communications that describe and compare things in terms of number, shape, texture, size, odor, sound, mass, color, and motion (2.1; 2.4; 2.7)</li> <li>a. use simple tools, follow directions, and/or ask for suggestions to make things that can actually be used to perform a task or solve a problem (1.5; 1.10; 3.2; 3.3)</li> <li>a. use whole numbers and simple fractions to measure and describe things (1.8)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Select a square plot of grass and make observations with magnifiers and metric rulers.</li> <li>• Use a periscope and develop an explanation of how it works. Work in groups to compare explanation and develop new understanding based on the explanations of the group.</li> <li>• Given a group of vegetables, seashells, leaves, etc., describe to another person a single item so that the person can pick it out from the group.</li> <li>• Use simple tools, follow directions, or ask for help in designing a paper boat that will hold 10 pennies and float across a pan of water.</li> <li>• Use simple measuring tools to measure an object that is usually described qualitatively and describe it using numbers.</li> </ul>

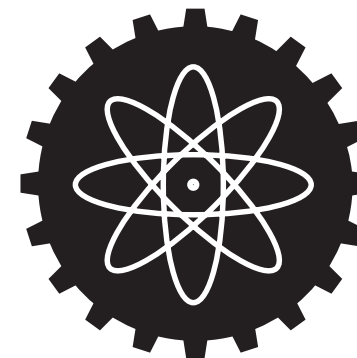
**I. Scientific Inquiry: A. Processes of Scientific Inquiry**

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 4, all students should know that</i></p> <p>6. The accuracy of measurements is very important as inaccuracy often produces questionable results.</p> <p>7. Additional, more careful observations resolve different explanations for the same event.</p> <p>8. Graphs, charts, maps, equations, and oral and written reports can be used to share the results of a scientific investigation and facilitate its discussion.</p> <p>9. Problems can often be solved by physically altering specific components of a mechanical or biological system and observing the consequences.</p>	<p><i>By the end of grade 4, all students should be able to</i></p> <p>a. judge whether measurements and computations of quantities are reasonable (1.7)</p> <p>b. compare measurements and computations to typical values with which students have had prior experience (1.10)</p> <p>a. use simple equipment to observe more detail, measure more accurately, and obtain more information about the environment in order to develop more accurate explanations (1.4; 1.6)</p> <p>a. use a variety of methods, forms, and technologies to organize data into forms that are understandable (1.4; 1.8; 2.1; 2.2; 2.4; 2.7)</p> <p>a. select and apply appropriate technology and common materials for construction and repair of simple things and make safe electrical connections with various electrical devices for the purpose of solving a problem or performing a task (1.10; 2.2; 2.3; 3.5; 3.7; 3.8)</p>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Given a set of data, such as length, area, volume, mass, or time, identify values that are questionable (e.g., values that are much larger or smaller than the others).</li> <li>• Identify the appropriate units of measurements for common objects (e.g., amount of water in a cup, a bucket, or a swimming pool).</li> <li>• Participate in a simulated mystery in which incriminating “evidence” can be accurately determined only with the use of a microscope or hard lens.</li> <li>• Measure the growth and development of organisms, such as bean plants or mealworms, and communicate observations using graphs, charts, and symbols.</li> <li>• Construct a “doorbell” for people with hearing impairment using wires, batteries, bulbs, etc.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>The breadth and style of investigations depend on the questions asked.</li> </ol> <p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>Most experiments involve changing something and then repeatedly comparing it to something similar that has not been changed.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>create and refine ideas and questions about the world by asking for information, making careful observations, and trying things out (1.1; 1.2; 1.6; 1.7)</li> <li>plan and conduct a simple investigation that includes formulating a question, gathering data, and constructing a reasonable explanation.</li> </ol> <p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>plan and conduct a simple experiment that is repeated and properly controlled; then discuss and respond thoughtfully to a variety of conclusions and determine whether the claims are logical arguments based on results of the experiment (1.5; 1.7; 2.3; 3.4; 3.6; 3.7)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>Observe a discrepant event, such as two balls of similar mass and size that do not bounce the same height, and formulate questions that might lead to an explanation.</li> <li>Predict what colors are present in the ink of different colored markers. Conduct an investigation and communicate an explanation.</li> </ul> <p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>Design two paper airplanes, identical except for one attribute, measure and compare the distance thrown. Discuss whether this is a fair test of how far the planes fly or of which plane is better.</li> </ul>

## II. SCIENTIFIC RELEVANCE (SHOW-ME STANDARDS, SCIENCE 8)

- A. The Nature of Technology
- B. Historical Perspective
- C. Science as a Human Endeavor



### K-12 Content Overview:

As long as there have been people, there has been technology. Indeed, the techniques of shaping tools are taken as the chief evidence of the beginning of human culture. On the whole, technology has been a powerful force in the development of civilization, all the more so as its link with science has been forged. Science and technology—like language, ritual, values, commerce, and the arts—are intrinsic parts of a cultural system that both shape and reflect the system’s values. Consider, for example, how new ideas are limited by the context in which they are conceived. These ideas are often rejected by the scientific establishment; sometimes spring from unexpected findings, and usually grow slowly through contributions from many different investigators. Historical episodes such as Galileo’s efforts to change perceptions of Earth’s place in the universe, Newton’s demonstration that the same laws of motion apply in the heavens and on Earth, Lyell’s careful documentation of the age of the Earth, and Pasteur’s identification of infectious disease with microscopic organisms are all concrete examples of how scientific theory and technology interact with social and political realities within a specific period of time. These examples also illustrate the power of individuals to conceptualize and change our understanding of the world around us.

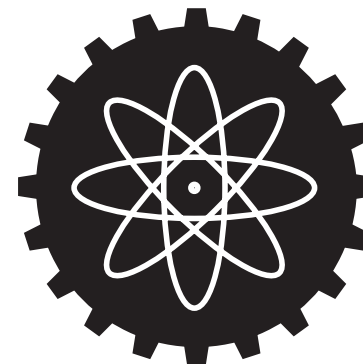
Even in today’s world, technology is a complex social enterprise that includes not only research, design, and crafts but also finance, manufacturing, management, labor, marketing, and maintenance. In the broadest sense, technology extends our abilities to change the world: to cut, shape, or put together materials; to move things from one place to another; to reach farther with our hands, voices, and senses. We use technology to try to change the world to suit us better. The results of changing the world are often complicated and unpredictable. They can include unexpected benefits, unexpected costs, and unexpected risks. Anticipating the effects of technology is, therefore, as important as advancing its capabilities.

(Benchmarks for Science Literacy, AAAS 1993)

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know</i></p> <ol style="list-style-type: none"> <li>1. Tools that have been invented affect all areas of life.</li> <li>2. When people want to build something or try something new, they should try to figure out ahead of time how this might affect all living things and environments.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. develop realistic strategies and use various objects to solve simple environmental or social problems encountered in school or community (3.1; 3.2; 3.3)</li> <li>a. predict, analyze, and evaluate the potential effects of technological solutions to simple problems on other people or the environment, considering such issues as costs, benefits, and consequences (3.6; 3.7; 3.8)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• After saving milk jugs for a period of time, discuss the benefits of these devices and the problems that have resulted due to difficulties with disposal. Develop reasonable strategies to bundle them and transport them to a recycling center.</li> <li>• Considering a specific technological solution to a problem, such as covering the playground with a rubber surface to prevent injuries, generate lists of possible positive and negative consequences of this solution.</li> </ul>
<p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>3. Technology extends the ability of people to change the way things work.</li> <li>4. Technological solutions to problems often have drawbacks as well as benefits.</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. develop several alternative strategies to solve existing and potential environmental or technological problems, analyze and evaluate the alternatives by comparing strengths (such as safety or ease of use) and weaknesses (such as cost or appearance), and determine the best solution ( 3.6; 3.7; 3.8)</li> <li>a. predict possible negative consequences, to people, other organisms, or the environment, of technological solutions to specific problems (3.6; 3.7; 3.8; 4.7)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Working in groups, design a new communication system for the school to replace the existing intercom system. Compare the alternative solutions from each group and generate a list of strengths and weaknesses of each one.</li> <li>• Considering a specific technological solution to a problem, such as controlling insects in farm crops, list possible alternative solutions and drawbacks of each.</li> </ul>

### III. MATTER AND ENERGY (SHOW-ME STANDARDS, SCIENCE 1)

- A. Properties, Characteristics and Structure of Matter
- B. Characteristics, Forms and Sources of Energy
- C. Interactions of Matter and Energy



#### K-12 Content Overview:

The physical universe is composed of matter. Students must develop a basic understanding of nature, structure, and properties of matter. They should also experience and learn how matter is changed and how the uses of matter are related to its properties. Every physical object in the universe consists of relatively few types of matter called elements. Elements consist of unique kinds of atoms that combine in different ways to form substances. The arrangement of the outermost electrons in an atom determines how atoms bond to form materials. Each of the elements consists of only a few naturally occurring isotopes. Every substance can exist in a variety of different states, depending on temperature and pressure.

The flow of energy between objects, between different parts of the biosphere and from one part of the universe to another drives the continual process of change occurring throughout all physical systems (biological, chemical, geological). Society needs abundant energy sources to improve its economic productivity and the quality of life. Students need to understand the fundamentals of energy and the natural laws that govern force and motion. Energy occurs in several forms: chemical, electrical, electromagnetic, mechanical, nuclear, and thermal, which are interchangeable. Most of the processes in the universe, from exploding stars to the operation of machines, involve the transformation of energy from one form to another. This transformation usually produces some heat energy that is lost by radiation or conduction. Whenever the amount of energy in one place or form diminishes, the amount in another place or form increases by an equivalent amount. Energy as well as matter occurs in discrete (quantum) units.

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>Observable properties are used to identify objects.</li> <li>Matter has physical properties that can change.</li> <li>Mixtures are composed of different kinds of matter, each with distinct properties.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>identify physical properties of objects and sort according to specific properties (1.3; 1.8; 4.1)</li> <li>identify physical properties of objects that are detected using the senses (1.3; 2.4; 4.1)</li> <li>demonstrate that magnification enhances the ability to observe the properties of small objects (1.4; 1.6; 2.1)</li> <li>describe a material as its form and size is changed (1.6; 2.2; 3.5)</li> <li>identify ways heat and light affect common objects (1.3; 3.5)</li> <li>compare and contrast the physical properties of a solid and liquid of the same material (1.2; 1.4; 1.6; 2.3)</li> <li>separate, sort, or group the components of a mixture by their properties (1.3; 1.4; 1.6)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>Sort common objects (buttons, rocks, blocks) using specific properties. Describe what properties were used.</li> <li>Use granular Jell-O and glue to make “scratch and sniff” stickers or pictures.</li> <li>Use feely boxes to describe and predict the object they are holding without using their eyes.</li> <li>Investigate colors by mixing new colors in a variety of mediums (e.g., food colors in frosting or water).</li> <li>Inspect several objects with and without a hand lens. Discuss and describe the increased level of detail that can be observed with magnification.</li> <li>Observe and describe changes in a material (e.g., paper, a leaf) as it is cut into increasingly smaller pieces. Use a magnifying glass to compare characteristics of the smallest segments with the original.</li> <li>Describe the physical changes that occur when newspaper is left in the sun, potato slices are left exposed to air, cereal left in a bowl of milk, etc.</li> <li>Describe and compare the physical properties of water and ice.</li> <li>Prepare a trail mix, or tossed salad. Discuss how the properties of the mixture are different from the properties of each component. Design a way for the mixture to be separated.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 4, all students should know that</i></p> <p>4. Matter is anything that has mass and volume and is composed of smaller parts.</p> <p>5. Substances can occur either in pure form or as a mixture.</p> <p>6. Physical properties of matter can change.</p>	<p><i>By the end of grade 4, all students should be able to</i></p> <p>a. select and classify a variety of common materials and objects as being composed of one substance or more than one substance (1.2; 2.3; 3.5)</p> <p>b. refine and adapt the parts of objects to create a new object (1.4; 1.6; 3.1; 4.6)</p> <p>c. demonstrate the mass of an object equals the sum of the masses of its parts (1.2; 2.4)</p> <p>a. predict the properties of a mixture given the concentration of ingredients (1.6; 2.3; 3.5)</p> <p>b. identify the factors that determine the choice of materials for a particular purpose (1.6; 2.3; 3.2; 3.3; 3.5)</p> <p>a. use magnifiers, measuring tools, and other technology to identify the properties of matter or objects (1.2; 1.3; 1.7)</p> <p>b. select and apply strategies to change matter by heating or cooling predict what changes will occur (1.3; 1.6; 2.4; 3.5)</p>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Identify things that are combinations of substances (e.g., bricks, concrete, cakes, cookies).</li> <li>• Identify the parts used to make a lamp, coffee pot, sofa, etc.</li> <li>• Construct an object out of Lego blocks, take it apart, and rearrange the parts to make a new object.</li> <li>• Mass an object made of Tinker Toys, Lego, Lincoln Logs, etc. Take the object apart and total the mass of each component.</li> <li>• Prepare different concentrations of Kool-Aid, Jell-O, etc. Observe and compare differences in the properties of these mixtures to the concentrations used (color, taste, etc.).</li> <li>• Investigate the properties of devices that make them useful for a given purpose in the real world. Use this knowledge to design a common object or to solve a problem (types of clothing, types of furniture, etc.)</li> <li>• Inspect and describe the physical characteristics of salt, flour, sugar, etc. Expand the description by using magnification.</li> <li>• Investigate how much energy it takes to change water to ice or steam.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
	<p>c. observe and describe the effects of the environment on a variety of objects (dissolving, weathering, shrinking, melting, rusting) (1.6; 2.1)</p>	<ul style="list-style-type: none"> <li>• Observe the long-term effects of the environment on a block of salt, a patch of snow, an exposed piece of iron, etc., and describe the changes.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. The sun is the primary source of light and heat for the Earth.</li> <li>2. Energy can be converted into different forms.</li> <li>3. Sound is a form of energy that results from vibrations in matter. Sound has the qualities of loudness and pitch.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. predict how sunlight will affect the temperature of air and water (1.2; 1.4, 1.6; 4.1)</li> <li>a. identify and describe the transformation of energy from one form to another (1.2; 1.4; 3.5; 4.1)</li> <li>a. apply knowledge of sound, learned from altering loudness and pitch (1.2; 1.3; 1.6)</li> <li>b. change the pitch of a stringed instrument by changing the length of the strings and the loudness by the energy of the vibration (1.1; 1.2; 1.3; 1.6)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Record and compare the temperatures of air and water at various times during the day, on cloudy and on clear days.</li> <li>• Use a lamp to demonstrate how electricity is transformed to light and heat energy.</li> <li>• Identify sounds around the school and identify the source of the vibrations.</li> <li>• Design a phone system from string/cans or funnels/tubing. Explain why it works.</li> <li>• Investigate the kinds of sounds produced from different lengths of string, different amounts of water in a bottle, or different types of bells and predict what sounds would be produced with additional variations.</li> </ul>

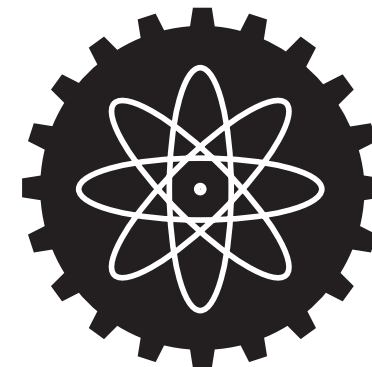
What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>4. Some of the sun’s light is transformed into heat when it hits objects.</li> <li>5. Electricity can be converted into light, heat, sound, magnetism, or mechanical motion.</li> <li>6. Friction produces heat.</li> <li>7. Sound travels at different rates through different materials.</li> <li>8. Light spreads from a source and travels in straight lines. Light can be transmitted, reflected, refracted, or absorbed by different materials.</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. predict the effect of sunlight on various objects, liquids, and solids (1.6; 2.3; 3.5)</li> <li>a. apply knowledge of simple circuits to create a new circuit that involves more components (1.10; 3.5; 4.1)</li> <li>a. identify and consider a variety of methods that produce heat by friction (1.2; 1.3; 1.6; 3.5)</li> <li>a. select and apply technology and other resources to show that sounds travels through some materials better than in others (1.4; 2.3; 3.5; 4.6)</li> <li>a. predict which materials will reflect, which will absorb, and which transmit light (1.2; 1.6; 2.3; 3.1)</li> <li>b. use lenses or water to observe examples of the bending of light; use mirrors or a water surface to show how light is reflected (1.6; 3.5)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Measure/record how the sun’s light is transformed into heat (e.g., asphalt road, concrete, dark clothing). Demonstrate ways this is useful (e.g., melt ice faster, run a solar calculator, make sun tea, warm a room).</li> <li>• Use a battery, wires, and a light (or a motor or buzzer) to demonstrate the requirements for a complete circuit. Observe the effect of interrupting the circuit.</li> <li>• Investigate how heat is produced by friction. Identify the source of friction and the amount of heat generated (rubbing hands together, rubbing pieces of metal together, shaking sand in a can, etc.).</li> <li>• Use a tuning fork to show the vibrations produced on a rubber membrane, on metal, or on wood.</li> <li>• Use a tuning fork to show how sound travels through water. Relate this to animals who use sonar.</li> <li>• Use glass, clear plastic, cloudy plastic, paper, etc. to determine which ones transmit light, partially transmits light, or casts shadows.</li> <li>• Observe the changes in shadows at different distances from a light source and different angles between the light source and objects.</li> <li>• Manipulate a reflected beam of light through a maze.</li> <li>• Generalize where a light source is when shadows are shortest/longest, where a fish is when seen from shore, etc.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Objects that give off light may also give off heat.</li> <li>2. Heat causes materials to increase in temperature and feel warmer, or change state (gas, liquid, or solid).</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. identify and consider a variety of light sources to determine which give off heat (1.1; 1.3; 1.6; 2.3; 3.5; 4.1)</li> <li>a. select and apply strategies to show how heat causes materials to increase in temperature and makes it feel warmer (1.2; 1.3; 1.6; 2.3; 3.5; 4.1)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Compare the heat from several light sources (e.g., incandescent bulb, fluorescent bulb, sun, halogen bulb).</li> <li>• Use a light bulb and a thermometer to compare how heat flows through different materials (e.g., aluminum, air, colored paper, cloth).</li> </ul>
<p><i>By the end of grade 4, all students should know</i></p> <ol style="list-style-type: none"> <li>3. Warm objects lose heat to cooler ones until they reach the same temperature.</li> <li>4. Different types of matter conduct heat at different rates.</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. identify which materials will become warmer and which materials will become cooler when mixed (1.2; 1.6; 1.10)</li> <li>a. identify characteristics of conductive materials and of insulative materials (1.2; 1.6; 3.5)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Explore how heat flows from warm objects to cooler ones, (ice cubes in water) to equalize the temperature.</li> <li>• Investigate different materials used to make cups to determine which are good conductors of heat and which are good insulators.</li> </ul>

## **IV. FORCE, MOTION AND MECHANICAL ENERGY**

**(SHOW-ME STANDARDS, SCIENCE 2)**

- A. Relative Motion**
- B. Types and Properties of Forces and Motion**
- C. Interactions of Forces and Motion**



### **K-12 Content Overview:**

Motion is as essential to understanding the physical world as matter and energy. Nothing in the universe is at rest and even things that appear to be at rest move. The description of how objects move depends on the frame of reference, but everything moves with respect to the sun and stars. Motion is described in terms of distance, displacement, speed, velocity, and acceleration. There are different types of motion, each with important properties, that can be combined into more complex forms. Types of motion include constant speed in a straight line, constant speed in a circle, acceleration in a straight line, and acceleration in a circular path. Relationships among these quantities are more easily interpreted and used to solve problems by means of graphical techniques involving slopes and areas under curves.

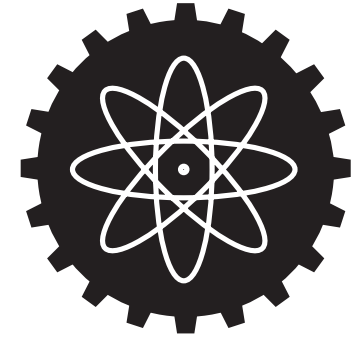
Four fundamental types of forces exist in the universe: gravitational, electromagnetic, strong nuclear force, and weak nuclear force. All other forces can be classified in terms of these four. Changes in the motion of objects are due to the effects of these forces. The size and direction of a force are important in order to determine the effect on the motion of an object. More than one force can act on an object at the same time and can make things move or keep them from moving, depending on the frame of reference.



What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Forces explain many kinds of motion (e.g., stopping, starting falling, straight, zigzag, circular, vibrational).</li> <li>2. Force is any push or pull exerted by one object on another.</li> <li>3. Weight is a measurement of the attraction of gravity on a mass. Mass is the amount of matter of an object.</li> </ol> <p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>4. Forces can be mechanical, gravitational, magnetic, or electrostatic.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. express ideas on the type of motion an object is undergoing (2.1; 2.4)</li> <li>a. identify the forces on a moving object and predict the direction it will go (1.6)</li> <li>a. use the appropriate tools to weigh an object then find its mass (1.4; 1.6; 3.3)</li> </ol> <p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. demonstrate the force of gravity by using a scale (2.1; 3.7; 4.1)</li> <li>b. design and conduct inquires to study the effects of an electrostatic force on the motion of an object (1.3; 1.6)</li> <li>c. demonstrate and investigate magnetic force fields (1.1; 1.2; 1.3; 1.4; 1.6; 2.1; 2.3; 3.2)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Observe and describe the motion of a feather, guitar string, merry-go-round, swing, etc.</li> <li>• Describe the forces acting on a ball thrown straight up.</li> <li>• Describe the forces acting on a moving toy and predict the movement it might take.</li> <li>• Use a scale to weigh an apple; use a balance to mass the same apple; compare numbers. Repeat with other objects.</li> </ul> <p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Prepare a demonstration using a scale to measure the effects of gravity on common objects.</li> <li>• Use a comb and pieces of paper to demonstrate electrostatic force.</li> <li>• Use a bar magnet and iron filings in a plastic bag to demonstrate a force field. Sketch the field lines.</li> </ul>

## V. UNIVERSE (SHOW-ME STANDARDS, SCIENCE 6)

- A. Characteristics of the Universe
- B. Motions of the Universe
- C. Tools of Space Exploration



### K-12 Content Overview:

Students today are growing up in a world of space travel and exciting new discoveries. Studying the universe helps students understand both the nature of the universe and the important contributions space exploration has made to our understanding of the universe and humankind.

The universe contains billions of galaxies, each of which contains billions of stars of various types. Our solar system, located near the edge of one galaxy, contains a very important star (the sun), planets, moons, asteroids, and comets.

By observing the sky on a regular basis, elementary students learn to identify changes and patterns. Observations of these changes and patterns help children understand and describe what is happening in the universe. Knowledge of the universe and the Earth's position in it provides students with a sense of time and place. The Earth's location and motion in relation to that of the sun and moon cause significant changes in the Earth's physical environment. Because direct experimentation is not possible for testing most concepts related to the universe, students must rely on data collected through technology, which, in turn, requires students to develop sequential thinking skills and the ability to follow logical multisteps to draw conclusions and make predictions.

By the middle level, students identify the characteristics of stars, their composition and distance. Current models of the universe used by high school students are based on mathematical and computer simulations.

Patterns, positions and distances of celestial objects are observed and measured with the use of telescopes and satellite images. The impact of technology on data gathering, prediction, and knowledge challenges students to follow the multistep logic necessary for understanding .

