Learning Standard	Ideas for Developing Investigations and Learning Experiences	Date Completed
Enduring Knowledge 1: *Use the scientific method, scientific tools, and safe lab procedures to solve problems.*		
Standards: • **Make purposeful observations using the appropriate senses.** • **Generate questions based on observations.** • **Identify strategies for gathering information (expert in field, books, observations, investigations, videos)** • **Conduct simple investigations.** • **Construct simple charts from data and observations.** • **Share ideas through purposeful conversation.** • **Communicate and present findings of observations (illustrations, models, writing).** • **Manipulate simple tools that aid in observation and data collection.** • **Make accurate measurements with appropriate units for the measurement tool.** **A. The Scientific Method is the way that scientists learn and study the world around them. The steps include:**	**ACTIVITY** • Create a science handbook including Scientific Method & Scientific Process Skills • Observe objects using the appropriate senses • Classify items • Make a chart with data • Have students and parents sign a Lab Safety Contract • Include lab safety rules in science handbook • Include scientific instruments and tools, and their uses, in science handbook **LAB** • The first lab should be a step by step practice using the Scientific Method of something they know (brushing teeth) • All labs should utilize the Scientific Method and Scientific Process Skills • Review safety rules at the beginning of every lab • Review instrument and tool name and use during every lab **INTERNET/SMART BOARD** • Video clips • WatchKnowLearn.org • Discovery Education **VOCABULARY** • Hypothesis: an educated guess • Procedure: the steps in an experiment • Experiment: a fair test designed to answer a question	

1. **Observe and ask a question** 2. **Form a hypothesis** 3. **Identify the procedure (materials and steps)** 4. **Follow the procedure to conduct the experiment** 5. **Tell what was learned from the experiment (conclusion)** **B. Scientists use Scientific Process Skills to solve problems.** 1. **Observing** 2. **Classifying** 3. **Measuring** • **Length (inches, centimeters)** • **Mass (ounces, grams)** 4. **Communication** 5. **Interdisciplinary Skills** **C. Lab Safety is a set of rules that scientists practice to safely learn and study the world around them. These rules include:** 1. **I will follow directions** 2. **I will listen carefully** 3. **I will keep myself and others safe**	• Observations: noting and recording information • Conclusion: the result of outcome • Observing: ability to identify properties, structures, etc. through use of all senses • Classifying: ability to group, match, compare by commonality • Measuring: ability to find quantitative differences, to estimate, to calculate, etc. (standard & metric) • Communication: ability to verbally relate experiences, information and procedures with clarity • Wafting: waving a hand over a substance to draw a scent toward the nose • Scientist: a person who asks questions and tries different ways to answer them	

4. **I will clean my area after lab activities** 5. **I am a responsible scientist** 6. **Do not enter Science Lab without an adult** 7. **Do not eat or drink in the lab** 8. **Do not inhale; wafting permitted with teacher approval** **D. Scientific Instruments and Tools help scientists observe, describe and record the world around them. Instruments and tools include:** 1. **Ruler** 2. **Pencil** 3. **Balance** 4. **Magnifying Lens** 5. **Safety Goggles** 6. **Flashlight** 7. **Globe**		

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Enduring Knowledge 2: *Matter can be defined by characteristics.*		
A. Living and nonliving things are made of parts and can be described in terms of materials of which they are made and their physical properties. Some objects are composed of a single substance; others are composed of more than one substance. **B. Pure substances have characteristic properties, such as density, solubility, boiling point, and melting point, all of which are independent of the amount of the sample.**	**ACTIVITY** • Sort and describe objects based on characteristics such as the materials of which they are made and their physical properties. • Discuss elements, molecules, and mixtures • Identify differences by comparing and how they can be categorized based on their properties • Explore special properties of water as compared to other substances **VOCABULARY** • Mass- the measure of the amount of matter an object has • Length- the measure of an object from end to end • Volume-a measure of how much space an object takes up • Buoyancy- the ability for something to float on water or air	