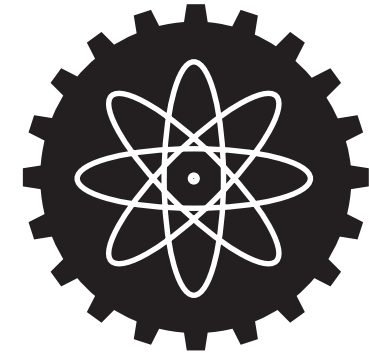
What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Earth is not alone in the universe. Most of the objects in the universe are separated by enormous distances.</li> <li>2. The sun, moon, and stars have recurring patterns.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. present ideas and opinions about the relationship of the sun and moon to Earth and Earth’s position in the universe (2.1)</li> <li>b. describe the major components of our solar system (1.3; 1.8)</li> </ol> <ol style="list-style-type: none"> <li>a. evaluate information about the sun and moon and share to determine patterns, changes, and relationships (1.2; 1.6; 3.5)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Draw a picture of the relative positions of the Earth, moon, and sun.</li> <li>• Use scaled objects at different distances to model the solar system and show the distances between and sizes of the planets.</li> <li>• Identify patterns and changes in the sun, moon, and stars.</li> </ul>
<p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>3. Constellations are patterns of stars.</li> <li>4. Earth is in our solar system and has unique properties.</li> <li>5. Earth rotates on a tilted axis and revolves around the sun. This combination causes changes in the amount of sunlight reaching the Earth’s surface and makes our seasons.</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. identify the major constellations and determine the seasonal changes in patterns (4.6)</li> <li>b. research and report on the legends of major constellations (1.4; 1.8; 2.1)</li> </ol> <ol style="list-style-type: none"> <li>a. compare and contrast Earth’s properties to other planets in our solar system (1.2; 1.6)</li> <li>a. explain how Earth’s movements and tilt cause seasons (1.4; 2.1; 2.7)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Observe the night sky over an extended period of time, keeping a record or chart of the observations to identify the major constellations.</li> <li>• Script a play about the major constellations based on legend.</li> <li>• Identify some characteristics of Earth that allow it to support life.</li> <li>• Model a demonstration of the tilt of Earth’s axis in relation to the plane of the orbit around the sun and use it to explain seasons at different places on the Earth.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Objects in the sky move.</li> <li>2. Earth makes a full rotation on its axis every 24 hours that causes the day / night cycle.</li> <li>3. Patterns of movement of some objects in the sky are cyclic.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. use senses to gather information about the day sky through regular observations (1.3; 1.6; 2.3)</li> <li>a. explain the relationship of the rotation of Earth and the day / night cycle (1.2; 1.7; 2.3; 3.5; 4.1)</li> <li>a. discover and evaluate patterns in the sky (1.6; 3.5; 4.1)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Observe and measure the shadow of a specific object at different times of the day, and determine the direction of the shadow points in relation to the position of the sun.</li> <li>• Use a ball and a light source to demonstrate the cycle of night and day and the rotation of Earth.</li> <li>• Record observations of the day and night skies over an extended period of time and identify patterns of movement.</li> </ul>
<p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>4. The motion and positions of objects in the solar system are observable phenomena that can be explained.</li> <li>5. Recurring predictable movements of the Earth and moon can be used to measure time.</li> <li>6. Different constellations can be seen in different seasons.</li> <li>7. The sun, moon, stars, and planets appear to move from east to west each day</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. evaluate information about the motion and position of Earth, moon, and sun to determine the patterns that give us our day, month, year, moon phases, and eclipses (1.6)</li> <li>a. explain how time can be based on the movements of Earth in relation to the sun, moon and stars (1.3; 1.6; 1.8; 2.7; 4.6)</li> <li>a. explain why certain constellations can be seen only at certain seasons (1.6; 2.4; 3.5; 4.1)</li> <li>a. explain the reasons for different time zones (1.2; 3.5; 4.1)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Demonstrate the positions and motions of the sun, moon, and Earth to explain moon phases, solar eclipse, and moon eclipse.</li> <li>• Make a working sundial and explain how it was done.</li> <li>• Construct and use a Big Dipper star clock.</li> <li>• Illustrate how the Earth’s position relative to the sun determines which constellations are visible in different seasons.</li> <li>• Chart the times and directions of sunrise and sunset over a 2-month period in two different time zones.</li> </ul>



## **VI. EARTH SYSTEMS** (SHOW-ME STANDARDS, SCIENCE 5)

- A. Physical Systems**
- B. Processes of Systems**



### **K-12 Content Overview:**

Knowledge of the processes and physical nature of Earth provides students with a picture of Earth's past, present, and future. The physical laws that have governed the entire universe in the past are the same as those that govern material interactions today. Earth's physical systems, comprised of subsystems (biosphere, atmosphere, hydrosphere, and lithosphere), are continuously interacting with one another. Changes in each of the subsystems impact Earth's physical and biological characteristics.

The processes on Earth, such as the movement of plates and the flow of air and water, are driven by heat energy from within the Earth and by heat generated when sunlight strikes the atmosphere and surface of Earth. Interactions between heat and other forms of energy with matter on Earth shape its surface, determine its climate, affect its atmosphere, and set the stage for life. Earth provides humans with the resources they need to sustain life and to advance technologically; however, as people use these resources, they have also altered Earth systems. Questions of environmental policy should be pursued when students become aware of these related issues.

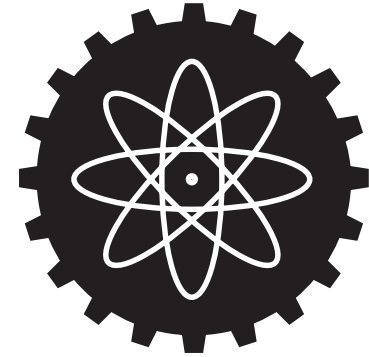
What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Water reaches Earth in different forms (snow, hail, rain, fog, etc.).</li> <li>2. Earth’s natural resources are limited.</li> <li>3. Earth’s surface is composed of rocks, soils, water, and living organisms. Differences in these components can be used to classify them.</li> <li>4. The atmosphere has physical properties that are measurable and predictable.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. conduct research to develop and evaluate information and ideas about how water in various forms reaches Earth (1.2; 1.6; 3.5)</li> <li>a. conduct research to develop and evaluate information on the use and abuse of Earth’s natural resources (1.2; 1.9)</li> <li>a. apply knowledge and skills to classify a variety of rocks or soil (1.10; 3.5)</li> <li>a. conduct research to develop and evaluate information about the atmosphere; plan and make a written, oral, and visual presentation of the patterns of change over a period of time (1.2; 1.4; 1.8; 2.1)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Use a globe to identify different areas that would have lots of or very little rain, snow, fog, etc.</li> <li>• Construct posters that promote responsible use of water or trees.</li> <li>• Collect a variety of rocks or soil and classify them according to one type of physical property.</li> <li>• Keep a journal of temperatures and weather conditions for a month or two. Identify patterns</li> <li>• Compare the seasonal changes and describe how humans have adapted to them.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>5. Fossils provide evidence of plants and animals that lived long ago and the environment in which they lived.</li> <li>6. Water is a valuable natural resource essential to all life.</li> <li>7. Rocks, minerals, and soil have physical characteristics by which they can be classified.</li> <li>8. Soil composition varies from location to location and affects the type of plants that grow in that location.</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. plan and make a written, oral, and visual presentation about the natural history of our state based on evidence of fossils found in Missouri (1.3; 1.8; 1.9; 2.1)</li> <li>a. exchange information and ideas with others about water conservation and the essential need for water by all living things while recognizing different points of view (1.4; 1.8; 2.3; 2.7)</li> <li>a. classify rocks, minerals, and soils according to their physical characteristics (1.6; 1.8)</li> <li>a. use technological tools and other resources to locate, select and organize information from simple investigations to determine which plants grow best under various conditions in a variety of locations (1.4; 1.6; 3.5)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Compare and contrast the Missouri environment of today to that of long ago through fossil evidence.</li> <li>• Compare the similarities and differences between fossils and living organisms. Ask reasonable questions about those comparisons.</li> <li>• Survey family and friends to see how many ways they use water. Compare findings with classmates and classify essential uses.</li> <li>• Classify a given group of rocks according to color.</li> <li>• Create and conduct simple investigations to determine what plants will grow best in different kinds of soil.</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Water is stored all over Earth.</li> <li>2. Rocks change over time by weathering.</li> <li>3. Earth’s rotation causes a day and night cycle.</li> <li>4. Seasons and changes in weather affect human and animal activity and plant growth.</li> <li>5. The surface of Earth changes slowly (e.g., erosion, weathering) or quickly (e.g., earthquakes, floods, rock/mud slides, volcanic activity).</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. discover and evaluate patterns and relationships in information to predict and identify areas that store water (1.3; 1.6; 2.4; 3.5)</li> <li>a. conduct research to develop and evaluate information to show how rocks change over time by weathering (1.2; 1.6; 1.8; 2.4; 3.5; 4.1)</li> <li>a. identify the apparent position of the sun throughout the day (1.3; 1.6; 2.3; 3.1; 4.6)</li> <li>a. apply the knowledge and skills learned from weather observation and investigations to study the effect on human and animal activity and plant growth (1.3; 1.6; 1.10; 3.2; 3.3)</li> <li>a. present perceptions and ideas on ways the surface of Earth changes slowly or quickly (2.4; 4.1)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Identify areas of Missouri that store water above and below ground.</li> <li>• Observe and describe signs of weathering on a brick building, statue, bridge, cliff, etc.</li> <li>• Using sticks in the ground, mark the position of the shadows during a sunny day. Describe what is observed.</li> <li>• Compare the different weather patterns in northern and southern parts of the United States. Discuss how these patterns influence plant growth and human activity in those states.</li> <li>• Choose a natural disturbance (flood, heat wave, snow, ice storm) and identify the changes it caused and how it affected plants, animals, and humans.</li> </ul>

## VII. LIVING SYSTEMS (SHOW-ME STANDARDS, SCIENCE 3)

- A. Structures/Function/Characteristics
- B. Life Processes
- C. Diversity
- D. Reproduction/Heredity
- E. Adaptation/Evolution



### K-12 Content Overview:

Observation and classification of living things began with the need of the earliest humans to survive. Human curiosity and desire to organize have led to systems that classify the complex diversity of life based on knowledge of external features, behaviors, internal structures, and molecular evidence. Understanding and appreciating the diversity of life comes from students' ability to see the patterns of similarity and differences that permeate the living world. The living environment consists of millions (perhaps tens of millions) of different types of organisms, all of which carry out the same basic functions that have maintained life for millions of years. The information required to carry out the life functions is encoded in chemicals in the nuclei of cells and is passed from generation to generation. A complex interplay between variations in the genetic code and environmental factors results, over time, in changes in living organisms.

The challenge for educators is to capitalize on the interest that students have in living things while moving them gradually toward ideas that make sense out of nature. Familiarity with the phenomena should precede their explanation, and attention to the concrete object should precede abstract theory. (The "Functions and Interrelationships of Systems" strand within the Health/Physical Education framework contains content related to body systems.)

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. Observable characteristics of living organisms can be used to sort and group them.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. sort common objects based on color and/or shape and use this skill to sort common organisms (1.5)</li> <li>b. discover and evaluate patterns and relationships of living organisms (1.6)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Observe and compare similarities and differences in mature and immature organisms (dogs/puppies, frogs/tadpoles, trees/saplings).</li> <li>• Sort common organisms based on one or two physical characteristics such as color, number of legs.</li> </ul>
<p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>2. Organisms differ in structure and function and have characteristics that help them survive and reproduce in different environments.</li> <li>3. Plants and animals are alive and have characteristics that make them different from nonliving matter.</li> </ol>	<p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. interpret and explain patterns and relationships of the animals' structure and systems based on data given about different animals (1.6; 1.7; 1.8; 2.2)</li> <li>a. identify characteristics that determine whether an object or material is living or nonliving and apply that knowledge to unknown samples (1.2; 1.3; 1.6)</li> </ol>	<p><i>These sample activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Examine crickets, mice, birds, etc., and explain how different physical structures help them survive.</li> <li>• Describe how a tree and a turtle differ from a rock. List these characteristics and identify the similarities and differences that exist.</li> </ul>

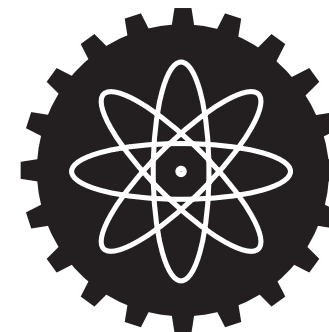




What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>Most offspring are similar but not exactly like their parents.</li> </ol> <p><i>By the end of grade 4, all students should know that</i></p> <ol style="list-style-type: none"> <li>Organisms resemble their parents because they inherit physical characteristics from them. Organisms with two parents inherit characteristics of both.</li> <li>All types of living organisms have offspring, and the similarities between parents and their offspring become more apparent as the offspring mature.</li> <li>The phases in the life cycle of all living organisms are predictable, but differ from species to species.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>identify and discuss the similarities and differences between parents and their offspring (1.6)</li> </ol> <p><i>By the end of grade 4, all students should be able to</i></p> <ol style="list-style-type: none"> <li>organize physical characteristics of offspring and parents into useful forms for communicating visual clarity and interpret patterns and sources of inheritance (1.6; 3.2)</li> <li>design and conduct investigations to observe and compare similarities and differences between offspring and their parents (1.3; 1.8)</li> <li>design and conduct investigations to observe and record the life cycles of organisms (1.3; 4.6)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>Observe parents and offspring of various species and draw reasonable conclusions about the inheritance of traits such as body shape, coloration, and behavior.</li> </ul> <p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>Chart and interpret data about inherited characteristics from an actual or hypothetical human biological family. Identify similarities and differences.</li> <li>Observe and compare similarities and differences between mature birds / nestling, butterflies / caterpillars, etc.</li> <li>Observe and record the life cycles of an insect, a frog, and a dandelion. Compare the differences.</li> </ul>



## VIII. ECOLOGY (SHOW-ME STANDARDS, SCIENCE 4)



- A. Interactions
- B. Changes

### K-12 Content Overview:

Knowledge of the living environment provides students with an understanding of their place in the natural world and of how humans can impact the environment to the benefit or detriment of themselves and other living organisms. Students generally know from everyday experience that in order to survive, organisms depend upon other organisms and the physical environment in which they live. But their awareness must be supported by knowledge of the types of interactions that occur among organisms, the kinds of physical conditions that organisms must cope with, and the complexity of the systems that are created through interdependence and interaction.

Living systems maintain a relatively stable internal environment through their regulatory mechanisms. Energy flows through an ecosystem from the Earth's primary source of energy, the sun, to organisms that can transform light energy into chemical energy. Other organisms then depend upon this chemical energy, in the form of food, to survive. While energy continually flows to Earth from the sun, matter on Earth is limited. Over periods of time, varying from days to eons, matter cycles between the living and nonliving environment.

The concept of evolution provides a framework for understanding the diversity and interdependence of life forms. All ecosystems change over time. Individual organisms that are best adapted to these new environments tend to survive and reproduce, leading to shifts in populations. The diversity of behaviors, structure, and biochemical characteristics within a population increases the likelihood that individuals will have characteristics that are beneficial in a changed environment.

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 2, all students should know that</i></p> <ol style="list-style-type: none"> <li>1. All living organisms interact with each other and their environment.</li> <li>2. All organisms depend on one another and their environment to live and grow.</li> <li>3. People depend on other organisms and Earth’s resources for clothing, shelter, and food.</li> </ol>	<p><i>By the end of grade 2, all students should be able to</i></p> <ol style="list-style-type: none"> <li>a. give examples of how living things affect their environment and other living things (1.3; 1.6; 4.1)</li> <li>a. identify the common basic needs of organisms and the ways in which they depend on each other and their environment (1.1; 1.2; 1.3; 1.6; 1.10; 2.4; 3.5; 4.6)</li> <li>a. identify ways humans depend on other organisms for food, clothing, and shelter, etc. (1.2; 2.3; 4.1)</li> </ol>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Investigate an outdoor plot to identify worms, bugs, birds, plants, etc. Give examples of how these things affect their environment and each other.</li> <li>• Study an aquarium and record how each organism contributes to the natural system of the aquarium.</li> <li>• Identify several animals that live in the local area. Investigate what food and environment they need to survive.</li> <li>• Investigate and discuss how different types of seeds are designed to be dispersed and the process of dispersal.</li> <li>• Design a fictitious animal or plant with the physical characteristics that will let it live and grow in a particular environment.</li> <li>• Determine the sources of the different materials used to make clothes.</li> <li>• Chart the process by which food is grown, processed, and brought to our homes.</li> <li>• List common building materials and categorize them into “natural” or “human-made.”</li> </ul>

What All Students Should Know	What All Students Should Be Able To Do	Sample Learning Activities
<p><i>By the end of grade 4, all students should know that</i></p> <p>4.. Behavior patterns and survival of organisms result from their interactions with a specific environment.</p> <p>5. Organisms interact with each other as producer/consumer, scavenger, predator/prey, parasite/host, decomposer, etc.</p> <p>6. Interactions between organisms and their environment contribute to continuous cycling of matter and energy.</p>	<p><i>By the end of grade 4, all students should be able to</i></p> <p>a. predict how specific changes in the environment will affect people and other organisms found in this environment (1.1; 1.3; 2.4; 3.2; 3.4; 3.5; 4.1; 4.6)</p> <p>b. identify behavior and physical adaptations that help organisms adapt to changing conditions (1.2; 1.5; 2.4)</p> <p>c. identify the physical attributes and behavior of living organisms that enable them to survive (1.2; 1.5; 2.4)</p> <p>a. identify and discuss the nature of relationships between two or more living organisms (1.2; 2.3; 2.7; 3.5)</p> <p>a. describe how organisms within a contained system maintain their relationships over time and what adjustments occur naturally within this system (1.1; 2.1; 3.1; 4.1)</p> <p>b. develop a food web to show the energy flow from any organism to another (1.8; 2.2; 3.5)</p>	<p><i>These samples activities offer ideas and are not meant to limit teacher or student resourcefulness.</i></p> <ul style="list-style-type: none"> <li>• Plan and conduct simple investigations to explore how modifications in soil, water, and sunlight affectsthe growth and survival of a plant.</li> <li>• Explain how humans and animals are affected by temperature, rainfall, violent storms, earthquakes, floods, etc., and how they adapt.</li> <li>• Investigate and describe the habitat of an owl. Identify physical attributes and behaviors of the owls that enable them to survive in their environment.</li> <li>• List ways that hawks, mice, and plants interact in an ecosystem. Identify the interdependent relationships that exist (such as predator/prey).</li> <li>• Conduct an extended investigation (terrarium, aquarium, local habitat) to explain how the inhabitants meet their energy needs. Generate reasonable questions about these interactions and design simple tests to investigate these questions.</li> <li>• Use pictures of plants, insects, birds, animals, and micro-organisms to illustrate the flow of energy from producers to decomposers.</li> </ul>

## **Section 2.**

### **Missouri School District Science Scores**

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### **Missouri State to District Grade 3 Science Performance**

		No Lev	Step 1	Progr	Near Prof	Prof	Advan	Bott 2 Lev	Top 2 Lev	MAP Ind
<b>Missouri State Performance</b>		1.2	3.8	11.7	36.8	38.7	9	15.5	47.7	218.7
<b>County/District</b>	<b>District Name</b>	No Lev	Step 1	Progr	Near Prof	Prof	Advan	Bott 2 Lev	Top 2 Lev	MAP Ind
014400	MO SCHOOL FOR THE DEAF	0.0	75.0	25.0	0.0	0.0	0.0	100.0	0.0	112.5
013062	KINGSTON 42	0.0	66.7	33.3	0.0	0.0	0.0	100.0	0.0	116.7
096119	SPECL. SCH. DST. ST. LOUIS CO.	33.3	50.0	50.0	0.0	0.0	0.0	100.0	0.0	125.0
023094	WYACONDA C-1	0.0	33.3	50.0	16.7	0.0	0.0	83.3	0.0	141.7
096115	WELLSTON	12.7	26.1	27.5	34.8	11.6	0.0	53.6	11.6	165.9
041004	GILMAN CITY R-IV	0.0	15.4	23.1	61.5	0.0	0.0	38.5	0.0	173.1
055111	VERONA R-VII	5.9	9.4	40.6	43.8	6.3	0.0	50.0	6.3	173.4
115414	MO SCHOOL FOR THE BLIND	0.0	0.0	50.0	50.0	0.0	0.0	50.0	0.0	175.0
105123	GREEN CITY R-I	0.0	20.8	25.0	29.2	25.0	0.0	45.8	25.0	179.2
029003	EVERTON R-III	0.0	23.5	17.6	35.3	23.5	0.0	41.2	23.5	179.4
105125	NEWTOWN-HARRIS R-III	0.0	20.0	20.0	40.0	20.0	0.0	40.0	20.0	180.0
078012	CARUTHERSVILLE 18	0.0	10.6	31.1	43.2	14.4	0.8	41.7	15.2	181.8
072073	GIDEON 37	0.0	8.3	33.3	44.4	13.9	0.0	41.7	13.9	181.9
075086	OREGON-HOWELL R-III	0.0	9.1	31.8	40.9	18.2	0.0	40.9	18.2	184.1
031117	WINSTON R-VI	5.9	18.8	18.8	37.5	25.0	0.0	37.5	25.0	184.4
042117	CALHOUN R-VIII	0.0	7.7	30.8	46.2	15.4	0.0	38.5	15.4	184.6
015001	STOUTLAND R-II	0.0	2.4	46.3	29.3	22.0	0.0	48.8	22.0	185.4
072068	PORTAGEVILLE	4.4	10.8	29.2	38.5	21.5	0.0	40.0	21.5	185.4
033092	GREEN FOREST R-II	0.0	9.5	19.0	61.9	9.5	0.0	28.6	9.5	185.7
078002	HAYTI R-II	2.7	8.5	26.8	49.3	15.5	0.0	35.2	15.5	185.9
090078	LESTERVILLE R-IV	0.0	0.0	36.4	54.5	9.1	0.0	36.4	9.1	186.4
013058	COWGILL R-VI	0.0	0.0	25.0	75.0	0.0	0.0	25.0	0.0	187.5
078001	NORTH PEMISCOT CO. R-I	0.0	17.2	24.1	31.0	20.7	6.9	41.4	27.6	187.9
040100	GRUNDY CO R-V	0.0	0.0	29.4	64.7	5.9	0.0	29.4	5.9	188.2
072066	RISCO R-II	0.0	5.9	35.3	41.2	11.8	5.9	41.2	17.6	188.2
053112	GASCONADE C-4	0.0	0.0	22.2	77.8	0.0	0.0	22.2	0.0	188.9

077104	LUTIE R-VI	0.0	15.8	0.0	73.7	10.5	0.0	15.8	10.5	189.5
084002	FAIR PLAY R-II	5.0	5.3	26.3	55.3	10.5	2.6	31.6	13.2	189.5
094076	BISMARCK R-V	0.0	8.3	20.8	54.2	16.7	0.0	29.2	16.7	189.6
067061	CHARLESTON R-I	0.0	10.1	33.0	27.5	25.7	3.7	43.1	29.4	189.9
068071	HIGH POINT R-III	0.0	0.0	16.7	83.3	0.0	0.0	16.7	0.0	191.7
080118	LA MONTE R-IV	8.7	9.5	19.0	47.6	23.8	0.0	28.6	23.8	192.9
048078	KANSAS CITY 33	2.4	11.0	21.9	39.7	24.0	3.4	32.9	27.4	193.4
068070	MONITEAU CO. R-I	6.1	11.7	15.6	49.4	20.8	2.6	27.3	23.4	193.5
061157	CALLAO C-8	0.0	12.5	12.5	50.0	25.0	0.0	25.0	25.0	193.8
027055	BLACKWATER R-II	0.0	11.8	11.8	52.9	23.5	0.0	23.5	23.5	194.1
005127	SHELL KNOB 78	5.3	0.0	27.8	55.6	16.7	0.0	27.8	16.7	194.4
041002	SOUTH HARRISON CO. R-II	0.0	5.8	28.8	38.5	23.1	3.8	34.6	26.9	195.2
096104	JENNINGS	1.1	6.2	21.6	49.0	21.6	1.5	27.8	23.2	195.4
035094	HOLCOMB R-III	0.0	14.3	11.4	48.6	20.0	5.7	25.7	25.7	195.7
084005	MARION C. EARLY R-V	0.0	6.8	18.6	50.8	23.7	0.0	25.4	23.7	195.8
007122	BALLARD R-II	0.0	7.7	30.8	30.8	23.1	7.7	38.5	30.8	196.2
096110	RITENOUR	2.4	5.5	24.1	46.9	19.5	4.0	29.6	23.5	196.2
028103	STEELVILLE R-III	0.0	4.9	16.0	60.5	18.5	0.0	21.0	18.5	196.3
015003	CLIMAX SPRINGS R-IV	0.0	6.7	13.3	66.7	6.7	6.7	20.0	13.3	196.7
038044	KING CITY R-I	0.0	3.3	30.0	36.7	30.0	0.0	33.3	30.0	196.7
088073	RENICK R-V	0.0	0.0	20.0	66.7	13.3	0.0	20.0	13.3	196.7
056017	LEWIS CO. C-1	3.7	3.8	25.3	44.3	26.6	0.0	29.1	26.6	196.8
062070	MARQUAND-ZION R-VI	0.0	6.3	18.8	50.0	25.0	0.0	25.0	25.0	196.9
101107	EMINENCE R-I	0.0	6.3	18.8	56.3	12.5	6.3	25.0	18.8	196.9
086100	PUTNAM CO. R-I	0.0	10.1	17.4	43.5	26.1	2.9	27.5	29.0	197.1
012108	NEELYVILLE R-IV	1.9	9.4	17.0	47.2	22.6	3.8	26.4	26.4	197.2
114114	MOUNTAIN GROVE R-III	0.9	7.5	25.5	36.8	25.5	4.7	33.0	30.2	197.2
091091	NAYLOR R-II	0.0	10.5	10.5	52.6	26.3	0.0	21.1	26.3	197.4
010092	HARRISBURG R-VIII	0.0	4.5	18.2	56.8	18.2	2.3	22.7	20.5	197.7
115115	ST. LOUIS CITY	2.6	12.3	18.2	37.1	26.2	6.0	30.6	32.3	197.7
013059	POLO R-VII	0.0	0.0	20.8	62.5	16.7	0.0	20.8	16.7	197.9
012109	POPLAR BLUFF R-I	0.8	7.1	20.5	43.6	26.6	2.2	27.7	28.8	198.1
112103	SEYMOUR R-II	0.0	1.3	24.1	54.4	17.7	2.5	25.3	20.3	198.1
096109	NORMANDY	0.6	6.1	21.4	44.7	24.9	2.9	27.5	27.7	198.5

072074	NEW MADRID CO. R-I	0.7	11.4	15.7	41.4	27.1	4.3	27.1	31.4	198.6
004106	COMMUNITY R-VI	0.0	3.3	20.0	50.0	26.7	0.0	23.3	26.7	200.0
010090	STURGEON R-V	3.1	0.0	19.4	64.5	12.9	3.2	19.4	16.1	200.0
023096	REVERE C-3	0.0	0.0	25.0	50.0	25.0	0.0	25.0	25.0	200.0
023099	LURAY 33	0.0	0.0	40.0	20.0	40.0	0.0	40.0	40.0	200.0
031118	NORTH DAVIESS R-III	0.0	0.0	23.1	53.8	23.1	0.0	23.1	23.1	200.0
040101	SPICKARD R-II	0.0	0.0	33.3	33.3	33.3	0.0	33.3	33.3	200.0
042118	LEESVILLE R-IX	0.0	0.0	25.0	50.0	25.0	0.0	25.0	25.0	200.0
042119	DAVIS R-XII	0.0	0.0	20.0	60.0	20.0	0.0	20.0	20.0	200.0
045077	FAYETTE R-III	0.0	6.3	16.7	50.0	25.0	2.1	22.9	27.1	200.0
066103	MILLER CO. R-III	0.0	3.8	11.5	65.4	19.2	0.0	15.4	19.2	200.0
068072	MONITEAU CO. R-V	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	200.0
069107	HOLLIDAY C-2	0.0	0.0	18.2	63.6	18.2	0.0	18.2	18.2	200.0
073102	DIAMOND R-IV	0.0	5.0	25.0	40.0	25.0	5.0	30.0	30.0	200.0
089077	STET R-XV	0.0	25.0	0.0	25.0	50.0	0.0	25.0	50.0	200.0
097118	OREARVILLE R-IV	0.0	0.0	33.3	33.3	33.3	0.0	33.3	33.3	200.0
020001	STOCKTON R-I	0.0	3.1	20.8	50.0	24.0	2.1	24.0	26.0	200.5
055110	AURORA R-VIII	0.6	8.1	19.2	39.0	30.8	2.9	27.3	33.7	200.6
071091	MORGAN CO. R-I	0.0	2.4	21.4	50.0	23.8	2.4	23.8	26.2	201.2
050009	SUNRISE R-IX	0.0	7.5	15.0	50.0	22.5	5.0	22.5	27.5	201.3
005121	SOUTHWEST R-V	1.5	6.1	19.7	40.9	31.8	1.5	25.8	33.3	201.5
035097	CLARKTON C-4	3.6	7.4	14.8	44.4	33.3	0.0	22.2	33.3	201.9
068073	MONITEAU CO. R-VI	0.0	5.6	24.1	35.2	31.5	3.7	29.6	35.2	201.9
035098	SENATH-HORNERSVILLE C-8	0.0	12.2	20.4	26.5	32.7	8.2	32.7	40.8	202.0
058112	BROOKFIELD R-III	0.0	4.3	18.1	47.9	28.7	1.1	22.3	29.8	202.1
114115	MANSFIELD R-IV	0.0	4.2	22.9	41.7	27.1	4.2	27.1	31.3	202.1
019144	SHERWOOD CASS R-VIII	1.5	6.0	17.9	43.3	31.3	1.5	23.9	32.8	202.2
029002	DADEVILLE R-II	0.0	0.0	31.6	36.8	26.3	5.3	31.6	31.6	202.6
065098	PRINCETON R-V	2.7	5.6	16.7	50.0	22.2	5.6	22.2	27.8	202.8
096111	RIVERVIEW GARDENS	1.6	5.3	19.2	44.4	26.6	4.5	24.5	31.0	202.8
110014	KINGSTON K-14	0.0	2.2	19.1	51.7	24.7	2.2	21.3	27.0	202.8
100063	SIKESTON R-VI	0.0	7.6	18.5	40.1	27.8	6.0	26.2	33.8	203.0
018047	EAST CARTER CO. R-II	4.1	6.4	12.8	51.1	27.7	2.1	19.1	29.8	203.2
028102	CRAWFORD CO. R-II	0.0	6.4	12.8	48.6	32.1	0.0	19.3	32.1	203.2

048072	HICKMAN MILLS C-1	0.0	6.7	16.2	45.0	28.1	4.0	22.9	32.1	203.3
059113	SOUTHWEST LIVINGSTON CO. R-I	0.0	0.0	28.6	35.7	35.7	0.0	28.6	35.7	203.6
107151	SUCCESS R-VI	6.7	0.0	7.1	78.6	14.3	0.0	7.1	14.3	203.6
046140	FAIRVIEW R-XI	0.0	3.7	13.0	55.6	27.8	0.0	16.7	27.8	203.7
097116	MIAMI R-I	0.0	7.7	15.4	53.8	7.7	15.4	23.1	23.1	203.8
013061	BRAYMER C-4	0.0	0.0	16.0	64.0	16.0	4.0	16.0	20.0	204.0
044078	CRAIG R-III	0.0	0.0	8.3	75.0	16.7	0.0	8.3	16.7	204.2
005122	EXETER R-VI	0.0	0.0	13.6	63.6	22.7	0.0	13.6	22.7	204.5
043003	WEAUBLEAU R-III	0.0	2.3	22.7	40.9	31.8	2.3	25.0	34.1	204.5
050013	CRYSTAL CITY 47	0.0	4.5	18.2	43.2	31.8	2.3	22.7	34.1	204.5
049142	CARTHAGE R-IX	2.1	6.2	19.3	38.7	30.7	5.1	25.5	35.8	204.6
016096	CAPE GIRARDEAU 63	0.3	6.3	17.8	40.4	31.0	4.5	24.0	35.5	204.9
027061	BOONVILLE R-I	0.0	5.8	14.6	47.6	28.2	3.9	20.4	32.0	204.9
058108	MEADVILLE R-IV	0.0	0.0	16.7	55.6	27.8	0.0	16.7	27.8	205.6
094083	NORTH ST. FRANCOIS CO. R-I	4.2	3.9	17.5	45.1	30.6	2.9	21.4	33.5	205.6
054039	LAFAYETTE CO. C-1	0.0	1.6	19.7	45.9	31.1	1.6	21.3	32.8	205.7
096088	HAZELWOOD	1.6	6.6	17.0	40.4	30.1	5.9	23.6	36.0	205.9
025001	CAMERON R-I	0.0	4.3	16.4	44.3	32.9	2.1	20.7	35.0	206.1
078009	DELTA C-7	0.0	0.0	20.8	50.0	25.0	4.2	20.8	29.2	206.3
046128	HOWELL VALLEY R-I	0.0	4.3	13.0	52.2	26.1	4.3	17.4	30.4	206.5
036131	UNION R-XI	0.4	5.8	17.7	38.5	33.6	4.4	23.5	38.1	206.6
036138	NEW HAVEN	3.2	6.7	26.7	23.3	33.3	10.0	33.3	43.3	206.7
020002	EL DORADO SPRINGS R-II	0.0	6.0	16.7	39.3	33.3	4.8	22.6	38.1	207.1
027057	PRAIRIE HOME R-V	0.0	0.0	28.6	28.6	42.9	0.0	28.6	42.9	207.1
059114	LIVINGSTON CO. R-III	0.0	0.0	14.3	57.1	28.6	0.0	14.3	28.6	207.1
054045	LEXINGTON R-V	1.1	5.7	17.0	39.8	31.8	5.7	22.7	37.5	207.4
084004	HUMANSVILLE R-IV	5.6	2.9	14.7	50.0	29.4	2.9	17.6	32.4	207.4
004109	VAN-FAR R-I	0.0	3.8	17.0	39.6	39.6	0.0	20.8	39.6	207.5
048069	GRAIN VALLEY R-V	0.0	2.5	12.6	54.7	27.7	2.5	15.1	30.2	207.5
012110	TWIN RIVERS R-X	0.0	3.5	14.0	48.8	31.4	2.3	17.4	33.7	207.6
108144	SHELDON R-VIII	0.0	0.0	15.4	53.8	30.8	0.0	15.4	30.8	207.7
066102	ELDON R-I	1.3	5.4	15.6	40.1	35.4	3.4	21.1	38.8	207.8
001090	ADAIR CO. R-I	0.0	0.0	15.8	52.6	31.6	0.0	15.8	31.6	207.9
061156	MACON CO. R-I	0.0	4.7	17.4	37.2	38.4	2.3	22.1	40.7	208.1

063066	MARIES CO. R-I	0.0	2.7	16.2	45.9	32.4	2.7	18.9	35.1	208.1
076083	OSAGE CO. R-III	2.3	0.0	20.9	48.8	23.3	7.0	20.9	30.2	208.1
106005	HOLLISTER R-V	0.0	5.2	12.4	46.4	33.0	3.1	17.5	36.1	208.2
090075	CENTERVILLE R-I	0.0	8.3	8.3	50.0	25.0	8.3	16.7	33.3	208.3
017124	BOSWORTH R-V	0.0	5.9	5.9	58.8	23.5	5.9	11.8	29.4	208.8
035099	SOUTHLAND C-9	0.0	0.0	7.1	67.9	25.0	0.0	7.1	25.0	208.9
114113	HARTVILLE R-II	0.0	2.0	14.0	52.0	28.0	4.0	16.0	32.0	209.0
027056	COOPER CO. R-IV	0.0	18.2	0.0	27.3	54.5	0.0	18.2	54.5	209.1
079078	ALTENBURG 48	0.0	9.1	18.2	18.2	54.5	0.0	27.3	54.5	209.1
105124	MILAN C-2	0.0	0.0	18.2	47.7	31.8	2.3	18.2	34.1	209.1
026005	COLE CO. R-V	1.5	6.2	10.8	49.2	26.2	7.7	16.9	33.8	209.2
098080	SCHUYLER CO. R-I	0.0	8.5	11.9	37.3	37.3	5.1	20.3	42.4	209.3
110031	VALLEY R-VI	0.0	0.0	12.5	59.4	25.0	3.1	12.5	28.1	209.4
002089	NORTH ANDREW CO. R-VI	0.0	0.0	19.2	46.2	30.8	3.8	19.2	34.6	209.6
044084	SOUTH HOLT CO. R-I	7.1	0.0	15.4	53.8	26.9	3.8	15.4	30.8	209.6
011078	MID-BUCHANAN CO. R-V	0.0	3.3	16.4	41.0	36.1	3.3	19.7	39.3	209.8
002097	SAVANNAH R-III	0.5	3.3	13.2	47.8	31.9	3.8	16.5	35.7	209.9
003033	FAIRFAX R-III	0.0	0.0	10.0	60.0	30.0	0.0	10.0	30.0	210.0
058106	LINN CO. R-I	0.0	5.0	15.0	35.0	45.0	0.0	20.0	45.0	210.0
039137	STRAFFORD R-VI	0.0	1.4	8.1	59.5	31.1	0.0	9.5	31.1	210.1
073099	EAST NEWTON CO. R-VI	0.8	3.4	13.6	46.6	32.2	4.2	16.9	36.4	210.2
005128	MONETT R-I	0.6	6.5	11.3	43.5	32.1	6.5	17.9	38.7	210.4
070093	MONTGOMERY CO. R-II	0.0	3.0	13.0	48.0	32.0	4.0	16.0	36.0	210.5
042124	CLINTON	1.6	2.5	14.9	44.6	34.7	3.3	17.4	38.0	210.7
009079	ZALMA R-V	0.0	8.7	8.7	39.1	39.1	4.3	17.4	43.5	210.9
035102	KENNETT 39	1.7	10.9	7.4	37.7	37.1	6.9	18.3	44.0	210.9
082100	BOWLING GREEN R-I	0.0	3.2	11.1	48.4	34.9	2.4	14.3	37.3	211.1
106001	BRADLEYVILLE R-I	10.0	11.1	0.0	55.6	22.2	11.1	11.1	33.3	211.1
048073	RAYTOWN C-2	1.4	5.2	14.5	37.5	38.2	4.6	19.7	42.7	211.2
053111	LACLEDE CO. R-I	1.5	6.0	14.9	34.3	40.3	4.5	20.9	44.8	211.2
054043	WELLINGTON-NAPOLEON R-IX	0.0	5.0	12.5	45.0	30.0	7.5	17.5	37.5	211.3
005120	WHEATON R-III	0.0	2.9	14.3	48.6	25.7	8.6	17.1	34.3	211.4
084001	BOLIVAR R-I	2.4	2.4	15.1	43.4	35.5	3.6	17.5	39.2	211.4
096098	AFFTON 101	0.5	5.1	12.5	43.5	31.9	6.9	17.6	38.9	211.6

055104	MILLER R-II	4.8	3.3	11.7	46.7	35.0	3.3	15.0	38.3	211.7
021151	SALISBURY R-IV	0.0	5.9	8.8	44.1	38.2	2.9	14.7	41.2	211.8
022094	SPOKANE R-VII	1.8	1.8	18.2	40.0	34.5	5.5	20.0	40.0	211.8
035092	MALDEN R-I	0.0	2.8	16.0	40.6	35.8	4.7	18.9	40.6	211.8
037037	GASCONADE CO. R-II	0.0	1.3	17.3	42.0	34.7	4.7	18.7	39.3	212.0
045076	NEW FRANKLIN R-I	2.4	2.4	17.1	39.0	36.6	4.9	19.5	41.5	212.2
005123	CASSVILLE R-IV	0.0	4.8	15.8	32.9	43.2	3.4	20.5	46.6	212.3
041001	CAINSVILLE R-I	0.0	0.0	12.5	50.0	37.5	0.0	12.5	37.5	212.5
016094	OAK RIDGE R-VI	0.0	2.6	12.8	43.6	38.5	2.6	15.4	41.0	212.8
026002	COLE CO. R-II	0.0	2.9	11.4	51.4	25.7	8.6	14.3	34.3	212.9
107153	SUMMERSVILLE R-II	0.0	0.0	14.3	45.7	40.0	0.0	14.3	40.0	212.9
069109	PARIS R-II	0.0	3.7	18.5	25.9	51.9	0.0	22.2	51.9	213.0
084006	PLEASANT HOPE R-VI	1.3	3.9	10.4	45.5	36.4	3.9	14.3	40.3	213.0
081097	PHELPS CO. R-III	0.0	0.0	26.3	31.6	31.6	10.5	26.3	42.1	213.2
097131	SWEET SPRINGS R-VII	0.0	5.9	8.8	44.1	35.3	5.9	14.7	41.2	213.2
015004	MACKS CREEK R-V	0.0	3.3	16.7	33.3	43.3	3.3	20.0	46.7	213.3
022088	CHADWICK R-I	0.0	0.0	26.7	26.7	40.0	6.7	26.7	46.7	213.3
030093	DALLAS CO. R-I	2.0	3.3	11.3	44.7	36.7	4.0	14.7	40.7	213.3
074202	SOUTH NODAWAY CO. R-IV	0.0	0.0	13.3	46.7	40.0	0.0	13.3	40.0	213.3
050010	WINDSOR C-1	0.9	1.4	13.5	47.4	32.1	5.6	14.9	37.7	213.5
096103	HANCOCK PLACE	0.7	1.5	14.6	45.3	32.8	5.8	16.1	38.7	213.5
001092	ADAIR CO. R-II	0.0	0.0	18.2	40.9	36.4	4.5	18.2	40.9	213.6
018050	VAN BUREN R-I	0.0	0.0	9.1	57.6	30.3	3.0	9.1	33.3	213.6
033093	DENT-PHELPS R-III	0.0	6.1	12.1	33.3	45.5	3.0	18.2	48.5	213.6
058109	MARCELINE R-V	0.0	0.0	10.6	55.3	29.8	4.3	10.6	34.0	213.8
082108	LOUISIANA R-II	1.2	1.3	12.5	45.0	40.0	1.3	13.8	41.3	213.8
096112	UNIVERSITY CITY	0.5	3.0	17.5	38.1	31.5	9.9	20.5	41.4	213.8
027059	PILOT GROVE C-4	0.0	5.6	5.6	44.4	44.4	0.0	11.1	44.4	213.9
080125	SEDALIA 200	1.0	4.2	15.8	33.3	41.4	5.3	20.0	46.7	213.9
108147	NORTHEAST VERNON CO. R-I	0.0	0.0	11.1	55.6	27.8	5.6	11.1	33.3	213.9
055105	PIERCE CITY R-VI	0.0	4.7	9.3	44.2	37.2	4.7	14.0	41.9	214.0
103132	DEXTER R-XI	2.1	2.9	11.6	47.8	29.7	8.0	14.5	37.7	214.1
111087	CLEARWATER R-I	0.0	4.9	8.6	45.7	34.6	6.2	13.6	40.7	214.2
034122	PLAINVIEW R-VIII	0.0	0.0	14.3	42.9	42.9	0.0	14.3	42.9	214.3

096099	BAYLESS	2.0	2.0	16.3	42.9	28.6	10.2	18.4	38.8	214.3
112099	NIANGUA R-V	0.0	4.8	0.0	57.1	38.1	0.0	4.8	38.1	214.3
019150	DREXEL R-IV	0.0	3.2	12.9	35.5	48.4	0.0	16.1	48.4	214.5
009077	MEADOW HEIGHTS R-II	0.0	2.0	7.8	54.9	29.4	5.9	9.8	35.3	214.7
049140	SARCOXIE R-II	4.5	0.0	9.4	54.7	32.8	3.1	9.4	35.9	214.8
096089	FERGUSON-FLORISSANT R-II	1.1	3.9	13.6	40.3	33.4	8.7	17.5	42.2	214.8
019139	CASS CO. R-V	0.0	4.0	12.0	40.0	38.0	6.0	16.0	44.0	215.0
036135	STRAIN-JAPAN R-XVI	0.0	0.0	0.0	70.0	30.0	0.0	0.0	30.0	215.0
085048	DIXON R-I	0.0	1.2	13.6	46.9	29.6	8.6	14.8	38.3	215.4
097129	MARSHALL	1.9	3.9	12.3	41.2	34.3	8.3	16.2	42.6	215.4
019148	PLEASANT HILL R-III	0.0	2.3	11.6	43.4	38.0	4.7	14.0	42.6	215.5
031122	TRI-COUNTY R-VII	0.0	0.0	6.3	56.3	37.5	0.0	6.3	37.5	215.6
074194	NORTHEAST NODAWAY CO. R-V	0.0	0.0	12.5	43.8	43.8	0.0	12.5	43.8	215.6
080119	SMITHTON R-VI	0.0	1.9	11.1	48.1	31.5	7.4	13.0	38.9	215.7
094087	WEST ST. FRANCOIS CO. R-IV	0.0	1.3	7.9	50.0	39.5	1.3	9.2	40.8	215.8
061151	BEVIER C-4	4.3	4.5	13.6	31.8	45.5	4.5	18.2	50.0	215.9
107156	PLATO R-V	0.0	0.0	14.7	44.1	35.3	5.9	14.7	41.2	216.2
036133	LONEDELL R-XIV	0.0	0.0	12.1	48.3	34.5	5.2	12.1	39.7	216.4
089089	RICHMOND R-XVI	2.0	2.7	9.6	48.6	30.1	8.9	12.3	39.0	216.4
073106	SENECA R-VII	1.7	5.2	11.3	33.9	44.3	5.2	16.5	49.6	216.5
106004	BRANSON R-IV	2.5	3.9	14.6	32.2	43.3	6.0	18.5	49.4	216.5
006103	GOLDEN CITY R-III	0.0	4.2	4.2	54.2	29.2	8.3	8.3	37.5	216.7
011076	EAST BUCHANAN CO. C-1	1.8	5.6	9.3	38.9	38.9	7.4	14.8	46.3	216.7
021150	KEYTESVILLE R-III	0.0	0.0	13.3	46.7	33.3	6.7	13.3	40.0	216.7
058107	BUCKLIN R-II	0.0	8.3	0.0	50.0	33.3	8.3	8.3	41.7	216.7
069104	MIDDLE GROVE C-1	0.0	0.0	16.7	33.3	50.0	0.0	16.7	50.0	216.7
104041	HURLEY R-I	0.0	0.0	11.1	55.6	22.2	11.1	11.1	33.3	216.7
035093	CAMPBELL R-II	3.8	4.0	14.0	38.0	32.0	12.0	18.0	44.0	217.0
051154	JOHNSON CO. R-VII	0.0	0.0	15.9	36.4	45.5	2.3	15.9	47.7	217.0
017125	CARROLLTON R-VII	1.2	2.4	17.1	39.0	26.8	14.6	19.5	41.5	217.1
019152	BELTON 124	0.9	3.2	13.3	37.5	38.3	7.8	16.4	46.1	217.1
085045	LAQUEY R-V	2.6	0.0	21.1	34.2	34.2	10.5	21.1	44.7	217.1
010093	COLUMBIA 93	1.2	4.4	14.3	32.3	40.5	8.5	18.7	49.0	217.2
038046	ALBANY R-III	0.0	3.8	23.1	19.2	42.3	11.5	26.9	53.8	217.3

095059	STE. GENEVIEVE CO. R-II	3.7	0.6	15.5	39.4	37.4	7.1	16.1	44.5	217.4
100062	SCOTT CO. CENTRAL	0.0	9.3	7.0	25.6	55.8	2.3	16.3	58.1	217.4
024087	SMITHVILLE R-II	0.8	2.4	11.9	39.7	40.5	5.6	14.3	46.0	217.5
024089	EXCELSIOR SPRINGS 40	1.8	3.2	9.7	41.0	41.0	5.1	12.9	46.1	217.5
049135	AVILLA R-XIII	0.0	0.0	10.0	45.0	45.0	0.0	10.0	45.0	217.5
103130	PUXICO R-VIII	0.0	0.0	15.8	42.1	33.3	8.8	15.8	42.1	217.5
006101	LIBERAL R-II	0.0	8.8	5.9	32.4	47.1	5.9	14.7	52.9	217.6
104042	GALENA R-II	7.5	0.0	10.8	48.6	35.1	5.4	10.8	40.5	217.6
079077	PERRY CO. 32	0.7	3.0	9.0	45.9	33.8	8.3	12.0	42.1	217.7
025002	LATHROP R-II	2.6	1.3	7.9	47.4	40.8	2.6	9.2	43.4	217.8
050014	DESOTO 73	1.4	3.3	10.3	40.8	38.5	7.0	13.6	45.5	217.8
023101	CLARK CO. R-I	0.0	0.0	11.1	46.9	37.0	4.9	11.1	42.0	217.9
005124	PURDY R-II	0.0	0.0	15.6	39.1	39.1	6.3	15.6	45.3	218.0
051150	KINGSVILLE R-I	0.0	0.0	12.0	48.0	32.0	8.0	12.0	40.0	218.0
080121	GREEN RIDGE R-VIII	0.0	0.0	8.0	48.0	44.0	0.0	8.0	44.0	218.0
107155	CABOOL R-IV	0.0	0.0	7.8	53.1	34.4	4.7	7.8	39.1	218.0
014129	FULTON 58	0.0	4.5	15.3	33.5	32.4	14.2	19.9	46.6	218.2
034121	SKYLINE R-II	0.0	0.0	0.0	63.6	36.4	0.0	0.0	36.4	218.2
109003	WARREN CO. R-III	0.0	4.1	8.6	40.1	41.1	6.1	12.7	47.2	218.3
108142	NEVADA R-V	0.6	6.9	10.3	31.0	42.5	9.2	17.2	51.7	218.4
011079	BUCHANAN CO. R-IV	0.0	0.0	14.8	37.0	44.4	3.7	14.8	48.1	218.5
050005	DUNKLIN R-V	4.5	1.2	12.9	42.4	34.1	9.4	14.1	43.5	218.8
064072	MARION CO. R-II	0.0	0.0	0.0	62.5	37.5	0.0	0.0	37.5	218.8
108143	BRONAUGH R-VII	0.0	0.0	0.0	62.5	37.5	0.0	0.0	37.5	218.8
096107	MAPLEWOOD-RICHMOND HEIGHTS	2.1	8.4	11.6	31.6	30.5	17.9	20.0	48.4	218.9
046135	GLENWOOD R-VIII	0.0	0.0	4.8	52.4	42.9	0.0	4.8	42.9	219.0
068074	MONITEAU CO. C-1	0.0	0.0	14.3	38.1	42.9	4.8	14.3	47.6	219.0
029004	GREENFIELD R-IV	0.0	2.9	14.7	26.5	52.9	2.9	17.6	55.9	219.1
032055	MAYSVILLE R-I	0.0	1.8	10.9	40.0	41.8	5.5	12.7	47.3	219.1
088075	HIGBEE R-VIII	0.0	0.0	7.7	46.2	46.2	0.0	7.7	46.2	219.2
091092	DONIPHAN R-I	0.0	0.0	7.7	49.6	39.3	3.4	7.7	42.7	219.2
103127	RICHLAND R-I	0.0	0.0	3.8	53.8	42.3	0.0	3.8	42.3	219.2
107152	HOUSTON R-I	0.0	0.0	7.1	48.6	42.9	1.4	7.1	44.3	219.3
026006	JEFFERSON CITY	2.4	2.6	12.4	38.2	36.9	9.8	15.1	46.7	219.4

043002	WHEATLAND R-II	0.0	0.0	11.1	38.9	50.0	0.0	11.1	50.0	219.4
046134	WEST PLAINS R-VII	0.0	5.6	8.3	38.2	37.5	10.4	13.9	47.9	219.4
102085	SHELBY CO. R-IV	3.1	0.0	8.1	46.8	43.5	1.6	8.1	45.2	219.4
103131	BLOOMFIELD R-XIV	0.0	0.0	8.1	54.8	27.4	9.7	8.1	37.1	219.4
107158	RAYMONDVILLE R-VII	0.0	0.0	11.1	38.9	50.0	0.0	11.1	50.0	219.4
016092	DELTA R-V	0.0	0.0	8.7	43.5	47.8	0.0	8.7	47.8	219.6
022091	BILLINGS R-IV	0.0	0.0	9.1	51.5	30.3	9.1	9.1	39.4	219.7
071092	MORGAN CO. R-II	0.0	1.6	10.7	41.0	40.2	6.6	12.3	46.7	219.7
096094	MEHLVILLE R-IX	0.5	3.1	12.5	36.9	36.7	10.8	15.6	47.5	219.8
051152	HOLDEN R-III	0.0	1.8	13.3	36.3	40.7	8.0	15.0	48.7	219.9
045078	HOWARD CO. R-II	0.0	0.0	10.0	60.0	10.0	20.0	10.0	30.0	220.0
009080	WOODLAND R-IV	1.6	0.0	9.7	46.8	37.1	6.5	9.7	43.5	220.2
093123	LAKELAND R-III	3.0	6.3	6.3	34.4	46.9	6.3	12.5	53.1	220.3
029001	LOCKWOOD R-I	5.6	5.9	5.9	29.4	58.8	0.0	11.8	58.8	220.6
064075	HANNIBAL 60	0.0	1.6	10.9	40.1	39.7	7.8	12.5	47.5	220.6
092087	FT. ZUMWALT R-II	0.4	2.2	10.5	39.4	39.7	8.3	12.7	47.9	220.6
083003	PLATTE CO. R-III	2.0	2.0	8.0	41.3	44.0	4.7	10.0	48.7	220.7
016097	NELL HOLCOMB R-IV	0.0	2.3	11.6	37.2	39.5	9.3	14.0	48.8	220.9
019147	EAST LYNNE 40	0.0	0.0	0.0	57.1	42.9	0.0	0.0	42.9	221.4
033090	SALEM R-80	4.7	1.2	12.3	39.5	35.8	11.1	13.6	46.9	221.6
069106	MONROE CITY R-I	0.0	0.0	3.9	54.9	35.3	5.9	3.9	41.2	221.6
050003	HILLSBORO R-III	5.0	1.9	8.7	42.3	38.5	8.7	10.6	47.2	221.7
057004	WINFIELD R-IV	0.0	3.6	8.9	34.8	45.5	7.1	12.5	52.7	221.9
019142	RAYMORE-PECULIAR R-II	0.6	1.2	9.3	39.5	44.0	6.0	10.5	50.0	222.1
097119	MALTA BEND R-V	0.0	11.1	11.1	11.1	55.6	11.1	22.2	66.7	222.2
082101	PIKE CO. R-III	0.0	2.3	6.8	38.6	47.7	4.5	9.1	52.3	222.7
039136	WALNUT GROVE R-V	0.0	4.2	16.7	25.0	37.5	16.7	20.8	54.2	222.9
102081	SHELBY CO. C-1	0.0	0.0	5.7	45.7	45.7	2.9	5.7	48.6	222.9
048074	GRANDVIEW C-4	1.9	3.0	11.6	34.4	38.4	12.6	14.6	51.0	223.0
112102	MARSHFIELD R-I	0.0	2.1	10.3	36.5	41.2	9.9	12.4	51.1	223.2
066104	ST. ELIZABETH R-IV	0.0	0.0	6.7	40.0	53.3	0.0	6.7	53.3	223.3
096092	KIRKWOOD R-VII	0.3	3.4	11.8	31.5	41.6	11.8	15.2	53.4	223.3
053113	LEBANON R-III	0.6	3.1	7.1	38.2	43.4	8.3	10.2	51.7	223.4
092088	FRANCIS HOWELL R-III	0.8	1.6	9.0	38.2	43.3	7.8	10.6	51.2	223.4

110029	POTOSI R-III	0.5	1.5	7.1	43.7	38.6	9.1	8.6	47.7	223.4
088081	MOBERLY	2.3	2.4	11.2	33.5	42.9	10.0	13.5	52.9	223.5
091093	RIPLEY CO. R-IV	0.0	0.0	0.0	52.9	47.1	0.0	0.0	47.1	223.5
104045	BLUE EYE R-V	1.8	0.0	1.8	52.7	41.8	3.6	1.8	45.5	223.6
014126	NORTH CALLAWAY CO. R-I	0.0	1.1	8.6	40.9	40.9	8.6	9.7	49.5	223.7
022090	SPARTA R-III	0.0	0.0	18.6	25.4	45.8	10.2	18.6	55.9	223.7
026001	COLE CO. R-I	0.0	0.0	10.2	42.4	37.3	10.2	10.2	47.5	223.7
067055	EAST PRAIRIE R-II	1.3	1.3	11.8	32.9	46.1	7.9	13.2	53.9	223.7
077103	DORA R-III	0.0	0.0	0.0	52.6	47.4	0.0	0.0	47.4	223.7
041003	NORTH HARRISON R-III	0.0	0.0	4.8	47.6	42.9	4.8	4.8	47.6	223.8
106006	KIRBYVILLE R-VI	0.0	2.5	12.5	25.0	55.0	5.0	15.0	60.0	223.8
110030	RICHWOODS R-VII	4.5	0.0	4.8	52.4	33.3	9.5	4.8	42.9	223.8
010089	BOONE CO. R-IV	0.0	2.1	8.3	37.5	43.8	8.3	10.4	52.1	224.0
025003	CLINTON CO. R-III	0.0	4.0	6.0	36.0	46.0	8.0	10.0	54.0	224.0
039141	SPRINGFIELD R-XII	1.4	3.2	10.6	32.7	42.1	11.4	13.8	53.5	224.0
031121	GALLATIN R-V	0.0	0.0	10.8	32.4	54.1	2.7	10.8	56.8	224.3
100060	CHAFFEE R-II	0.0	0.0	11.4	34.3	48.6	5.7	11.4	54.3	224.3
046131	WILLOW SPRINGS R-IV	0.0	4.0	7.0	34.0	46.0	9.0	11.0	55.0	224.5
078005	SOUTH PEMISCOT CO. R-V	1.3	1.3	13.0	33.8	39.0	13.0	14.3	51.9	224.7
096095	PARKWAY C-2	1.9	2.8	9.6	33.4	43.6	10.7	12.4	54.3	224.9
007121	MIAMI R-I	0.0	0.0	5.6	50.0	33.3	11.1	5.6	44.4	225.0
017121	HALE R-I	0.0	0.0	0.0	50.0	50.0	0.0	0.0	50.0	225.0
019151	MIDWAY R-I	0.0	2.5	5.0	40.0	45.0	7.5	7.5	52.5	225.0
044083	MOUND CITY R-II	0.0	0.0	8.3	37.5	50.0	4.2	8.3	54.2	225.0
047065	IRON CO. C-4	8.1	0.0	5.9	41.2	50.0	2.9	5.9	52.9	225.0
048070	OAK GROVE R-VI	0.0	2.5	6.3	36.1	48.7	6.3	8.9	55.1	225.0
048077	INDEPENDENCE 30	1.1	1.8	9.2	38.1	39.2	11.7	11.0	51.0	225.0
055106	MARIONVILLE R-IX	0.0	3.3	8.3	33.3	45.0	10.0	11.7	55.0	225.0
080116	PETTIS CO. R-V	0.0	0.0	10.0	36.7	46.7	6.7	10.0	53.3	225.0
085043	SWEDEBORG R-III	0.0	0.0	0.0	50.0	50.0	0.0	0.0	50.0	225.0
089087	ORRICK R-XI	0.0	0.0	7.9	36.8	52.6	2.6	7.9	55.3	225.0
090077	BUNKER R-III	0.0	5.0	5.0	30.0	55.0	5.0	10.0	60.0	225.0
097122	HARDEMAN R-X	0.0	0.0	0.0	50.0	50.0	0.0	0.0	50.0	225.0
097127	GILLIAM C-4	0.0	0.0	0.0	50.0	50.0	0.0	0.0	50.0	225.0

103128	BELL CITY R-II	0.0	0.0	11.5	38.5	38.5	11.5	11.5	50.0	225.0
106008	MARK TWAIN R-VIII	0.0	0.0	0.0	50.0	50.0	0.0	0.0	50.0	225.0
114116	MANES R-V	0.0	0.0	0.0	50.0	50.0	0.0	0.0	50.0	225.0
048066	FORT OSAGE R-I	0.0	3.4	7.4	37.7	38.3	13.1	10.9	51.4	225.1
094078	FARMINGTON R-VII	0.4	1.2	6.9	38.4	47.3	6.1	8.2	53.5	225.1
109002	WRIGHT CITY R-II	0.9	2.6	12.1	26.7	49.1	9.5	14.7	58.6	225.4
013055	HAMILTON R-II	0.0	2.0	2.0	49.0	36.7	10.2	4.1	46.9	225.5
034124	AVA R-I	0.0	0.9	3.6	46.4	41.8	7.3	4.5	49.1	225.5
039139	GREENE CO. R-VIII	0.0	1.4	7.2	38.1	45.3	7.9	8.6	53.2	225.5
059117	CHILLICOTHE R-II	0.7	2.2	9.5	29.9	51.8	6.6	11.7	58.4	225.5
048080	CENTER 58	3.3	5.1	14.8	25.0	34.1	21.0	19.9	55.1	225.6
049137	JASPER CO. R-V	0.0	3.2	9.7	29.0	48.4	9.7	12.9	58.1	225.8
052096	KNOX CO. R-I	0.0	2.3	4.5	38.6	47.7	6.8	6.8	54.5	226.1
024093	NORTH KANSAS CITY 74	1.3	2.5	9.2	33.1	42.8	12.3	11.7	55.1	226.6
075087	ALTON R-IV	1.5	6.3	6.3	25.0	53.1	9.4	12.5	62.5	226.6
019149	HARRISONVILLE R-IX	0.6	1.7	5.7	40.2	42.0	10.3	7.5	52.3	226.7
061154	LA PLATA R-II	0.0	3.3	6.7	33.3	46.7	10.0	10.0	56.7	226.7
081096	ROLLA 31	0.3	2.5	9.0	34.2	41.3	13.0	11.5	54.3	226.7
085046	WAYNESVILLE R-VI	0.9	0.7	7.0	38.8	44.9	8.6	7.7	53.5	226.9
100059	SCOTT CITY R-I	2.9	1.5	10.4	29.9	49.3	9.0	11.9	58.2	226.9
046137	JUNCTION HILL C-12	0.0	2.7	10.8	32.4	37.8	16.2	13.5	54.1	227.0
006104	LAMAR R-I	1.0	1.9	4.9	39.8	43.7	9.7	6.8	53.4	227.2
085044	PULASKI CO. R-IV	0.0	2.4	4.8	40.5	40.5	11.9	7.1	52.4	227.4
036137	SULLIVAN C-2	0.0	0.8	4.9	39.3	48.4	6.6	5.7	54.9	227.5
051155	KNOB NOSTER R-VIII	1.2	0.6	6.9	38.1	45.6	8.8	7.5	54.4	227.5
057003	TROY R-III	0.3	0.3	9.0	34.3	48.0	8.4	9.3	56.4	227.7
036123	FRANKLIN CO. R-II	0.0	0.0	11.1	22.2	66.7	0.0	11.1	66.7	227.8
057001	SILEX R-I	0.0	0.0	5.6	33.3	61.1	0.0	5.6	61.1	227.8
024090	LIBERTY 53	0.2	0.9	6.9	35.4	49.1	7.6	7.8	56.8	227.9
009078	LEOPOLD R-III	0.0	0.0	0.0	50.0	43.8	6.3	0.0	50.0	228.1
004110	MEXICO 59	1.8	1.2	6.7	34.4	49.7	8.0	8.0	57.7	228.2
049132	CARL JUNCTION R-I	0.5	1.9	10.7	29.1	45.6	12.6	12.6	58.3	228.2
103135	BERNIE R-XIII	0.0	0.0	5.1	41.0	46.2	7.7	5.1	53.8	228.2
073108	NEOSHO R-V	2.8	1.3	6.4	35.9	46.8	9.6	7.7	56.4	228.5

096114	WEBSTER GROVES	0.0	2.3	9.3	29.6	46.9	11.9	11.6	58.8	228.5
007123	ADRIAN R-III	0.0	0.0	6.3	36.5	50.8	6.3	6.3	57.1	228.6
074187	NODAWAY-HOLT R-VII	0.0	0.0	9.5	28.6	57.1	4.8	9.5	61.9	228.6
106003	FORSYTH R-III	0.0	0.0	6.3	41.3	41.3	11.3	6.3	52.5	228.8
015002	CAMDENTON R-III	0.3	1.4	6.5	36.1	45.0	11.0	7.9	56.0	228.9
075085	THAYER R-II	0.0	1.8	0.0	49.1	36.8	12.3	1.8	49.1	228.9
092090	ST. CHARLES R-VI	1.7	1.0	7.4	36.8	42.1	12.7	8.4	54.8	229.1
008106	LINCOLN R-II	0.0	2.8	2.8	41.7	38.9	13.9	5.6	52.8	229.2
040107	TRENTON R-IX	2.2	0.0	7.9	33.7	50.6	7.9	7.9	58.4	229.2
050001	NORTHWEST R-I	0.0	1.4	8.4	32.6	45.2	12.4	9.8	57.6	229.4
069108	MADISON C-3	0.0	0.0	11.8	29.4	47.1	11.8	11.8	58.8	229.4
092089	WENTZVILLE R-IV	0.4	1.4	8.1	32.3	46.7	11.5	9.5	58.2	229.4
007129	BUTLER R-V	2.4	1.2	6.0	33.7	50.6	8.4	7.2	59.0	229.5
074201	MARYVILLE R-II	0.0	1.1	10.2	28.4	48.9	11.4	11.4	60.2	229.5
083005	PARK HILL	1.0	1.8	6.8	33.5	46.5	11.4	8.6	57.9	229.5
037039	GASCONADE CO. R-I	1.4	0.0	7.0	35.2	49.3	8.5	7.0	57.7	229.6
053114	LACLEDE CO. C-5	0.0	0.0	8.5	40.8	33.8	16.9	8.5	50.7	229.6
049148	JOPLIN R-VIII	1.0	1.6	7.8	33.0	44.7	12.9	9.4	57.6	229.8
062072	FREDERICKTOWN R-I	0.0	0.8	4.8	38.7	45.2	10.5	5.6	55.6	229.8
096093	LINDBERGH R-VIII	1.6	2.2	8.6	32.9	39.9	16.4	10.8	56.3	229.9
096113	VALLEY PARK	1.2	2.4	8.2	31.8	42.4	15.3	10.6	57.6	230.0
100065	ORAN R-III	0.0	0.0	0.0	44.0	52.0	4.0	0.0	56.0	230.0
056015	CANTON R-V	0.0	2.4	9.8	26.8	46.3	14.6	12.2	61.0	230.5
008111	COLE CAMP R-I	0.0	1.9	3.7	37.0	46.3	11.1	5.6	57.4	230.6
022092	CLEVER R-V	0.0	0.0	2.4	42.9	45.2	9.5	2.4	54.8	231.0
083002	WEST PLATTE CO. R-II	3.3	0.0	5.2	34.5	53.4	6.9	5.2	60.3	231.0
048068	BLUE SPRINGS R-IV	0.1	0.8	7.1	33.9	45.9	12.4	7.8	58.3	231.1
066107	IBERIA R-V	1.6	1.6	6.6	31.1	49.2	11.5	8.2	60.7	231.1
107154	LICKING R-VIII	0.0	1.6	8.2	27.9	50.8	11.5	9.8	62.3	231.1
039134	REPUBLIC R-III	0.4	1.3	5.8	35.6	43.6	13.8	7.1	57.3	231.3
042113	SHAWNEE R-III	0.0	0.0	0.0	37.5	62.5	0.0	0.0	62.5	231.3
093121	ROSCOE C-1	0.0	0.0	0.0	50.0	37.5	12.5	0.0	50.0	231.3
093124	OSCEOLA	0.0	3.1	0.0	37.5	50.0	9.4	3.1	59.4	231.3
010091	CENTRALIA R-VI	0.0	1.3	9.0	26.9	51.3	11.5	10.3	62.8	231.4

054041	ODESSA R-VII	0.0	1.1	5.7	34.7	46.0	12.5	6.8	58.5	231.5
104044	REEDS SPRING R-IV	0.0	0.6	6.8	35.2	43.8	13.6	7.4	57.4	231.5
014127	NEW BLOOMFIELD R-III	1.7	1.8	5.3	31.6	50.9	10.5	7.0	61.4	231.6
096102	CLAYTON	0.6	1.3	7.1	31.6	47.1	12.9	8.4	60.0	231.6
022093	OZARK R-VI	0.0	1.3	6.7	32.7	46.0	13.3	8.0	59.3	231.7
036139	WASHINGTON	0.8	1.2	6.2	33.3	46.5	12.8	7.4	59.3	231.7
042111	HENRY CO. R-I	1.9	0.0	5.8	30.8	57.7	5.8	5.8	63.5	231.7
051159	WARRENSBURG R-VI	1.3	0.4	6.5	36.1	43.0	13.9	7.0	57.0	231.7
100061	SCOTT CO. R-IV	0.0	1.3	7.8	29.9	48.1	13.0	9.1	61.0	231.8
054037	CONCORDIA R-II	0.0	0.0	11.1	25.0	52.8	11.1	11.1	63.9	231.9
055108	MT. VERNON R-V	0.0	0.0	9.9	25.3	56.0	8.8	9.9	64.8	231.9
087083	RALLS CO. R-II	0.0	0.0	2.4	37.3	54.2	6.0	2.4	60.2	231.9
078003	PEMISCOT CO. R-III	0.0	0.0	7.1	35.7	42.9	14.3	7.1	57.1	232.1
097130	SLATER	0.0	6.5	6.5	16.1	58.1	12.9	12.9	71.0	232.3
046130	MOUNTAIN VIEW-BIRCH TREE R-III	0.0	0.8	7.6	29.4	50.4	11.8	8.4	62.2	232.4
021149	BRUNSWICK R-II	0.0	0.0	0.0	35.0	65.0	0.0	0.0	65.0	232.5
050002	GRANDVIEW R-II	0.0	0.0	3.2	36.5	52.4	7.9	3.2	60.3	232.5
049144	WEBB CITY R-VII	1.7	1.4	5.6	32.6	47.0	13.3	7.0	60.4	232.6
017122	TINA-AVALON R-II	6.3	0.0	0.0	46.7	40.0	13.3	0.0	53.3	233.3
032056	UNION STAR R-II	0.0	0.0	0.0	44.4	44.4	11.1	0.0	55.6	233.3
039133	WILLARD R-II	0.4	0.8	4.5	35.2	46.2	13.3	5.3	59.5	233.3
068075	CLARKSBURG C-2	0.0	0.0	8.3	25.0	58.3	8.3	8.3	66.7	233.3
082105	BONCL R-X	0.0	0.0	0.0	33.3	66.7	0.0	0.0	66.7	233.3
001091	KIRKSVILLE R-III	1.0	2.0	8.2	28.1	44.4	17.3	10.2	61.7	233.4
039135	ASH GROVE R-IV	0.0	0.0	5.5	32.7	50.9	10.9	5.5	61.8	233.6
047060	SOUTH IRON CO. R-I	0.0	0.0	7.1	28.6	53.6	10.7	7.1	64.3	233.9
094086	CENTRAL R-III	0.0	0.7	3.5	30.6	57.6	7.6	4.2	65.3	234.0
074197	NORTH NODAWAY CO. R-VI	0.0	0.0	6.3	31.3	50.0	12.5	6.3	62.5	234.4
064074	PALMYRA R-I	1.3	1.4	8.1	25.7	50.0	14.9	9.5	64.9	234.5
011082	ST. JOSEPH	1.8	1.5	6.3	28.0	49.9	14.3	7.8	64.2	234.6
066105	SCHOOL OF THE OSAGE R-II	0.8	0.0	4.3	33.3	51.3	11.1	4.3	62.4	234.6
051156	LEETON R-X	0.0	0.0	0.0	39.1	52.2	8.7	0.0	60.9	234.8
010087	SOUTHERN BOONE CO. R-I	1.0	0.0	7.3	29.2	50.0	13.5	7.3	63.5	234.9
043001	HICKORY CO. R-I	4.8	1.7	6.7	28.3	46.7	16.7	8.3	63.3	235.0

089088	HARDIN-CENTRAL C-2	0.0	0.0	5.0	25.0	65.0	5.0	5.0	70.0	235.0
036126	MERAMEC VALLEY R-III	5.6	0.7	5.5	31.5	47.4	14.9	6.2	62.3	235.1
050012	FOX C-6	0.3	0.6	4.1	33.0	49.4	13.0	4.6	62.4	235.1
088072	NORTHEAST RANDOLPH CO. R-IV	0.0	0.0	8.1	27.0	51.4	13.5	8.1	64.9	235.1
024086	KEARNEY R-I	1.4	0.9	5.0	32.9	45.2	16.0	5.9	61.2	235.2
093120	APPLETON CITY R-II	0.0	2.6	2.6	21.1	68.4	5.3	5.3	73.7	235.5
096091	ROCKWOOD R-VI	0.7	1.9	6.1	28.0	47.5	16.6	7.9	64.1	235.5
013054	BRECKENRIDGE R-I	0.0	0.0	0.0	28.6	71.4	0.0	0.0	71.4	235.7
027058	OTTERVILLE R-VI	0.0	0.0	0.0	35.7	57.1	7.1	0.0	64.3	235.7
074190	WEST NODAWAY CO. R-I	0.0	0.0	14.3	23.8	38.1	23.8	14.3	61.9	235.7
076081	OSAGE CO. R-I	0.0	0.0	9.5	28.6	42.9	19.0	9.5	61.9	235.7
077100	THORNFIELD R-I	0.0	0.0	0.0	42.9	42.9	14.3	0.0	57.1	235.7
048071	LEE'S SUMMIT R-VII	1.0	0.6	5.1	28.7	52.8	12.8	5.7	65.6	236.0
017126	NORBORNE R-VIII	0.0	9.1	9.1	9.1	45.5	27.3	18.2	72.7	236.4
032054	OSBORN R-O	0.0	0.0	0.0	45.5	36.4	18.2	0.0	54.5	236.4
088080	WESTRAN R-I	0.0	0.0	8.5	28.8	44.1	18.6	8.5	62.7	236.4
106002	TANEYVILLE R-II	0.0	0.0	15.2	21.2	39.4	24.2	15.2	63.6	236.4
016090	JACKSON R-II	0.3	1.0	5.9	29.5	45.8	17.7	6.9	63.5	236.6
022089	NIXA R-II	0.3	1.3	7.3	27.2	45.4	18.8	8.6	64.2	236.6
048075	LONE JACK C-6	0.0	0.0	0.0	35.5	54.8	9.7	0.0	64.5	237.1
024091	MISSOURI CITY 56	0.0	0.0	0.0	25.0	75.0	0.0	0.0	75.0	237.5
033094	NORTH WOOD R-IV	0.0	0.0	0.0	41.7	41.7	16.7	0.0	58.3	237.5
041005	RIDGEWAY R-V	0.0	0.0	0.0	37.5	50.0	12.5	0.0	62.5	237.5
036134	SPRING BLUFF R-XV	0.0	0.0	8.0	28.0	44.0	20.0	8.0	64.0	238.0
060077	MCDONALD CO. R-I	1.5	3.5	6.5	23.8	42.7	23.5	10.0	66.2	238.1
061150	ATLANTA C-3	0.0	0.0	0.0	23.8	76.2	0.0	0.0	76.2	238.1
075084	COUCH R-I	0.0	0.0	9.5	23.8	47.6	19.0	9.5	66.7	238.1
047062	ARCADIA VALLEY R-II	1.1	2.2	6.7	24.7	44.9	21.3	9.0	66.3	238.2
050006	FESTUS R-VI	0.5	1.0	5.4	26.0	51.5	16.2	6.4	67.6	238.2
054042	SANTA FE R-X	0.0	0.0	0.0	34.3	54.3	11.4	0.0	65.7	238.6
039142	FAIR GROVE R-X	1.4	0.0	8.8	17.6	60.3	13.2	8.8	73.5	239.0
090076	SOUTHERN REYNOLDS CO. R-II	0.0	0.0	2.4	31.7	51.2	14.6	2.4	65.9	239.0
076082	OSAGE CO. R-II	0.0	0.0	1.8	29.1	58.2	10.9	1.8	69.1	239.1
028101	CRAWFORD CO. R-I	0.0	1.6	3.3	27.9	49.2	18.0	4.9	67.2	239.3

003031	TARKIO R-I	0.0	0.0	15.8	10.5	52.6	21.1	15.8	73.7	239.5
081094	ST. JAMES R-I	1.6	2.5	0.8	23.3	61.7	11.7	3.3	73.3	239.6
113001	WORTH CO. R-III	0.0	4.2	4.2	16.7	58.3	16.7	8.3	75.0	239.6
046132	RICHARDS R-V	2.5	0.0	2.6	33.3	46.2	17.9	2.6	64.1	239.7
081095	NEWBURG R-II	0.0	0.0	2.2	28.3	56.5	13.0	2.2	69.6	240.2
096101	BRENTWOOD	1.3	0.0	6.4	24.4	51.3	17.9	6.4	69.2	240.4
019140	STRASBURG C-3	0.0	0.0	0.0	54.5	9.1	36.4	0.0	45.5	240.9
096090	PATTONVILLE R-III	2.9	0.7	7.0	22.8	48.3	21.2	7.7	69.5	241.1
070092	WELLSVILLE MIDDLETOWN R-I	0.0	0.0	5.9	26.5	47.1	20.6	5.9	67.6	241.2
057002	ELSBERRY R-II	1.5	0.0	0.0	25.0	67.2	7.8	0.0	75.0	241.4
063067	MARIES CO. R-II	1.6	0.0	4.8	25.8	50.0	19.4	4.8	69.4	241.9
033091	OAK HILL R-I	0.0	0.0	0.0	33.3	44.4	22.2	0.0	66.7	244.4
103129	ADVANCE R-IV	0.0	0.0	0.0	37.9	34.5	27.6	0.0	62.1	244.8
099082	SCOTLAND CO. R-I	2.5	0.0	0.0	30.8	48.7	20.5	0.0	69.2	244.9
101105	WINONA R-III	0.0	0.0	0.0	24.4	60.0	15.6	0.0	75.6	245.6
050007	JEFFERSON CO. R-VII	0.0	1.4	2.9	21.4	51.4	22.9	4.3	74.3	245.7
021148	NORTHWESTERN R-I	0.0	0.0	8.3	25.0	33.3	33.3	8.3	66.7	245.8
089080	LAWSON R-XIV	0.0	0.0	0.0	25.6	57.0	17.4	0.0	74.4	245.9
112101	FORDLAND R-III	0.0	1.9	1.9	13.5	67.3	15.4	3.8	82.7	246.2
100064	KELSO C-7	0.0	0.0	0.0	28.6	50.0	21.4	0.0	71.4	246.4
111086	GREENVILLE R-II	0.0	0.0	9.1	18.2	43.6	29.1	9.1	72.7	246.4
008107	WARSAW R-IX	0.0	0.0	2.2	27.5	45.1	25.3	2.2	70.3	246.7
036136	ST. CLAIR R-XIII	1.6	0.0	2.7	22.4	53.6	21.3	2.7	74.9	246.7
084003	HALFWAY R-III	0.0	0.0	5.9	17.6	52.9	23.5	5.9	76.5	247.1
096106	LADUE	2.1	0.9	3.5	21.9	47.8	25.9	4.4	73.7	247.1
047064	BELLEVIEW R-III	0.0	5.6	5.6	11.1	44.4	33.3	11.1	77.8	247.2
080122	PETTIS CO. R-XII	0.0	0.0	0.0	21.7	60.9	17.4	0.0	78.3	247.8
092091	ST. CHARLES CO. R-V	1.0	1.1	4.2	17.9	51.6	25.3	5.3	76.8	247.9
083001	NORTH PLATTE CO. R-I	0.0	0.0	3.5	21.1	50.9	24.6	3.5	75.4	248.2
077102	GAINESVILLE R-V	2.3	0.0	0.0	23.3	55.8	20.9	0.0	76.7	248.8
002090	AVENUE CITY R-IX	0.0	0.0	0.0	9.1	81.8	9.1	0.0	90.9	250.0
007126	HUDSON R-IX	0.0	0.0	0.0	16.7	66.7	16.7	0.0	83.3	250.0
013057	NEW YORK R-IV	0.0	0.0	0.0	20.0	60.0	20.0	0.0	80.0	250.0
013060	MIRABILE C-1	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0	250.0

032058	STEWARTSVILLE C-2	0.0	0.0	0.0	26.3	47.4	26.3	0.0	73.7	250.0
040103	PLEASANT VIEW R-VI	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0	250.0
091095	RIPLEY CO. R-III	0.0	7.7	7.7	0.0	46.2	38.5	15.4	84.6	250.0
104043	CRANE R-III	0.0	0.0	0.0	22.0	52.5	25.4	0.0	78.0	251.7
114112	NORWOOD R-I	8.3	0.0	9.1	15.2	36.4	39.4	9.1	75.8	253.0
077101	BAKERSFIELD R-IV	0.0	0.0	0.0	18.2	54.5	27.3	0.0	81.8	254.5
007125	HUME R-VIII	0.0	0.0	0.0	10.0	70.0	20.0	0.0	90.0	255.0
074195	JEFFERSON C-123	0.0	0.0	0.0	10.0	70.0	20.0	0.0	90.0	255.0
043004	HERMITAGE R-IV	3.7	0.0	0.0	7.7	73.1	19.2	0.0	92.3	255.8
073105	WESTVIEW C-6	0.0	0.0	0.0	24.0	40.0	36.0	0.0	76.0	256.0
014130	SOUTH CALLAWAY CO. R-II	0.0	0.0	0.0	12.1	59.1	28.8	0.0	87.9	258.3
051153	CHILHOWEE R-IV	0.0	0.0	0.0	0.0	81.8	18.2	0.0	100.0	259.1
065096	NORTH MERCER CO. R-III	0.0	0.0	0.0	9.1	63.6	27.3	0.0	90.9	259.1
078004	COOTER R-IV	0.0	0.0	0.0	9.1	63.6	27.3	0.0	90.9	259.1
099078	GORIN R-III	0.0	0.0	0.0	18.2	45.5	36.4	0.0	81.8	259.1
031116	PATTONSBURG R-II	0.0	0.0	0.0	0.0	77.8	22.2	0.0	100.0	261.1
007124	RICH HILL R-IV	0.0	0.0	0.0	9.4	53.1	37.5	0.0	90.6	264.1
085049	CROCKER R-II	2.5	0.0	0.0	7.7	56.4	35.9	0.0	92.3	264.1
061158	MACON CO. R-IV	0.0	0.0	0.0	16.7	33.3	50.0	0.0	83.3	266.7
038045	STANBERRY R-II	0.0	0.0	0.0	7.1	50.0	42.9	0.0	92.9	267.9
003032	ROCK PORT R-II	0.0	0.0	0.0	4.3	39.1	56.5	0.0	95.7	276.1
042121	MONTROSE R-XIV	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0	300.0

## **Section 3.**

### **LWS Correlation at a Glance**

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	LWS Resource			
	ST20 - Physical Science	ST21 - Life Science	ST22 - Earth Science	ST23 - Scientific Reasoning
Elementary Science Standard Element				
Scientific Inquiry				
Scientific Relevance				
Matter and Energy				
Force, Motion and Mechanical Energy				
Universe				
Earth Systems				
Living Systems				
Ecology				

## **Section 4.**

# **LWS Assignment Correlation**

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**Elementary Science Standards Statement**

Living with Science Resource							
Physical Science 1	Physical Science 2	Life Science 1	Life Science 2	Earth Science 1	Earth Science 2	Scientific Reasoning 1	Scientific Reasoning 2

**Scientific Inquiry**

Tools, especially measuring, magnifying, and photographic ones, can give more information than by observing only using the senses.	11		6		13		1,5,21	1,21
Sometimes two people can observe the same object or event and describe it differently.	20	20	20	20	20	20	20	20
Words, pictures, numbers, models, and sounds can be used to describe objects and events.	5						20	2,21
Using tools, following directions, and asking for suggestions are helpful in building something or getting something to work better.								4,5,8,21
Objects and events are often observed and described quantitatively.	1	8	8	21	21		1,13	1,21,22
The accuracy of measurements is very important as inaccuracy often produces questionable results.							1,5,11,21	21,22
Additional, more careful observations resolve different explanations for the same event.								22
Graphs, charts, maps, equations, and oral and written reports can be used to share the results of a scientific investigation and facilitate its discussion.	20	8,21	20	20	20	20	20	8,21
Problems can often be solved by physically altering specific components of a mechanical or biological system and observing the consequences.							8	
The breadth and style of investigations depend on the questions asked.								

Most experiments involve changing something and then repeatedly comparing it to something similar that has not been changed.				4				
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### Scientific Relevance

Tools that have been invented affect all areas of life.								
When people want to build something or try something new, they should try to figure out ahead of time how this might affect all living things and environments.								
Technology extends the ability of people to change the way things work.								
Technological solutions to problems often have drawbacks as well as benefits.								
Throughout human history, technological innovations have played an important role in improving the quality of life.								
Advances in science and technology are occurring at a faster rate today than in the past.								
Science is a way to solve problems; everybody can do scientific activities, discover some things about nature, and invent things and ideas.	2,6,7	5	2,3	5,6	6,7	1	4	
Science requires many different kinds of activities, involving men and women of all ages and backgrounds.								

### Matter and Energy

Observable properties are used to identify objects.	4,11,13,21	11					3,7	7
Matter has physical properties that can change.								1,3,21
Mixtures are composed of different kinds of matter, each with distinct properties.						7		
The sun is the primary source of light and heat for the Earth.					3	6		
Energy can be converted into different forms.	7,13	2,7					11	
Sound is a form of energy that results from vibrations in matter. Sound has the qualities of loudness and pitch.	3,7,11	3,7,11,21						
Some of the sun's light is transformed into heat when it hits objects.						6		
Electricity can be converted into light, heat, sound, magnetism, or mechanical motion.	7	2,7					6	

Friction produces heat.		1,7,11					
Sound travels at different rates through different materials.	3,11	3					
Light spreads from a source and travels in straight lines. Light can be transmitted, reflected, refracted, or absorbed by different materials.	4	4,11,12,21					
Objects that give off light may also give off heat.	7				6,14		
Heat causes materials to increase in temperature and feel warmer, or change state (gas, liquid, or solid).							3
Warm objects lose heat to cooler ones until they reach the same temperature.	7	13					3,11
Different types of matter conduct heat at different rates.		13					

### Force, Motion and Mechanical Energy

An object's position can be describe drelative to another object (above, below, left of, right of, behind, or in front).					2		
An object's motion can be described in terms of another object (e.g., faster, slower) and how its position changes over time.	5						
Forces explain many kinds of motion (e.g., stopping, starting falling, straight, zigzag, circular, vibrational).	1,5,7						
Force is any push or pull exerted by one object on another.	1,5,11,13						
Weight is a measurement of the attraction of gravity on a mass. Mass is the amount of matter of an object.	5,21	13					7,21
Forces can be mechanical, gravitational, magnetic, or electrostatic.	2,5	2,7				4	
Magnets attract and repel each other and certain kinds of metals.	2,11,21						
The movement of an object depends on the force applied and how much mass it has.	5						
An unbalanced force causes an object to change speed or direction. The magnitude of the change in speed or direction depends on the amount of force applied and the mass of the object.						8,21	
Simple machines are used to change the direction of an applied force and provide the mechanical advantage needed to move objects.						4,8,11	2

**Universe**

Earth is not alone in the universe. Most of the objects in the universe are separated by enormous distances.						2		
The sun, moon, and stars have recurring patterns.					3,6	2		
Constellations are patterns of stars.								
Earth is in our solar system and has unique properties.					3,6		13	
Earth rotates on a tilted axis and revolves around the sun. This combination causes changes in the amount of sunlight reaching the Earth's surface and makes our seasons.					3	2,6,21		
Objects in the sky move.								
Earth makes a full rotation on its axis every 24 hours that causes the day/ night cycle.					2			
Patterns of movement of some objects in the sky are cyclic.					6			
The motion and positions of objects in the solar system are observable phenomena that can be explained.						2		
Recurring predictable movements of the Earth and moon can be used to measure time.					21			
Different constellations can be seen in different seasons.								
The sun, moon, stars, and planets appear to move from east to west each day.					2,6	6		
Special clothing and equipment must be used by people who travel into space.								
Telescopes and satellite imaging allow scientists to observe features and structures of some objects in the sky.								
Space exploration has provided many benefits to humankind.								

**Earth Systems**

Water reaches Earth in different forms (snow, hail, rain, fog, etc.).						3,21		
Earth's natural resources are limited.						21	2,7,11	
Earth's surface is composed of rocks, soils, water, and living organisms. Differences in these components can be used to classify them.				3,7,21	1,5	4,11,21		
The atmosphere has physical properties that are measurable and predictable.					3,7,13	21		
Fossils provide evidence of plants and animals that lived long ago and the environment in which they lived.					8,11,21			
Water is a valuable natural resource essential to all life.				4,6		21		
Rocks, minerals, and soil have physical characteristics by which they can be classified.			8		5	4		
Soil composition varies from location to location and affects the type of plants that grow in that location.				4,6,8,13,21				
Water is stored all over Earth.						3,21		
Rocks change over time by weathering.						4,8		
Earth's rotation causes a day and night cycle.					2,11	21		
Seasons and changes in weather affect human and animal activity and plant growth.				21	3,7,11	21		
The surface of Earth changes slowly (e.g., erosion, weathering) or quickly (e.g., earthquakes, floods, rock/mud slides, volcanic activity).						21		
Water condenses, evaporates, and exists as a gas liquid or solid on Earth and in the air.						3,21	21	
Earth's surface features are continually changing.						21		

### Living Systems

Observable characteristics of living organisms can be used to sort and group them.				3,11,21				
Organisms differ in structure and function and have characteristics that help them survive and reproduce in different environments.				22		1,11,21		
Plants and animals are alive and have characteristics that make them different from nonliving matter.					1			
Organisms go through life cycles.			2,3,11,2 1					
Most organisms require a variety of materials including food, water, air, and a suitable environment for survival. Animals obtain energy and nutrients from plants or other animals.			4,21	5,6,7				
Organisms are composed of parts that work together and exhibit behaviors that ensure the survival of the whole organism.			1,5,7	13				
Organisms can be grouped by specific structures.				3,21				
Some characteristics of organisms are inherited and some are acquired as a result of interaction with the environment.			22					
Most offspring are similar but not exactly like their parents.			22					
Organisms resemble their parents because they inherit physical characteristics from them. Organisms with two parents inherit characteristics of both.			22					
All types of living organisms have offspring, and the similarities between parents and their offspring become more apparent as the offspring mature.			22					
The phases in the life cycle of all living organisms are predictable, but differ from species to species.			2,3,11,2 1					
Organisms have parts that enable them to live and survive in the world.						1,21		
Organisms of the same species can have variations that provide an advantage in survival and reproducing.				22				
Fossils give evidence that organisms that lived in the past were both similar to and different from present day organisms.					8,21			

**Ecology**

All living organisms interact with each other and their environment.			4,21	7				
All organisms depend on one another and their environment to live and grow.								
People depend on other organisms and Earth's resources for clothing, shelter, and food.							7,13	
Behavior patterns and survival of organisms result from their interactions with a specific environment.						1		
Organisms interact with each other as producer/consumer, scavenger, predator/prey, parasite/host, decomposer, etc.			4	7				
Interactions between organisms and their environment contribute to continuous cycling of matter and energy.				7				
All organisms, including humans, cause changes in their environments that can be either beneficial or harmful to the organisms in the ecosystem.				22	1,11			
Organisms that survive in an environment have developed adaptations that allow the organisms to compete for available resources and cope with the physical conditions of their environment.				22				
Human activities can change the environment in ways that affect the health and survival of all living organisms.					1	5,13		
Changes in an environment, caused naturally or by humans, can be beneficial or harmful to the organisms living in that environment.				22	21			

## **Section 5.**

# **LWS Objectives Correlation**

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## Missouri K-4 Science Standards

- 1 Scientific Inquiry**
- 1 Tools, especially measuring, magnifying, and photographic ones, can give more information than by observing only using the senses.**  
*Students identify tools that could be used in measurement of physical phenomena.*  
*Identifies units of measurement that would be most suitable for measuring a series of different items.*  
*Identifies that pushes and pulls are forces that can be measured in newtons.*  
*Uses non-standard measurements, such as paper clips and hands, to measure different objects.*  
*Uses an analogue light meter to measure light levels in a room.*  
*Measures temperature using thermometers.*  
*Identifies symbols and instruments which can be used to represent and measure the weather.*  
*Identifies the parts and controls of a microscope.*  
*Uses a motion sensor to measure distances.*  
*Uses a microscope to view the cells of plants.*
- 2 Sometimes two people can observe the same object or event and describe it differently.**  
*Debates issues that relate to science.*  
*Debates issues that relate to physical science.*  
*Debates issues that relate to Earth and space science.*  
*Debates issues that relate to life science.*
- 3 Words, pictures, numbers, models, and sounds can be used to describe objects and events.**  
*Makes a presentation on science.*  
*Writes a report on science.*  
*Creates a science poster.*  
*Critiques written and oral explanations of science.*  
*Uses a model of the Earth to identify the changes in time between different time zones.*  
*Constructs models from three different designs and compares the advantages and disadvantages of each design.*  
*Observes how a varying incline effects the speed of a model car.*  
*Changes the size and shape of a wing of a model aeroplane to see the effect in the lift given.*  
*Debates issues that relate to science.*
- 4 Using tools, following directions, and asking for suggestions are helpful in building something or getting something to work better.**  
*Constructs a pendulum to observe the relationship between pendulum weight and length with its swing time.*  
*Constructs models from three different designs and compares the advantages and disadvantages of each design.*  
*Constructs a windlass to observe that a gear will increase the amount of lift for each turn of its handle.*  
*Constructs a bridge to span a gap.*

- 5 Objects and events are often observed and described quantitatively.**  
*Measures temperature using thermometers.  
Identifies units of measurement that would be most suitable for measuring a series of different items.  
Investigates the pH levels of virtual fields to find which field is most suitable to grow crops.  
Students identify tools that could be used in measurement of physical phenomena.  
Identifies units of measurement that would be most suitable for measuring a series of different items.  
Measures pulling forces using a newton meter.  
Uses a motion sensor to measure distances.  
Experiments with actions that effect heart rate and creates a table to record their results.  
Measures and compares the heat insulation properties of different materials.  
Records rainfall information into a table and constructs a bar chart of the results.  
Identifies how the level of light can be measured.*
- 6 The accuracy of measurements is very important as inaccuracy often produces questionable results.**  
*Students identify tools that could be used in measurement of physical phenomena.  
Uses non-standard measurements, such as paper clips and hands, to measure different objects.  
Identifies units of measurement that would be most suitable for measuring a series of different items.  
Uses a digital light meter to measure light levels in a room.  
Identifies different ways to measure things.  
Uses a ruler and a motion sensor to measure height.  
Uses an analogue light meter to measure light levels in a room.*
- 7 Additional, more careful observations resolve different explanations for the same event.**  
*Students analyze experimental data to identify if the hypothesis is disproved or supported.  
Students state whether an experiment tests a hypothesis.  
Students reorder data into logical sequences to identify patterns in results.*

- 8 **Graphs, charts, maps, equations, and oral and written reports can be used to share the results of a scientific investigation and facilitate its discussion.**  
*Writes a report about a life science topic.*  
*Compares the heat loss in different materials using graphs.*  
*Records rainfall information into a table and constructs a bar chart of the results.*  
*Displays results from a friction experiment in a series of bar charts.*  
*Experiments with actions that effect heart rate and creates a table to record their results.*  
*Writes a report about a physical science topic.*  
*Critiques written and oral explanations of a physical science.*  
*Debates issues that relate to life science.*  
*Critiques written and oral explanations of a life science.*  
*Writes a report about an Earth and space science topic.*  
*Debates issues that relate to Earth and space science.*  
*Critiques written and oral explanations of an Earth and space science.*  
*Writes a report on science.*  
*Debates issues that relate to science.*  
*Critiques written and oral explanations of science.*  
*Debates issues that relate to physical science.*  
*Uses graphs to plot the change of temperature over periods of time.*
- 9 **Problems can often be solved by physically altering specific components of a mechanical or biological system and observing the consequences.**  
*Modifies a crawler to change the direction it moves in.*  
*Modifies a crawler so that it can store enough energy to reach the top of a slope.*  
*Finds the effects of giving a crawler more energy.*
- 10 **The breadth and style of investigations depend on the questions asked.**  
*N/A*
- 11 **Most experiments involve changing something and then repeatedly comparing it to something similar that has not been changed.**  
*Observes the growth of a plant when grown under different watering conditions.*  
*Observes the growth of a plant when grown under different temperature conditions.*  
*Describes different forms of climate control used to grow plants.*
- 2 **Scientific Relevance**
- 1 **Tools that have been invented affect all areas of life.**  
*N/A*
- 2 **When people want to build something or try something new, they should try to figure out ahead of time how this might affect all living things and environments.**  
*N/A*

- |   |                                 |  |
|---|---------------------------------|--|
| 3 | <p><b>Matter and Energy</b></p> | <p>3 <b>Technology extends the ability of people to change the way things work.</b><br/><i>N/A</i></p> <p>4 <b>Technological solutions to problems often have drawbacks as well as benefits.</b><br/><i>N/A</i></p> <p>5 <b>Throughout human history, technological innovations have played an important role in improving the quality of life.</b><br/><i>N/A</i></p> <p>6 <b>Advances in science and technology are occurring at a faster rate today than in the past.</b><br/><i>N/A</i></p> <p>7 <b>Science is a way to solve problems; everybody can do scientific activities, discover some things about nature, and invent things and ideas.</b><br/><i>Discovers the habitats of different animals.</i><br/><i>Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.</i><br/><i>Using software, discovers the different stages in the life cycle of butterflies and frogs.</i><br/><i>Uses a board-game to discover the stages in the life cycle of a plant.</i><br/><i>Discovers the food groups necessary for a healthy balanced diet.</i><br/><i>Uses software to discover facts about the Moon and its relation to the Earth.</i><br/><i>Uses software to discover the different phases of the Moon.</i><br/><i>Discovers symbols that are used to represent the weather.</i><br/><i>Discovers the effect of forces on a lever.</i><br/><i>Discovers that electricity cannot flow unless a circuit is complete.</i><br/><i>Discovers that materials containing iron stick to magnets.</i><br/><i>Uses software to discover methods of seeds dispersal from different plants.</i><br/><i>Discovers the effects that sunlight and water have on the growth of plants.</i><br/><i>Students identify how living organisms have adapted to become suited to the environment in which they grow.</i><br/><i>Discovers the elastic properties of metal springs.</i><br/><i>Using software, discovers the different stages of the human life cycle.</i></p> <p>8 <b>Science requires many different kinds of activities, involving men and women of all ages and backgrounds.</b><br/><i>N/A</i></p> <p>1 <b>Observable properties are used to identify objects.</b><br/><i>Identifies the weight of objects in units of newtons and places them in order of their weight.</i><br/><i>Determines if objects are transparent or opaque using a light ray box.</i></p> |
|---|---------------------------------|--|

- 2 Matter has physical properties that can change.**  
*States if changes in different materials, caused by heating and cooling, can be reversed.*  
*Interprets text and diagrams to identify changes that are physical or chemical and useful things that can result from those changes.*  
*Uses graphs to plot the change of temperature over periods of time.*
- 3 Mixtures are composed of different kinds of matter, each with distinct properties.**  
*Separates mixtures using a sieve.*  
*Separates solids and liquids using filter paper.*
- 4 The sun is the primary source of light and heat for the Earth.**  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*  
*States the effects that the Sun has on the light levels on the planets of the solar system.*
- 5 Energy can be converted into different forms.**  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*  
*Identifies different types of energy.*  
*Identifies renewable and non-renewable energy sources.*  
*Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.*  
*Uses flow diagrams to track the conversion of energy.*  
*Observes the change from kinetic energy into heat and sound energy when rubbing hands together.*  
*Discovers that a dynamo can be used to convert kinetic energy into electrical energy.*

- 6 Sound is a form of energy that results from vibrations in matter. Sound has the qualities of loudness and pitch.**  
*Identifies that sound travels as a vibration by speaking into a balloon.*  
*Predicts how the pitch of sound produced by a vibrating object changes with object size.*  
*Observes the change from kinetic energy into heat and sound energy when rubbing hands together.*  
*Observes the relationship between volume of air and pitch of sound made by a percussion instrument.*  
*Observes the relationship between length of tube and pitch of sound made by a wind instrument.*  
*Observes the relationship between length of rubber band and pitch of sound made by a stringed instrument.*  
*Identifies that sound travels as a vibration and so can travel through solids.*  
*Identifies that sound travels through string as a vibration by using a string telephone.*  
*Identifies how the size of a vibration can effect the loudness of a sound.*  
*Identifies that the volume of a sound changes as the distance from the source of the sound is increased.*  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*
- 7 Some of the sun's light is transformed into heat when it hits objects.**  
*States the effects that the Sun has on the light levels on the planets of the solar system.*  
*Observes the effect that distance has on light levels.*
- 8 Electricity can be converted into light, heat, sound, magnetism, or mechanical motion.**  
*Uses a bar magnet and an electromagnet to find the differences and similarities between them.*  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*  
*Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.*  
*Uses flow diagrams to track the conversion of energy.*
- 9 Friction produces heat.**  
*Describes the friction force that occurs between two surfaces.*  
*Observes the change from kinetic energy into heat and sound energy when rubbing hands together.*  
*Compares the force of friction between different materials.*  
*Observes the force of friction.*

- 10 Sound travels at different rates through different materials.**  
*Identifies that sound travels as a vibration by speaking into a balloon.*  
*Identifies that sound travels through string as a vibration by using a string telephone.*  
*Identifies that sound travels as a vibration and so can travel through solids.*  
*Observes the relationship between length of rubber band and pitch of sound made by a stringed instrument.*  
*Observes the relationship between length of tube and pitch of sound made by a wind instrument.*  
*Observes the relationship between volume of air and pitch of sound made by a percussion instrument.*
- 11 Light spreads from a source and travels in straight lines. Light can be transmitted, reflected, refracted, or absorbed by different materials.**  
*Uses lenses to bend light rays.*  
*Describes the behaviour of light.*  
*Observes the mixing of coloured light to make other colours, including the making of white light.*  
*Determines if objects are transparent or opaque using a light ray box.*  
*Uses a triangular prism to split white light into the colors from which it is composed.*  
*Recognises the lenses that bend light rays.*  
*Identifies objects around the classroom that are light sources.*
- 12 Objects that give off light may also give off heat.**  
*Relates the position of a planet in the solar system to the amount of light it receives.*  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*  
*States the effects that the Sun has on the light levels on the planets of the solar system.*
- 13 Heat causes materials to increase in temperature and feel warmer, or change state (gas, liquid, or solid).**  
*States if changes in different materials, caused by heating and cooling, can be reversed.*  
*Describes the changes that occur in different materials when they are heated.*  
*Describes the changes that occur in different materials when they are cooled.*

- 14 Warm objects lose heat to cooler ones until they reach the same temperature.**  
*Describes the changes that occur in different materials when they are heated.*  
*Identifies the changes that happen to materials when they are heated and cooled.*  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*  
*Describes how heat insulators and heat conductors lose heat.*  
*Describes the changes that occur in different materials when they are cooled.*  
*States if changes in different materials, caused by heating and cooling, can be reversed.*
- 15 Different types of matter conduct heat at different rates.**  
*Describes how heat insulators and heat conductors lose heat.*
- 1 Observable properties are used to identify objects.**  
*Determines that the parts of a mirror do not create a reflection until they are combined and identifies objects around the classroom that give reflections.*  
*Describes how density of an object can effect if it floats or sinks in water.*  
*Predicts how the pitch of sound produced by a vibrating object changes with object size.*  
*Identifies what natural materials have been used to make a series of sample objects.*  
*Tests a series of different objects to find if they are flexible, inflexible or elastic.*  
*Identifies if objects are electrical conductors or electrical insulators.*  
*Identifies the attraction and repulsion between magnets and other objects.*  
*Identifies objects around the classroom that are light sources.*
- 4 Force, Motion and Mechanical Energy**
- 1 An object's position can be describe drelative to another object (above, below, left of, right of, behind, or in front).**  
*States the position of the planets in the solar system.*
- 2 An object's motion can be described in terms of another object (e.g., faster, slower) and how its position changes over time.**  
*Observes how a varying incline effects the speed of a model car.*  
*Measures the effect that the force of gravity has on a mass placed on an inclined plane.*
- 3 Forces explain many kinds of motion (e.g., stopping, starting falling, straight, zigzag, circular, vibrational).**  
*States if illustrated movements are pushes or pulls.*  
*Observes how a varying incline effects the speed of a model car.*  
*Measures the effect that the force of gravity has on a mass placed on an inclined plane.*  
*Uses a model car on a track to find when the car has enough energy to travel over a hill.*

- 4 Force is any push or pull exerted by one object on another.**  
*Describes the effect of pushing and pulling forces.  
States if illustrated movements are pushes or pulls.  
Measures pulling forces using a newton meter.  
Squashes a ball and stretches a spring to observe the effects of pushing and pulling forces.  
Identifies that pushes and pulls are forces that can be measured in newtons.*
- 5 Weight is a measurement of the attraction of gravity on a mass. Mass is the amount of matter of an object.**  
*Measures the effect that the force of gravity has on a mass placed on an inclined plane.  
Determines the effect of air resistance on an object when gravity is pulling the object towards the ground.  
Relates the weight, shape and size of a material to its density.  
Identifies the weight of objects in units of newtons and places them in order of their weight.  
Predicts that the stretch of a spring is proportional to the weight placed on it.*
- 6 Forces can be mechanical, gravitational, magnetic, or electrostatic.**  
*Observes the magnetic attraction and repulsion forces between the poles of magnets.  
Squashes a ball and stretches a spring to observe the effects of pushing and pulling forces.  
Discovers the effect of forces on a lever.  
Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.  
Discovers that a dynamo can be used to convert kinetic energy into electrical energy.*
- 7 Magnets attract and repel each other and certain kinds of metals.**  
*Identifies the attraction and repulsion between magnets and other objects.  
Identifies everyday items that would stick to a magnet.  
Determines which materials stick to a magnet.  
Observes the magnetic attraction and repulsion forces between the poles of magnets.*
- 8 The movement of an object depends on the force applied and how much mass it has.**  
*Measures the effect that the force of gravity has on a mass placed on an inclined plane.*
- 9 An unbalanced force causes an object to change speed or direction. The magnitude of the change in speed or direction depends on the amount of force applied and the mass of the object.**  
*Interprets text and diagrams to identify if forces are balanced or unbalanced.  
Modifies a crawler to change the direction it moves in.*

5 Universe

- 10 Simple machines are used to change the direction of an applied force and provide the mechanical advantage needed to move objects.**  
*Modifies a crawler to change the direction it moves in.*  
*Uses wing flaps and rudders to control the direction of aeroplanes in the air.*  
*Discovers the effect of forces on a lever.*  
*Uses a lever to balance weights.*  
*Indicates how levers can be used to balance weights.*
- 1 Earth is not alone in the universe. Most of the objects in the universe are separated by enormous distances.**  
*States the position of the planets in the solar system.*  
*Recognises planets in the solar system.*
- 2 The sun, moon, and stars have recurring patterns.**  
*Uses software to discover facts about the Moon and its relation to the Earth.*  
*Uses software to discover the different phases of the Moon.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*  
*States the position of the planets in the solar system.*  
*Recognises planets in the solar system.*
- 3 Constellations are patterns of stars.**  
*N/A*
- 4 Earth is in our solar system and has unique properties.**  
*Identifies if materials come from the Earth, from plants or from animals.*  
*Uses software to discover facts about the Moon and its relation to the Earth.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*
- 5 Earth rotates on a tilted axis and revolves around the sun. This combination causes changes in the amount of sunlight reaching the Earth's surface and makes our seasons.**  
*States the effects that the Sun has on the light levels on the planets of the solar system.*  
*Observes the effect that distance has on light levels.*  
*States the position of the planets in the solar system.*  
*Recognises planets in the solar system.*  
*Observes the weather during different seasons in a virtual representation of New York.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*  
*Uses a model of the Earth to identify how the position of the Earth during different seasons effects the hours of daylight.*
- 6 Objects in the sky move.**  
*N/A*

- 7 **Earth makes a full rotation on its axis every 24 hours that causes the day/ night cycle.**  
*Uses software to find out why there is day and night.*  
*Uses a shadow trainer to find out why shadows change shape during the day.*
- 8 **Patterns of movement of some objects in the sky are cyclic.**  
*Uses software to discover facts about the Moon and its relation to the Earth.*  
*Uses software to discover the different phases of the Moon.*
- 9 **The motion and positions of objects in the solar system are observable phenomena that can be explained.**  
*Recognises planets in the solar system.*  
*States the position of the planets in the solar system.*
- 10 **Recurring predictable movements of the Earth and moon can be used to measure time.**  
*Uses a model of the Earth to identify the changes in time between different time zones.*
- 11 **Different constellations can be seen in different seasons.**  
*N/A*
- 12 **The sun, moon, stars, and planets appear to move from east to west each day.**  
*Uses a shadow trainer to find out why shadows change shape during the day.*  
*States the effects that the Sun has on the light levels on the planets of the solar system.*  
*Observes the effect that distance has on light levels.*  
*Uses software to discover facts about the Moon and its relation to the Earth.*  
*Uses software to discover the different phases of the Moon.*  
*Uses software to find out why there is day and night.*
- 13 **Special clothing and equipment must be used by people who travel into space.**  
*N/A*
- 14 **Telescopes and satellite imaging allow scientists to observe features and structures of some objects in the sky.**  
*N/A*
- 15 **Space exploration has provided many benefits to humankind.**  
*N/A*
- 6 **Earth Systems**
- 1 **Water reaches Earth in different forms (snow, hail, rain, fog, etc.).**  
*States the different forms of water in the water cycle.*  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*  
*Replicates and observes the stages of the water cycle.*

- 2 Earth's natural resources are limited.**  
*Identifies renewable and non-renewable energy sources.*  
*Identifies what natural materials have been used to make a series of sample objects.*  
*Identifies where different natural materials come from.*  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*  
*Uses a solar panel to generate electricity in a circuit.*  
*Identifies renewable and non-renewable energy sources.*
- 3 Earth's surface is composed of rocks, soils, water, and living organisms. Differences in these components can be used to classify them.**  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.*  
*Uses a checklist of the seven life processes to identify if things are living or not living.*  
*Classifies animals as carnivores, herbivores or omnivores.*  
*Creates questions in a classification key to sort a group of farmyard animals.*  
*Inserts questions into the correct places in a classification key so that it can be used to sort a series of dogs.*  
*Describes the different conditions for the formation of various rocks.*  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*  
*Uses classification keys to sort animals.*  
*Sorts rocks into sedimentary, metamorphic and igneous rock types.*  
*Uses a simple classification key to sort three different types of metal.*  
*States how different rocks are formed.*  
*Interprets text and diagrams to plan a fair experiment that tests how different soil types can effect the growth of a plant.*
- 4 The atmosphere has physical properties that are measurable and predictable.**  
*Interprets text and diagrams to identify physical, chemical and biological forms of weathering.*  
*Observes the weather during different seasons in a virtual representation of New York.*  
*Discovers symbols that are used to represent the weather.*  
*Uses a virtual weather station to record temperature and rainfall.*  
*Identifies symbols and instruments which can be used to represent and measure the weather.*
- 5 Fossils provide evidence of plants and animals that lived long ago and the environment in which they lived.**  
*Uses symbols to represent different types of fossil.*  
*Identifies fossil fuels and how they are made.*  
*Uses a virtual excavation to find different fossils.*  
*Uses software to find out how different types of fossils are formed.*

- 6 Water is a valuable natural resource essential to all life.**  
*Observes the growth of a plant when grown under different watering conditions.  
Discovers the effects that sunlight and water have on the growth of plants.  
Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*
- 7 Rocks, minerals, and soil have physical characteristics by which they can be classified.**  
*Describes the different conditions for the formation of various rocks.  
Uses litmus paper to find out if samples are acidic, basic or neutral.  
Uses a simple classification key to sort three different types of metal.  
Investigates the pH levels of virtual fields to find which field is most suitable to grow crops.  
Sorts rocks into sedimentary, metamorphic and igneous rock types.*
- 8 Soil composition varies from location to location and affects the type of plants that grow in that location.**  
*Observes the growth of a plant when grown under different watering conditions.  
Discovers the effects that sunlight and water have on the growth of plants.  
Observes the effects of tap water, salt water and fertiliser on the growth of plants in a nine day period.  
Identifies the nutrients plants use for growth.  
Interprets text and diagrams to plan a fair experiment that tests how different soil types can effect the growth of a plant.*
- 9 Water is stored all over Earth.**  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.  
Replicates and observes the stages of the water cycle.  
States the different forms of water in the water cycle.*
- 10 Rocks change over time by weathering.**  
*Describes the different conditions for the formation of various rocks.  
Sorts rocks into sedimentary, metamorphic and igneous rock types.  
Observes the effect of adding an insoluble material to a liquid.  
Tests if materials are soluble or insoluble.*
- 11 Earth's rotation causes a day and night cycle.**  
*Uses software to find out why there is day and night.  
Uses a shadow trainer to find out why shadows change shape during the day.  
Describes what causes day and night and what happens to shadows during the day.  
Uses a model of the Earth to identify how the position of the Earth during different seasons effects the hours of daylight.*

- 12 Seasons and changes in weather affect human and animal activity and plant growth.**  
*Interprets text and diagrams to plan a fair experiment that tests how different soil types can effect the growth of a plant.*  
*Interprets text and diagrams to identify physical, chemical and biological forms of weathering.*  
*Discovers symbols that are used to represent the weather.*  
*Uses a virtual weather station to record temperature and rainfall.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*  
*Uses a model of the Earth to identify how the position of the Earth during different seasons effects the hours of daylight.*  
*Observes the weather during different seasons in a virtual representation of New York.*  
*Identifies the seasons at different places on the Earth.*
- 13 The surface of Earth changes slowly (e.g., erosion, weathering) or quickly (e.g., earthquakes, floods, rock/mud slides, volcanic activity).**  
*Interprets text and diagrams to identify physical, chemical and biological forms of weathering.*
- 14 Water condenses, evaporates, and exists as a gas liquid or solid on Earth and in the air.**  
*States if everyday items are solids, liquids or gases.*  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*  
*Replicates and observes the stages of the water cycle.*  
*States the different forms of water in the water cycle.*
- 15 Earth's surface features are continually changing.**  
*Interprets text and diagrams to identify physical, chemical and biological forms of weathering.*
- 7 Living Systems**
- 1 Observable characteristics of living organisms can be used to sort and group them.**  
*Inserts questions into the correct places in a classification key so that it can be used to sort a series of dogs.*  
*Identifies questions that can be asked to sort different animals.*  
*Uses classification keys to sort animals.*  
*Creates questions in a classification key to sort a group of farmyard animals.*
- 2 Organisms differ in structure and function and have characteristics that help them survive and reproduce in different environments.**  
*Describes characteristics of animals habitats.*  
*Discovers the characteristics of animals that allow them to survive in their natural habitats.*  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.*  
*Discovers the habitats of different animals.*  
*Interprets text and diagrams to identify the habitats of different plants.*

- 3 Plants and animals are alive and have characteristics that make them different from nonliving matter.**  
*Uses a checklist of the seven life processes to identify if things are living or not living.*
- 4 Organisms go through life cycles.**  
*Compares the life cycles of animals and identifies similarities and differences between them.*  
*Uses a board-game to discover the stages in the life cycle of a plant.*  
*Using software, discovers the different stages of the human life cycle.*  
*Using software, discovers the different stages in the life cycle of butterflies and frogs.*  
*Identifies the stages in the life cycle of a plant.*  
*Compares the life cycles of plants and identifies similarities and differences between them.*
- 5 Most organisms require a variety of materials including food, water, air, and a suitable environment for survival. Animals obtain energy and nutrients from plants or other animals.**  
*Identifies the producers primary consumers and secondary consumers in food chains.*  
*Discovers the effects that sunlight and water have on the growth of plants.*  
*Discovers the food groups necessary for a healthy balanced diet.*  
*Identifies the nutrients contained in different foods.*  
*Uses a matching game to find what foods humans can obtain from plants.*  
*Uses a matching game to find what foods humans can obtain from animals.*  
*Students identify how populations can be affected by changes in a food chain.*  
*Identifies if everyday foods come from plants or animals.*
- 6 Organisms are composed of parts that work together and exhibit behaviors that ensure the survival of the whole organism.**  
*Identifies the parts of plants that help them to make their own food.*  
*Investigates the bones of the human body.*  
*Investigates the joints of the human body.*  
*Investigates the lungs of the human body.*  
*Investigates the stomach of the human body.*  
*Investigates the heart of the human body.*  
*Uses software to find what parts of the human body give each of the five senses.*
- 7 Organisms can be grouped by specific structures.**  
*Inserts questions into the correct places in a classification key so that it can be used to sort a series of dogs.*  
*Uses classification keys to sort animals.*  
*Creates questions in a classification key to sort a group of farmyard animals.*

- 8 Some characteristics of organisms are inherited and some are acquired as a result of interaction with the environment.**  
*Students identify that heredity traits are those that are passed between parent and offspring.*  
*Students identify the differences between learnt and inherited traits.*
- 9 Most offspring are similar but not exactly like their parents.**  
*Students identify the differences between learnt and inherited traits.*  
*Students identify that heredity traits are those that are passed between parent and offspring.*
- 10 Organisms resemble their parents because they inherit physical characteristics from them. Organisms with two parents inherit characteristics of both.**  
*Students identify that heredity traits are those that are passed between parent and offspring.*  
*Students identify the differences between learnt and inherited traits.*
- 11 All types of living organisms have offspring, and the similarities between parents and their offspring become more apparent as the offspring mature.**  
*Students identify that heredity traits are those that are passed between parent and offspring.*  
*Students identify the differences between learnt and inherited traits.*
- 12 The phases in the life cycle of all living organisms are predictable, but differ from species to species.**  
*Using software, discovers the different stages of the human life cycle.*  
*Identifies stages in the life cycle of animals.*  
*Using software, discovers the different stages in the life cycle of butterflies and frogs.*  
*Uses a board-game to discover the stages in the life cycle of a plant.*  
*Compares the life cycles of animals and identifies similarities and differences between them.*  
*Compares the life cycles of plants and identifies similarities and differences between them.*  
*Identifies the stages in the life cycle of a plant.*
- 13 Organisms have parts that enable them to live and survive in the world.**  
*Interprets text and diagrams to identify the habitats of different plants.*  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.*  
*Discovers the habitats of different animals.*  
*Discovers the characteristics of animals that allow them to survive in their natural habitats.*

**8 Ecology**

- 14 Organisms of the same species can have variations that provide an advantage in survival and reproducing.**  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.*  
*Students identify how populations can be affected by changes in a food chain.*
- 15 Fossils give evidence that organisms that lived in the past were both similar to and different from present day organisms.**  
*Uses a virtual excavation to find different fossils.*  
*Uses software to find out how different types of fossils are formed.*  
*Uses symbols to represent different types of fossil.*
- 1 All living organisms interact with each other and their environment.**  
*Identifies the producers primary consumers and secondary consumers in food chains.*  
*States the energy transfer that occurs between plants to animals and animals to animals in food chains.*  
*Uses a matching game to find what foods humans can obtain from plants.*  
*Classifies animals as carnivores, herbivores or omnivores.*  
*Uses a matching game to find what foods humans can obtain from animals.*  
*Identifies if everyday foods come from plants or animals.*
- 2 All organisms depend on one another and their environment to live and grow.**  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.*
- 3 People depend on other organisms and Earth's resources for clothing, shelter, and food.**  
*Identifies if materials come from the Earth, from plants or from animals.*  
*Identifies what natural materials have been used to make a series of sample objects.*  
*Identifies where different natural materials come from.*
- 4 Behavior patterns and survival of organisms result from their interactions with a specific environment.**  
*Discovers the habitats of different animals.*  
*Discovers the characteristics of animals that allow them to survive in their natural habitats.*

- 5 Organisms interact with each other as producer/consumer, scavenger, predator/prey, parasite/host, decomposer, etc.**  
*Classifies animals as carnivores, herbivores or omnivores.  
Identifies the producers primary consumers and secondary consumers in food chains.  
States the energy transfer that occurs between plants to animals and animals to animals in food chains.  
Uses a matching game to find what foods humans can obtain from plants.  
Uses a matching game to find what foods humans can obtain from animals.*
- 6 Interactions between organisms and their environment contribute to continous cycling of matter and energy.**  
*States the energy transfer that occurs between plants to animals and animals to animals in food chains.*
- 7 All organisms, including humans, cause changes in their environments that can be either beneficial or harmful to the organisms in the ecosystem.**  
*Identifies if things are alive or not alive and how they can be affected by pollution.  
Students identify how living organisms have adapted to become suited to the environment in which they grow.  
Identifies what effect pollution can have on rivers and ponds.*
- 8 Organisms that survive in an environment have developed adaptations that allow the organisms to compete for available resources and cope with the physical conditions of their environment.**  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.  
Students identify how populations can be affected by changes in a food chain.*
- 9 Human activities can change the environment in ways that affect the health and survival of all living organisms.**  
*Identifies what effect pollution can have on rivers and ponds.  
Identifies some causes and effects of global warming.  
Discovers some of the causes of global warming.  
Explores the effects of global warming and alternative energy sources.*
- 10 Changes in an environment, caused naturally or by humans, can be beneficial or harmful to the organisms living in that environment.**  
*Interprets text to identify things that harm, preserve or protect the environment.  
Students identify how living organisms have adapted to become suited to the environment in which they grow.*

## **Section 6.**

### **LWS Objective Lists**

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## **ST20-1 Living with Physical Science Level-1**

### **1 Pushes and Pulls**

- 1 States if illustrated movements are pushes or pulls.
- 2 Measures pulling forces using a Newton meter.

### **2 Magnets**

- 1 Determines which materials stick to a magnet.
- 2 Discovers that materials containing iron stick to magnets.
- 3 Observes the magnetic attraction and repulsion forces between the poles of magnets.

### **3 Sound Travel**

- 1 Identifies that sound travels as a vibration by speaking into a balloon.
- 2 Identifies that sound travels through string as a vibration by using a string telephone.

### **4 Light Sources**

- 1 Identifies objects around the classroom that are light sources.
- 2 Determines if objects are transparent or opaque using a light ray box.

### **5 Effects of Force**

- 1 Squashes a ball and stretches a spring to observe the effects of pushing and pulling forces.
- 2 Observes how a varying incline effects the speed of a model car.
- 3 Measures the effect that the force of gravity has on a mass placed on an inclined plane.

### **6 Electrical Conductors**

- 1 Determines if materials are electrical conductors or electrical insulators using a simple lamp circuit.
- 2 Discovers that electricity cannot flow unless a circuit is complete.

### **7 Types of Energy**

- 1 Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.
- 2 Uses a model car on a track to find when the car has enough energy to travel over a hill.

### **8 Reflections and Shadows**

- 1 Observes that images are reversed when reflected in a mirror.
- 2 Identifies how shadows are formed and how they change depending on their distance from a light source.

### **11 Pre Test Quiz 1**

- 1 Identifies that pushes and pulls are forces that can be measured in Newton's.
- 2 Identifies the attraction and repulsion between magnets and other objects.
- 3 Identifies that sound travels as a vibration and so can travel through solids.
- 4 Identifies if objects are light sources and if they are transparent or opaque.

### **12 Post Test Quiz 1**

- 1 Identifies that pushes and pulls are forces that can be measured in Newton's.
- 2 Identifies the attraction and repulsion between magnets and other objects.
- 3 Identifies that sound travels as a vibration and so can travel through solids.
- 4 Identifies if objects are light sources and if they are transparent or opaque.

### **13 Pre Test Quiz 2**

- 1 Describes the effect of pushing and pulling forces.
- 2 Identifies if objects are electrical conductors or electrical insulators.
- 3 Identifies different types of energy.
- 4 Describes the appearance of reflections and shadows.

### **14 Post Test Quiz 2**

- 1 Describes the effect of pushing and pulling forces.
- 2 Identifies if objects are electrical conductors or electrical insulators.
- 3 Identifies different types of energy.
- 4 Describes the appearance of reflections and shadows.

## ST20-2 Living with Physical Science Level-2

### 1 Friction

- 1 Observes the force of friction.
- 2 Compares the force of friction between different materials.

### 2 Series Circuits

- 1 Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.
- 2 Interprets electrical diagrams to predict the behavior of electrical components connected in series.

### 3 Musical Sounds

- 1 Observes the relationship between length of rubber band and pitch of sound made by a stringed instrument.
- 2 Observes the relationship between length of tube and pitch of sound made by a wind instrument.
- 3 Observes the relationship between volume of air and pitch of sound made by a percussion instrument.

### 4 Light Rays

- 1 Uses lenses to bend light rays.
- 2 Observes the mixing of colored light to make other colors, including the making of white light.

### 5 Springs

- 1 Discovers the elastic properties of metal springs.
- 2 Discovers that the stretch of spring is proportional to the weight placed on it.

### 6 Parallel Circuits

- 1 Discovers how electricity flows in series and parallel circuits.
- 2 Interprets electrical diagrams to predict the behavior of electrical components connected in parallel.
- 3 States the use of parallel and series electrical circuits in the home.

### 7 Energy Conversion

- 1 Uses flow diagrams to track the conversion of energy.
- 2 Observes the change from kinetic energy into heat and sound energy when rubbing hands together.
- 3 Discovers that a dynamo can be used to convert kinetic energy into electrical energy.

### 8 Cooling

- 1 Compares the heat loss in different materials using graphs.
- 2 Measures and compares the heat insulation properties of different materials.
- 3 Identifies the use of insulating domestic water pipes against cold.

### 11 Pre Test Quiz 3

- 1 Describes the friction force that occurs between two surfaces.
- 2 Describes how electrical components work in series circuits.
- 3 Predicts how the pitch of sound produced by a vibrating object changes with object size.
- 4 Recognizes the lenses that bend light rays.

### 12 Post Test Quiz 3

- 1 Describes the friction force that occurs between two surfaces.
- 2 Predicts how the pitch of sound produced by a vibrating object changes with object size.
- 3 Describes how electrical components work in series circuits.
- 4 Describes the behavior of light.

### 13 Pre Test Quiz 4

- 1 Predicts that the stretch of a spring is proportional to the weight placed on it.
- 2 Describes how electrical components work in parallel circuits.
- 3 Recognizes different forms of energy.
- 4 Describes how heat insulators and heat conductors lose heat.

### 14 Post Test Quiz 4

- 1 Predicts that the stretch of a spring is proportional to the weight placed on it.
- 2 Describes how electrical components work in parallel circuits.
- 3 Recognizes different forms of energy.
- 4 Describes how heat insulators and heat conductors lose heat.

## **ST21-1 Living with Life Science Level-1**

### **1 Bones**

- 1 Investigates the bones of the human body.
- 2 Investigates the joints of the human body.

### **2 Plant Life Cycles**

- 1 Uses a board-game to discover the stages in the life cycle of a plant.
- 2 Uses software to discover methods of seeds dispersal from different plants.

### **3 Animal Life Cycles**

- 1 Using software, discovers the different stages of the human life cycle.
- 2 Using software, discovers the different stages in the life cycle of butterflies and frogs.

### **4 Food Providers**

- 1 Uses a matching game to find what foods humans can obtain from animals.
- 2 Uses a matching game to find what foods humans can obtain from plants.

### **5 The Body**

- 1 Investigates the lungs of the human body.
- 2 Investigates the stomach of the human body.
- 3 Investigates the heart of the human body.

### **6 Using a Microscope**

- 1 Identifies the parts and controls of a microscope.
- 2 Uses a microscope to view the cells of plants.

### **7 Senses**

- 1 Uses software to find what parts of the human body give each of the five senses.
- 2 Specifies what senses can be used to identify different things.

### **8 Acids and Bases**

- 1 Uses litmus paper to find out if samples are acidic, basic or neutral.
- 2 Investigates the pH levels of virtual fields to find which field is most suitable to grow crops.

### **11 Pre Test Quiz 1**

- 1 Identifies bones and joints of the human body.
- 2 Identifies the stages in the life cycle of a plant.
- 3 Identifies stages in the life cycle of animals.
- 4 Identifies foods that come from plants and animals.

### **12 Post Test Quiz 1**

- 1 Identifies bones and joints of the human body.
- 2 Identifies the stages in the life cycle of a plant.
- 3 Identifies stages in the life cycle of animals.
- 4 Identifies foods that come from plants and animals.

### **13 Pre Test Quiz 2**

- 1 Identifies characteristics of the lungs, stomach and heart of the human body.
- 2 States the uses of a microscope.
- 3 Identifies senses of the human body.
- 4 Identifies the pH levels of acids and bases.

### **14 Post Test Quiz 2**

- 1 Identifies characteristics of the lungs, stomach and heart of the human body.
- 2 States the uses of a microscope.
- 3 Identifies senses of the human body.
- 4 Identifies the pH levels of acids and bases.

## **ST21-2 Living with Life Science Level-2**

### **1 Exercise**

- 1 Discovers the relationship between heartbeat and pulse.
- 2 Determines the effect of exercise on heart rate.

### **2 Pollination**

- 1 Observes flower pollen magnified by a microscope.
- 2 Discovers how insects aid pollination in the life cycle of a plant.

### **3 Sorting Animals**

- 1 Uses classification keys to sort animals.
- 2 Creates questions in a classification key to sort a group of farmyard animals.

### **4 Climate Control**

- 1 Observes the growth of a plant when grown under different watering conditions.
- 2 Observes the growth of a plant when grown under different temperature conditions.
- 3 Describes different forms of climate control used to grow plants.

### **5 Diet**

- 1 Identifies the nutrients contained in different foods.
- 2 Discovers the food groups necessary for a healthy balanced diet.

### **6 Plant Food**

- 1 Recognizes the purpose of photosynthesis in plants.
- 2 Discovers the effects that sunlight and water have on the growth of plants.
- 3 Discovers that plants require carbon dioxide and produce oxygen as a waste product.

### **7 Food Chains**

- 1 States the energy transfer that occurs between plants to animals and animals to animals in food chains.
- 2 Identifies the producers primary consumers and secondary consumers in food chains.
- 3 Classifies animals as carnivores, herbivores or omnivores.

### **8 Nutrients**

- 1 Determines the nutrients that plants need to grow.
- 2 Observes the effects of tap water, salt water and fertilizer on the growth of plants in a nine day period.

### **11 Pre Test Quiz 3**

- 1 Describes the pulse as a method of detecting blood flow around the body.
- 2 Describes the relationship between a honeybee and a flower for pollination to occur.
- 3 Identifies questions that can be asked to sort different animals.
- 4 Relates plant growth with climate.

### **12 Post Test Quiz 3**

- 1 Identifies questions that can be asked to sort different animals.
- 2 Describes the relationship between a honeybee and a flower for pollination to occur.
- 3 States the appropriate climate to grow different plants.
- 4 Describes the pulse as a method of detecting blood flow around the body.

### **13 Pre Test Quiz 4**

- 1 Associates various nutrients with food groups.
- 2 Identifies the parts of plants that help them to make their own food.
- 3 Determines the placement of animals and plants in food chains.
- 4 Identifies the nutrients plants use for growth.

### **14 Post Test Quiz 4**

- 1 Associates various nutrients with food groups.
- 2 Identifies the parts of plants that help them to make their own food.
- 3 Identifies the various nutrients plants use for growth.
- 4 Distinguishes between a herbivore and a carnivore.

## **ST22-1 Living with Earth Science Level-1**

### **1 Rivers and Ponds**

- 1 Uses a checklist of the seven life processes to identify if things are living or not living.
- 2 Identifies what effect pollution can have on rivers and ponds.

### **2 Day and Night**

- 1 Uses software to find out why there is day and night.
- 2 Uses a shadow trainer to find out why shadows change shape during the day.

### **3 The Seasons**

- 1 Observes the weather during different seasons in a virtual representation of New York.
- 2 Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.

### **4 Fossil Fuels**

- 1 Identifies how fossil fuels are made and where they come from.
- 2 Identifies what fossil fuels can be used for.

### **5 Recycling**

- 1 Identifies how different materials can be recycled.
- 2 Uses a simple classification key to sort three different types of metal.

### **6 The Moon**

- 1 Uses software to discover facts about the Moon and its relation to the Earth.
- 2 Uses software to discover the different phases of the Moon.

### **7 Weather Records**

- 1 Discovers symbols that are used to represent the weather.
- 2 Uses a virtual weather station to record temperature and rainfall.

### **8 Fossils**

- 1 Uses a virtual excavation to find different fossils.
- 2 Uses software to find out how different types of fossils are formed.

### **11 Pre Test Quiz 1**

- 1 Identifies if things are alive or not alive and how they can be affected by pollution.
- 2 Describes what causes day and night and what happens to shadows during the day.
- 3 Identifies the seasons at different places on the Earth.
- 4 Identifies fossil fuels and how they are made.

### **12 Post Test Quiz 1**

- 1 Identifies if things are alive or not alive and how they can be affected by pollution.
- 2 Describes what causes day and night and what happens to shadows during the day.
- 3 Identifies the seasons at different places on the Earth.
- 4 Identifies fossil fuels and how they are made.

### **13 Pre Test Quiz 2**

- 1 Identifies processes by which different materials can be recycled.
- 2 Identifies characteristics of the Moon and its phases.
- 3 Identifies symbols and instruments which can be used to represent and measure the weather.
- 4 Describes how fossils are formed.

### **14 Post Test Quiz 2**

- 1 Identifies processes by which different materials can be recycled.
- 2 Identifies characteristics of the Moon and its phases.
- 3 Identifies symbols and instruments which can be used to represent and measure the weather.
- 4 Describes how fossils are formed.

## **ST22-2 Living with Earth Science Level-2**

### **1 Habitats**

- 1 Discovers the characteristics of animals that allow them to survive in their natural habitats.
- 2 Discovers the habitats of different animals.

### **2 The Planets**

- 1 States the position of the planets in the solar system.
- 2 Recognizes planets in the solar system.

### **3 Rain and Clouds**

- 1 States the necessary conditions for the formation of clouds and precipitation.
- 2 Replicates and observes the stages of the water cycle.
- 3 States the different forms of water in the water cycle.

### **4 Rocks**

- 1 Describes the different conditions for the formation of various rocks.
- 2 Sorts rocks into sedimentary, metamorphic and igneous rock types.

### **5 Global Warming**

- 1 Discovers some of the causes of global warming.
- 2 Explores the effects of global warming and alternative energy sources.

### **6 The Sun**

- 1 States the effects that the Sun has on the light levels on the planets of the solar system.
- 2 Observes the effect that distance has on light levels.

### **7 Separating Mixtures**

- 1 Separates mixtures using a sieve.
- 2 Separates solids and liquids using filter paper.

### **8 Solubility**

- 1 Tests if materials are soluble or insoluble.
- 2 Observes the effect of adding an insoluble material to a liquid.

### **11 Pre Test Quiz 3**

- 1 Describes characteristics of animals habitats.
- 2 Identifies planets in the solar system.
- 3 Describes the states and processes of the water cycle.
- 4 States how different rocks are formed.

### **12 Post Test Quiz 3**

- 1 Describes characteristics of animals habitats.
- 2 States how different rocks are formed.
- 3 Identifies planets in the solar system.
- 4 Describes the states and processes of the water cycle.

### **13 Pre Test Quiz 4**

- 1 Identifies some causes and effects of global warming.
- 2 Relates the position of a planet in the solar system to the amount of light it receives.
- 3 Identifies how mixtures can be separated using different filters.
- 4 Describes what happens to soluble and insoluble materials when they are added to a liquid.

### **14 Post Test Quiz 4**

- 1 Describes what happens to soluble and insoluble materials when they are added to a liquid.
- 2 Identifies how mixtures can be separated using filters.
- 3 Relates the position of a planet in the solar system to the amount of light it receives.
- 4 Identifies some causes and effects of global warming.

## **ST23-1 Living with Scientific Reasoning Level-1**

### **1 Measuring Distance**

- 1 Uses a motion sensor to measure distances.
- 2 Uses a ruler and a motion sensor to measure height.

### **2 Alternative Energy**

- 1 Identifies renewable and non-renewable energy sources.
- 2 Uses a solar panel to generate electricity in a circuit.

### **3 Elasticity**

- 1 Tests a series of different objects to find if they are flexible, inflexible or elastic.
- 2 Identifies if different objects should be flexible, inflexible or elastic in order to do their jobs.

### **4 Balance**

- 1 Discovers the effect of forces on a lever.
- 2 Uses a lever to balance weights.

### **5 Light Levels**

- 1 Uses an analogue light meter to measure light levels in a room.
- 2 Uses a digital light meter to measure light levels in a room.

### **6 Electromagnets**

- 1 Uses a bar magnet and an electromagnet to find the differences and similarities between them.
- 2 Increases the strength of an electromagnet.

### **7 Natural Materials**

- 1 Identifies where different natural materials come from.
- 2 Identifies what natural materials have been used to make a series of sample objects.

### **8 Crawler**

- 1 Finds the effects of giving a crawler more energy.
- 2 Modifies a crawler so that it can store enough energy to reach the top of a slope.
- 3 Modifies a crawler to change the direction it moves in.

### **11 Pre Test Quiz 1**

- 1 Identifies different ways to measure things.
- 2 Identifies renewable and non-renewable energy sources.
- 3 Identifies flexible, inflexible and elastic material properties.
- 4 Indicates how levers can be used to balance weights.

### **12 Post Test Quiz 1**

- 1 Identifies different ways to measure things.
- 2 Identifies renewable and non-renewable energy sources.
- 3 Identifies flexible, inflexible and elastic material properties.
- 4 Indicates how levers can be used to balance weights.

### **13 Pre Test Quiz 2**

- 1 Identifies how the level of light can be measured.
- 2 Identifies the behavior of temporary and permanent magnets.
- 3 Identifies if materials come from the Earth, from plants or from animals.
- 4 Identifies how a device called a crawler works on different surfaces when given varying amounts of energy.

### **14 Post Test Quiz 2**

- 1 Identifies how the level of light can be measured.
- 2 Identifies the behavior of temporary and permanent magnets.
- 3 Identifies if materials come from the Earth, from plants or from animals.
- 4 Identifies how a device called a crawler works on different surfaces when given varying amounts of energy.

## **ST23-2 Living with Scientific Reasoning Level-2**

### **1 Temperature**

- 1 Measures temperature using thermometers.
- 2 Uses graphs to plot the change of temperature over periods of time.

### **2 Flight**

- 1 Uses wing flaps and rudders to control the direction of airplanes in the air.
- 2 Changes the size and shape of a wing of a model airplane to see the effect in the lift given.
- 3 Changes the balance of a model airplane to see the effect on flight.

### **3 Changes**

- 1 Describes the changes that occur in different materials when they are heated.
- 2 Describes the changes that occur in different materials when they are cooled.
- 3 States if changes in different materials, caused by heating and cooling, can be reversed.

### **4 Lifting Machines**

- 1 Discovers the uses of a windlass.
- 2 Constructs a windlass to observe that a gear will increase the amount of lift for each turn of its handle.

### **5 Pendulum**

- 1 Observes the effect of the changing the weight of a pendulum on the time of its swing.
- 2 Observes the effect of changing the length of a pendulum on the time of its swing.
- 3 Constructs a pendulum to observe the relationship between pendulum weight and length with its swing time.

### **6 Sending Signals**

- 1 Sends messages using radio waves.
- 2 Sends messages using light signals.
- 3 Sends messages using coded signals.

### **7 Density**

- 1 Describes how density of an object can effect if it floats or sinks in water.
- 2 Relates the weight, shape and size of a material to its density.

### **8 Bridges**

- 1 Uses different supports to make a bridge stronger.
- 2 Constructs a bridge to span a gap.
- 3 Observes the weakness of a beam bridge.

### **11 Pre Test Quiz 3**

- 1 States how temperature can be measured and identifies the temperature of the human body.
- 2 States how wings can be used in flight.
- 3 Identifies the changes that happen to materials when they are heated and cooled.
- 4 Describes the function of lifting machines.

### **12 Post Test Quiz 3**

- 1 States how temperature can be measured and states the temperature of the human body.
- 2 Identifies the change that happens to materials when they are heated and cooled.
- 3 States how wings can be used in flight.
- 4 Describes the function of a lifting machine.

### **13 Pre Test Quiz 4**

- 1 Relates the swing time of a pendulum with its length.
- 2 States different ways that signals can be sent.
- 3 States the relationship between weight, size and density of a material.
- 4 Identifies different types of bridges.

### **14 Post Test Quiz 4**

- 1 States the relationship between weight, size and density of a material.
- 2 States different ways that signals can be sent.
- 3 Identifies different types of bridges.
- 4 Relates the swing time of a pendulum with its length.

## **Section 7.**

# **ClassAct Student Report**

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## Missouri K-4 Science Standards Report

Student Name: Rachel Bernstein

Student ID: RB10945

Class: Grade 4 Science

Scores – A\*, A, B, C, D, F

### A – Scientific Inquiry

**A\*** Tools, especially measuring, magnifying, and photographic ones, can give more information than by observing only using the senses.

*Students identify tools that could be used in measurement of physical phenomena.*

*Identifies units of measurement that would be most suitable for measuring a series of different items.*

*Identifies that pushes and pulls are forces that can be measured in Newton's.*

*Identifies symbols and instruments that can be used to represent and measure the weather.*

*Uses a motion sensor to measure distances.*

*Uses an analogue light meter to measure light levels in a room.*

*Measures temperature using thermometers.*

*Identifies the parts and controls of a microscope.*

*Uses non-standard measurements, such as paper clips and hands, to measure different objects.*

*Uses a microscope to view the cells of plants.*

**A** Sometimes two people can observe the same object or event and describe it differently.

*Debates issues that relate to physical science.*

*Debates issues that relate to science.*

*Debates issues that relate to life science.*

*Debates issues that relate to Earth and space science.*

**B** Words, pictures, numbers, models, and sounds can be used to describe objects and events.

*Writes a report on science.*

*Changes the size and shape of a wing of a model airplane to see the effect in the lift given.*

*Observes how a varying incline effects the speed of a model car.*

*Constructs model from three different designs and compares the advantages and disadvantages of each design.*

*Uses a model of the Earth to identify the changes in time between different time zones.*

*Debates issues that relate to science.*

*Creates a science poster.*

*Makes a presentation on science.*

*Critiques written and oral explanations of science.*

- A** Using tools, following directions, and asking for suggestions are helpful in building something or getting something to work better.  
*Constructs a pendulum to observe the relationship between pendulum weight and length with its swing time.*  
*Constructs a windlass to observe that a gear will increase the amount of lift for each turn of its handle.*  
*Constructs a bridge to span a gap.*  
*Constructs model from three different designs and compares the advantages and disadvantages of each design.*
- A** Objects and events are often observed and described quantitatively.  
*Uses a motion sensor to measure distances.*  
*Records rainfall information into a table and constructs a bar chart of the results.*  
*Experiments with actions that effect heart rate and creates a table to record their results.*  
*Identifies how the level of light can be measured.*  
*Measures pulling forces using a Newton meter.*  
*Identifies units of measurement that would be most suitable for measuring a series of different items.*  
*Investigates the pH levels of virtual fields to find which field is most suitable to grow crops.*  
*Measures temperature using thermometers.*  
*Students identify tools that could be used in measurement of physical phenomena.*  
*Identifies units of measurement that would be most suitable for measuring a series of different items.*  
*Measures and compares the heat insulation properties of different materials.*
- B** The accuracy of measurements is very important as inaccuracy often produces questionable results.  
*Uses non-standard measurements, such as paper clips and hands, to measure different objects.*  
*Identifies different ways to measure things.*  
*Uses an analogue light meter to measure light levels in a room.*  
*Uses a digital light meter to measure light levels in a room.*  
*Uses a ruler and a motion sensor to measure height.*  
*Identifies units of measurement that would be most suitable for measuring a series of different items.*  
*Students identify tools that could be used in measurement of physical phenomena.*
- A** Additional, more careful observations resolve different explanations for the same event.  
*Students reorder data into logical sequences to identify patterns in results.*  
*Students analyze experimental data to identify if the hypothesis is disproved or supported.*  
*Students state whether an experiment tests a hypothesis.*

**B** Graphs, charts, maps, equations, and oral and written reports can be used to share the results of a scientific investigation and facilitate its discussion.

*Debates issues that relate to life science.*

*Experiments with actions that effect heart rate and creates a table to record their results.*

*Writes a report about a physical science topic.*

*Debates issues that relate to physical science.*

*Displays results from a friction experiment in a series of bar charts.*

*Writes a report about a life science topic.*

*Writes a report about an Earth and space science topic.*

*Critiques written and oral explanations of a life science.*

*Debates issues that relate to Earth and space science.*

*Writes a report on science.*

*Debates issues that relate to science.*

*Critiques written and oral explanations of science.*

*Critiques written and oral explanations of a physical science.*

*Uses graphs to plot the change of temperature over periods of time.*

*Compares the heat loss in different materials using graphs.*

*Critiques written and oral explanations of an Earth and space science.*

*Records rainfall information into a table and constructs a bar chart of the results.*

**A** Problems can often be solved by physically altering specific components of a mechanical or biological system and observing the consequences.

*Modifies a crawler to change the direction it moves in.*

*Modifies a crawler so that it can store enough energy to reach the top of a slope.*

*Finds the effects of giving a crawler more energy.*

The breadth and style of investigations depend on the questions asked.

N/A

**A** Most experiments involve changing something and then repeatedly comparing it to something similar that has not been changed.

*Observes the growth of a plant when grown under different watering conditions.*

*Observes the growth of a plant when grown under different temperature conditions.*

*Describes different forms of climate control used to grow plants.*

## **B – Scientific Relevance**

Tools that have been invented affect all areas of life.

N/A

When people want to build something or try something new, they should try to figure out ahead of time how this might affect all living things and environments.

N/A

Technology extends the ability of people to change the way things work.

N/A

Technological solutions to problems often have drawbacks as well as benefits.

N/A

Throughout human history, technological innovations have played an important role in improving the quality of life.

N/A

Advances in science and technology are occurring at a faster rate today than in the past.

N/A

Science is a way to solve problems; everybody can do scientific activities, discover some things about nature, and invent things and ideas.

N/A

Science requires many different kinds of activities, involving men and women of all ages and backgrounds.

N/A

## B – Matter and Energy

### A Observable properties are used to identify objects.

*Identifies if objects are electrical conductors or electrical insulators. Identifies the weight of objects in units of Newton's and places them in order of their weight.*

*Describes how density of an object can effect if it floats or sinks in water.*

*Identifies what natural materials have been used to make a series of sample objects.*

*Tests a series of different objects to find if they are flexible, inflexible or elastic.*

*Predicts how the pitch of sound produced by a vibrating object, changes with object size.*

*Identifies the attraction and repulsion between magnets and other objects.*

*Determines if objects are transparent or opaque using a light ray box.*

*Determines that the parts of a mirror do not create a reflection until they are combined and identifies objects around the classroom that give reflections.*

*Identifies objects around the classroom that are light sources.*

### A Matter has physical properties that can change.

*States if changes in different materials, caused by heating and cooling, can be reversed.*

*Interprets text and diagrams to identify changes that are physical or chemical and useful things that can result from those changes.*

*Uses graphs to plot the change of temperature over periods of time.*

**A** Mixtures are composed of different kinds of matter, each with distinct properties.

*Separates mixtures using a sieve.*

*Separates solids and liquids using filter paper.*

**C** The sun is the primary source of light and heat for the Earth.

*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*

*States the effects that the Sun has on the light levels on the planets of the solar system.*

**B** Energy can be converted into different forms.

*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*

*Uses flow diagrams to track the conversion of energy.*

*Discovers that a dynamo can be used to convert kinetic energy into electrical energy.*

*Observes the change from kinetic energy into heat and sound energy when rubbing hands together.*

*Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.*

*Identifies different types of energy.*

*Identifies renewable and non-renewable energy sources.*

**B** Sound is a form of energy that results from vibrations in matter. Sound has the qualities of loudness and pitch.

*Observes the relationship between length of rubber band and pitch of sound made by a stringed instrument.*

*Predicts how the pitch of sound produced by a vibrating object, changes with object size.*

*Observes the change from kinetic energy into heat and sound energy when rubbing hands together.*

*Observes the relationship between length of tube and pitch of sound made by a wind instrument.*

*Identifies that sound travels as a vibration and so can travel through solids.*

*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*

*Identifies that sound travels through string as a vibration by using a string telephone.*

*Identifies that sound travels as a vibration by speaking into a balloon.*

*Identifies how the size of a vibration can effect the loudness of a sound.*

*Identifies that the volume of a sound changes as the distance from the source of the sound is increased.*

*Observes the relationship between volume of air and pitch of sound made by a percussion instrument.*

**A** Some of the sun's light is transformed into heat when it hits objects.

*States the effects that the Sun has on the light levels on the planets of the solar system.*

*Observes the effect that distance has on light levels.*

- B Electricity can be converted into light, heat, sound, magnetism, or mechanical motion.**  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*  
*Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.*  
*Uses flow diagrams to track the conversion of energy.*  
*Uses a bar magnet and an electromagnet to find the differences and similarities between them.*
- A Friction produces heat.**  
*Compares the force of friction between different materials.*  
*Describes the friction force that occurs between two surfaces.*  
*Observes the force of friction.*  
*Observes the change from kinetic energy into heat and sound energy when rubbing hands together.*
- C Sound travels at different rates through different materials.**  
*Identifies that sound travels as a vibration by speaking into a balloon.*  
*Identifies that sound travels through string as a vibration by using a string telephone.*  
*Identifies that sound travels as a vibration and so can travel through solids.*  
*Observes the relationship between length of rubber band and pitch of sound made by a stringed instrument.*  
*Observes the relationship between length of tube and pitch of sound made by a wind instrument.*  
*Observes the relationship between volume of air and pitch of sound made by a percussion instrument.*
- A Light spreads from a source and travels in straight lines. Light can be transmitted, reflected, refracted, or absorbed by different materials.**  
*Determines if objects are transparent or opaque using a light ray box.*  
*Describes the behavior of light.*  
*Recognizes the lenses that bend light rays.*  
*Uses lenses to bend light rays.*  
*Identifies objects around the classroom that are light sources.*  
*Uses a triangular prism to split white light into the colors from which it is composed.*  
*Observes the mixing of colored light to make other colors, including the making of white light.*
- B Objects that give off light may also give off heat.**  
*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*  
*States the effects that the Sun has on the light levels on the planets of the solar system.*  
*Relates the position of a planet in the solar system to the amount of light it receives.*

**B** Heat causes materials to increase in temperature and feel warmer, or change state (gas, liquid, or solid).

*Describes the changes that occur in different materials when they are heated.*

*Describes the changes that occur in different materials when they are cooled.*

*States if changes in different materials, caused by heating and cooling, can be reversed.*

**A** Warm objects lose heat to cooler ones until they reach the same temperature.

*Describes the changes that occur in different materials when they are cooled.*

*Identifies the changes that happen to materials when they are heated and cooled.*

*States if changes in different materials, caused by heating and cooling, can be reversed.*

*Discovers where kinetic, potential, chemical, light, heat and sound energy can occur.*

*Describes the changes that occur in different materials when they are heated.*

*Describes how heat insulators and heat conductors lose heat.*

**C** Different types of matter conduct heat at different rates.

*Describes how heat insulators and heat conductors lose heat.*

#### **A – Force, Motion and Mechanical Energy**

**A** An object's position can be described relative to another object (above, below, left of, right of, behind, or in front).

*States the position of the planets in the solar system.*

**B** An object's motion can be described in terms of another object (e.g., faster, and slower) and how its position changes over time.

*Observes how a varying incline effects the speed of a model car.*

*Measures the effect that the force of gravity has on a mass placed on an inclined plane.*

**A\*** Forces explain many kinds of motion (e.g., stopping, starting falling, straight, zigzag, circular, vibrational).

*Uses a model car on a track to find when the car has enough energy to travel over a hill.*

*States if illustrated movements are pushes or pulls.*

*Observes how a varying incline effects the speed of a model car.*

*Measures the effect that the force of gravity has on a mass placed on an inclined plane.*

- A Force is any push or pull exerted by one object on another.**  
*Describes the effect of pushing and pulling forces.  
Identifies that pushes and pulls are forces that can be measured in Newton's.  
Squashes a ball and stretches a spring to observe the effects of pushing and pulling forces.  
States if illustrated movements are pushes or pulls.  
Measures pulling forces using a Newton meter.*
- B Weight is a measurement of the attraction of gravity on a mass. Mass is the amount of matter of an object.**  
*Identifies the weight of objects in units of Newton's and places them in order of their weight.  
Predicts that the stretch of a spring is proportional to the weight placed on it.  
Relates the weight, shape and size of a material to its density.  
Determines the effect of air resistance on an object when gravity is pulling the object towards the ground.  
Measures the effect that the force of gravity has on a mass placed on an inclined plane.*
- A Forces can be mechanical, gravitational, magnetic, or electrostatic.**  
*Squashes a ball and stretches a spring to observe the effects of pushing and pulling forces.  
Discovers that a dynamo can be used to convert kinetic energy into electrical energy.  
Discovers the effect of forces on a lever.  
Uses components, like lamps and buzzers, to discover that electrical energy can be changed into different energies.  
Observes the magnetic attraction and repulsion forces between the poles of magnets.*
- B Magnets attract and repel each other and certain kinds of metals.**  
*Identifies everyday items that would stick to a magnet.  
Determines which materials stick to a magnet.  
Observes the magnetic attraction and repulsion forces between the poles of magnets.  
Identifies the attraction and repulsion between magnets and other objects.*
- A The movement of an object depends on the force applied and how much mass it has.**  
*Measures the effect that the force of gravity has on a mass placed on an inclined plane.*
- A An unbalanced force causes an object to change speed or direction. The magnitude of the change in speed or direction depends on the amount of force applied and the mass of the object.**  
*Interprets text and diagrams to identify if forces are balanced or unbalanced.  
Modifies a crawler to change the direction it moves in.*

- B** Simple machines are used to change the direction of an applied force and provide the mechanical advantage needed to move objects.  
*Uses wing flaps and rudders to control the direction of airplanes in the air.*  
*Indicates how levers can be used to balance weights.*  
*Discovers the effect of forces on a lever.*  
*Modifies a crawler to change the direction it moves in.*  
*Uses a lever to balance weights.*

**C – Universe**

- B** Earth is not alone in the universe. Most of the objects in the universe are separated by enormous distances.  
*States the position of the planets in the solar system.*  
*Recognizes planets in the solar system.*

- C** The sun, moon, and stars have recurring patterns.  
*Recognizes planets in the solar system.*  
*States the position of the planets in the solar system.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*  
*Uses software to discover the different phases of the Moon.*  
*Uses software to discover facts about the Moon and its relation to the Earth.*

**Constellations are patterns of stars.**

*N/A*

- B** Earth is in our solar system and has unique properties.  
*Identifies if materials come from the Earth, from plants or from animals.*  
*Uses software to discover facts about the Moon and its relation to the Earth.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*

- C** Earth rotates on a tilted axis and revolves around the sun. This combination causes changes in the amount of sunlight reaching the Earth's surface and makes our seasons.  
*Uses a model of the Earth to identify how the position of the Earth during different seasons effects the hours of daylight.*  
*States the effects that the Sun has on the light levels on the planets of the solar system.*  
*States the position of the planets in the solar system.*  
*Recognizes planets in the solar system.*  
*Observes the weather during different seasons in a virtual representation of New York.*  
*Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.*  
*Observes the effect that distance has on light levels.*

**Objects in the sky move.**

*N/A*

**C** Earth makes a full rotation on its axis every 24 hours that causes the day/ night cycle.

*Uses software to find out why there is day and night.*

*Uses a shadow trainer to find out why shadows change shape during the day.*

**A** Patterns of movement of some objects in the sky are cyclic.

*Uses software to discover facts about the Moon and its relation to the Earth.*

*Uses software to discover the different phases of the Moon.*

**C** The motion and positions of objects in the solar system are observable phenomena that can be explained.

*States the position of the planets in the solar system.*

*Recognizes planets in the solar system.*

**B** Recurring predictable movements of the Earth and moon can be used to measure time.

*Uses a model of the Earth to identify the changes in time between different time zones.*

**Different constellations can be seen in different seasons.**

*N/A*

**C** The sun, moon, stars, and planets appear to move from east to west each day.

*Uses software to find out why there is day and night.*

*Uses a shadow trainer to find out why shadows change shape during the day.*

*Uses software to discover the different phases of the Moon.*

*Uses software to discover facts about the Moon and its relation to the Earth.*

*States the effects that the Sun has on the light levels on the planets of the solar system.*

*Observes the effect that distance has on light levels.*

**People who travel into space must use special clothing and equipment.**

*N/A*

**Telescopes and satellite imaging allow scientists to observe features and structures of some objects in the sky.**

*N/A*

**Space exploration has provided many benefits to humankind.**

*N/A*

## **B – Earth Systems**

**B** Water reaches Earth in different forms (snow, hail, rain, fog, etc.).

*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*

*Replicates and observes the stages of the water cycle.*

*States the different forms of water in the water cycle.*

- A Earth's natural resources are limited.**  
*Identifies renewable and non-renewable energy sources.  
Identifies renewable and non-renewable energy sources.  
Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.  
Identifies where different natural materials come from.  
Uses a solar panel to generate electricity in a circuit.  
Identifies what natural materials have been used to make a series of sample objects.*
- B Earth's surface is composed of rocks, soils, water, and living organisms. Differences in these components can be used to classify them.**  
*Uses a simple classification key to sort three different types of metal.  
Uses a checklist of the seven life processes to identify if things are living or not living.  
Classifies animals as carnivores, herbivores or omnivores.  
Uses classification keys to sort animals.  
Inserts questions into the correct places in a classification key so that it can be used to sort a series of dogs.  
Students identify how living organisms have adapted to become suited to the environment in which they grow.  
Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.  
Interprets text and diagrams to plan a fair experiment that tests how different soil types can effect the growth of a plant.  
States how different rocks are formed.  
Sort rocks into sedimentary, metamorphic and igneous rock types.  
Describes the different conditions for the formation of various rocks.  
Creates questions in a classification key to sort a group of farmyard animals.*
- B The atmosphere has physical properties that are measurable and predictable.**  
*Discovers symbols that are used to represent the weather.  
Observes the weather during different seasons in a virtual representation of New York.  
Interprets text and diagrams to identify physical, chemical and biological forms of weathering.  
Identifies symbols and instruments that can be used to represent and measure the weather.  
Uses a virtual weather station to record temperature and rainfall.*
- B Fossils provide evidence of plants and animals that lived long ago and the environment in which they lived.**  
*Uses software to find out how different types of fossils are formed.  
Identifies fossil fuels and how they are made.  
Uses a virtual excavation to find different fossils.  
Uses symbols to represent different types of fossil.*

- A Water is a valuable natural resource essential to all life.**  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*  
*Observes the growth of a plant when grown under different watering conditions.*  
*Discovers the effects that sunlight and water have on the growth of plants.*
- C Rocks, minerals, and soil have physical characteristics by which they can be classified.**  
*Sort rocks into sedimentary, metamorphic and igneous rock types.*  
*Uses a simple classification key to sort three different types of metal.*  
*Uses litmus paper to find out if samples are acidic, basic or neutral.*  
*Describes the different conditions for the formation of various rocks.*  
*Investigates the pH levels of virtual fields to find which field is most suitable to grow crops.*
- B Soil composition varies from location to location and affects the type of plants that grow in that location.**  
*Interprets text and diagrams to plan a fair experiment that tests how different soil types can effect the growth of a plant.*  
*Identifies the nutrients plants use for growth.*  
*Observes the effects of tap water, salt water and fertilizer on the growth of plants in a nine-day period.*  
*Observes the growth of a plant when grown under different watering conditions.*  
*Discovers the effects that sunlight and water have on the growth of plants.*
- B Water is stored all over Earth.**  
*Replicates and observes the stages of the water cycle.*  
*States the different forms of water in the water cycle.*  
*Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.*
- A Rocks change over time by weathering.**  
*Observes the effect of adding an insoluble material to a liquid.*  
*Tests if materials are soluble or insoluble.*  
*Describes the different conditions for the formation of various rocks.*  
*Sort rocks into sedimentary, metamorphic and igneous rock types.*
- B Earth's rotation causes a day and night cycle.**  
*Describes what causes day and night and what happens to shadows during the day.*  
*Uses a model of the Earth to identify how the position of the Earth during different seasons effects the hours of daylight.*  
*Uses software to find out why there is day and night.*  
*Uses a shadow trainer to find out why shadows change shape during the day.*

- B Seasons and changes in weather affect human and animal activity and plant growth.**  
*Discovers symbols that are used to represent the weather.  
 Uses a virtual weather station to record temperature and rainfall.  
 Uses a software simulation to find out how seasons are linked to the position of the Earth in relation to the Sun.  
 Observes the weather during different seasons in a virtual representation of New York.  
 Interprets text and diagrams to identify physical, chemical and biological forms of weathering.  
 Identifies the seasons at different places on the Earth.  
 Uses a model of the Earth to identify how the position of the Earth during different seasons effects the hours of daylight.  
 Interprets text and diagrams to plan a fair experiment that tests how different soil types can effect the growth of a plant.*
- C The surface of Earth changes slowly (e.g., erosion, weathering) or quickly (e.g., earthquakes, floods, rock/mud slides, volcanic activity).**  
*Interprets text and diagrams to identify physical, chemical and biological forms of weathering.*
- A Water condenses, evaporates, and exists as a gas liquid or solid on Earth and in the air.**  
*Replicates and observes the stages of the water cycle.  
 States the different forms of water in the water cycle.  
 Interprets text and diagrams to identify natural sources of water, such as rivers, lakes and oceans.  
 States if everyday items are solids, liquids or gases.*
- B Earth's surface features are continually changing.**  
*Interprets text and diagrams to identify physical, chemical and biological forms of weathering.*

**A – Living Systems**

- A\* Observable characteristics of living organisms can be used to sort and group them.**  
*Identifies questions that can be asked to sort different animals.  
 Uses classification keys to sort animals.  
 Inserts questions into the correct places in a classification key so that it can be used to sort a series of dogs.  
 Creates questions in a classification key to sort a group of farmyard animals.*
- A Organisms differ in structure and function and have characteristics that help them survive and reproduce in different environments.**  
*Interprets text and diagrams to identify the habitats of different plants.  
 Discovers the characteristics of animals that allow them to survive in their natural habitats.  
 Discovers the habitats of different animals.  
 Describes characteristics of animals habitats.  
 Students identify how living organisms have adapted to become suited to the environment in which they grow.*

**B Plants and animals are alive and have characteristics that make them different from nonliving matter.**

*Uses a checklist of the seven life processes to identify if things are living or not living.*

**A Organisms go through life cycles.**

*Compares the life cycles of animals and identifies similarities and differences between them.*

*Using software, discovers the different stages in the life cycle of butterflies and frogs.*

*Uses a board game to discover the stages in the life cycle of a plant.*

*Identifies the stages in the life cycle of a plant.*

*Compares the life cycles of plants and identifies similarities and differences between them.*

*Using software, discovers the different stages of the human life cycle.*

**A Most organisms require a variety of materials including food, water, air, and a suitable environment for survival. Animals obtain energy and nutrients from plants or other animals.**

*Discovers the effects that sunlight and water have on the growth of plants.*

*Identifies the producers primary consumers and secondary consumers in food chains.*

*Discovers the food groups necessary for a healthy balanced diet.*

*Identifies the nutrients contained in different foods.*

*Uses a matching game to find what foods humans can obtain from plants.*

*Uses a matching game to find what foods humans can obtain from animals.*

*Identifies if everyday foods come from plants or animals.*

*Students identify how populations can be affected by changes in a food chain.*

**A Organisms are composed of parts that work together and exhibit behaviors that ensure the survival of the whole organism.**

*Uses software to find what parts of the human body give each of the five senses.*

*Identifies the parts of plants that help them to make their own food.*

*Investigates the bones of the human body.*

*Investigates the heart of the human body.*

*Investigates the stomach of the human body.*

*Investigates the lungs of the human body.*

*Investigates the joints of the human body.*

**A Organisms can be grouped by specific structures.**

*Uses classification keys to sort animals.*

*Creates questions in a classification key to sort a group of farmyard animals.*

*Inserts questions into the correct places in a classification key so that it can be used to sort a series of dogs.*

- B** Some characteristics of organisms are inherited and some are acquired as a result of interaction with the environment.  
*Students identify that heredity traits are those that are passed between parent and offspring.*  
*Students identify the differences between learnt and inherited traits.*
- A** Most offspring are similar but not exactly like their parents.  
*Students identify that heredity traits are those that are passed between parent and offspring.*  
*Students identify the differences between learnt and inherited traits.*
- A** Organisms resemble their parents because they inherit physical characteristics from them. Organisms with two parents inherit characteristics of both.  
*Students identify the differences between learnt and inherited traits.*  
*Students identify that heredity traits are those that are passed between parent and offspring.*
- B** All types of living organisms have offspring, and the similarities between parents and their offspring become more apparent as the offspring mature.  
*Students identify that heredity traits are those that are passed between parent and offspring.*  
*Students identify the differences between learnt and inherited traits.*
- C** The phases in the life cycle of all living organisms are predictable, but differ from species to species.  
*Compares the life cycles of animals and identifies similarities and differences between them.*  
*Using software, discovers the different stages of the human life cycle.*  
*Uses a board game to discover the stages in the life cycle of a plant.*  
*Identifies stages in the life cycle of animals.*  
*Using software, discovers the different stages in the life cycle of butterflies and frogs.*  
*Compares the life cycles of plants and identifies similarities and differences between them.*  
*Identifies the stages in the life cycle of a plant.*
- A** Organisms have parts that enable them to live and survive in the world.  
*Interprets text and diagrams to identify the habitats of different plants.*  
*Discovers the characteristics of animals that allow them to survive in their natural habitats.*  
*Discovers the habitats of different animals.*  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.*

**A** Organisms of the same species can have variations that provide an advantage in survival and reproducing.

*Students identify how populations can be affected by changes in a food chain.*

*Students identify how living organisms have adapted to become suited to the environment in which they grow.*

**A** Fossils give evidence that organisms that lived in the past were both similar to and different from present day organisms.

*Uses a virtual excavation to find different fossils.*

*Uses symbols to represent different types of fossil.*

*Uses software to find out how different types of fossils are formed.*

**C – Ecology**

**C** All living organisms interact with each other and their environment.

*Identifies the producers primary consumers and secondary consumers in food chains.*

*States the energy transfer that occurs between plants to animals and animals to animals in food chains.*

*Uses a matching game to find what foods humans can obtain from plants.*

*Classifies animals as carnivores, herbivores or omnivores.*

*Uses a matching game to find what foods humans can obtain from animals.*

*Identifies if everyday foods come from plants or animals.*

**C** All organisms depend on one another and their environment to live and grow.

*Students identify how living organisms have adapted to become suited to the environment in which they grow.*

**B** People depend on other organisms and Earth's resources for clothing, shelter, and food.

*Identifies where different natural materials come from.*

*Identifies if materials come from the Earth, from plants or from animals.*

*Identifies what natural materials have been used to make a series of sample objects.*

**Behavior patterns and survival of organisms result from their interactions with a specific environment.**

*N/A*

**C** Organisms interact with each other as producer/consumer, scavenger, predator/prey, parasite/host, decomposer, etc.

*Identifies the producers primary consumers and secondary consumers in food chains.*

*States the energy transfer that occurs between plants to animals and animals to animals in food chains.*

*Uses a matching game to find what foods humans can obtain from animals.*

*Classifies animals as carnivores, herbivores or omnivores.*

*Uses a matching game to find what foods humans can obtain from plants.*

- B** Interactions between organisms and their environment contribute to continuous cycling of matter and energy.  
*States the energy transfer that occurs between plants to animals and animals to animals in food chains.*
- B** All organisms, including humans, cause changes in their environments that can be either beneficial or harmful to the organisms in the ecosystem.  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.  
Identifies if things are alive or not alive and how they can be affected by pollution.  
Identifies what effect pollution can have on rivers and ponds.*
- C** Organisms that survive in an environment have developed adaptations that allow the organisms to compete for available resources and cope with the physical conditions of their environment.  
*Students identify how living organisms have adapted to become suited to the environment in which they grow.  
Students identify how populations can be affected by changes in a food chain.*
- C** Human activities can change the environment in ways that affect the health and survival of all living organisms.  
*Identifies some causes and effects of global warming.  
Identifies what effect pollution can have on rivers and ponds.  
Explores the effects of global warming and alternative energy sources.  
Discovers some of the causes of global warming.*
- B** Changes in an environment, caused naturally or by humans, can be beneficial or harmful to the organisms living in that environment.  
*Interprets text to identify things that harm, preserve or protect the environment.  
Students identify how living organisms have adapted to become suited to the environment in which they grow.*