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Enduring Knowledge 3: *Matter can exist in different states.*		
A. Understand that matter exists in several different states; the most commonly encountered are solids, liquids, and gases. **B. States of matter can be observed and described.**	**ACTIVITY** • Identify common objects as solids, liquids, and gasses • Demonstrate water in its different states and have students make observations • Illustrate and color the water cycle **VOCABULARY** • Solid- matter that has a certain shape and volume • Liquid- matter that takes the shape of the container that it is in but has a volume • Gas-matter that has no certain shape or volume	

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Enduring Knowledge 4: *Matter can be measured in a variety of ways.*		
A. Objects and substances have properties, such as weight and volume, which can be measured using appropriate tools. **B. Unknown substances can sometimes be identified by their properties** **C. Measure the mass and volume of gas.**	**ACTIVITY** • Determine the weight and volume of common objects using appropriate tools such as graduated cylinders, rulers, balances, and scales. • Explain why the volume of cereal changed while mass remains the same. • Design an experiment to determine which cereal would be the most economical in terms of volume, cost, and mass. • Have students brainstorm to determine how to test theories • Use balloons to demonstrate the concept of volume with a gas. **VOCABULARY** • Graduated Cylinder- scientific tool used to measure volume • Ruler- tool used to measure length • Balance- tool used to measure mass • Scale- tool used to measure weight	

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Enduring Knowledge 5: *Combinations of elements account for all types of matter in the world.*		
A. All matter is made from atoms. Matter made of only one type of atom is called an element. **B. All substances are composed of one or more of approximately 100 elements**	**ACTIVITY** • Explain that all matter is made of atoms and five examples of common elements and molecules (water, carbon dioxide, calcium, gold, silver, etc.) • Show the periodic table and point out various elements • Discuss and explain the implications of how this is possible. **VOCABULARY** • Atom-the basic unit of an element • Element- substance that cannot be broken down into any simpler parts. Found on the periodic table of elements • Compound- two or more elements that are combined	

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Enduring Knowledge 6: *Matter can change from one form to another.*		
A. Many substances can be changed from one state to another by heating and cooling. **B. Predict the effects of heating and cooling on the physical state and mass of a substance.** **C. Distinguish between chemical and physical changes.**	**ACTIVITY** • Adding heat can change a substance from a solid, to a liquid, to a gas. • Predict and explain how mass and volume of an ice cube will be affected when heat is applied. • Predict and explain what happens when a common substance, such as shortening or candle wax, is heated to melting and then cooled to a solid. • Observe evidence of simple chemical changes or reactions. (Rusted nail, vinegar and baking soda, burning match). **VOCABULARY** • Melt- to change from a solid to a liquid • Boil- to change from a liquid to a gas • Evaporate- to change from a liquid to a gas without boiling • Condense-to change from a gas to a liquid • Freeze- to change from a liquid to a solid	

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Enduring Knowledge 7: *Energy is transferred.*		
A. Discuss how food's chemical energy is passed from reducer to consumer; the Sun is the primary source of energy for plants and animals. **B. Nutrition is essential to the health of an organism.**	**ACTIVITY** • Discuss plants and animals as producers of food (plants use light energy from the sun to make chemical energy). • Create food webs and chains illustrating the consumers of food energy from producers. • Nutrition involves proteins, lipids, and carbohydrates. Use nutrition facts on various foods to investigate the nutrients that humans consume. **VOCABULARY** • Nutrients-a substance that provides nourishment that is essential for growth • Carbohydrate- sugars, starches, and fibers that are essential for life • Proteins- long chains of elements that nourish the body and are essential for life • Lipids- fats and waxes that are essential for life • Vitamins- nutrients that are required, in small amounts, for life • Food Plate- nutrition guide • Calorie- unit of energy	

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Enduring Knowledge 8: *Energy and matter interact through forces that result in changes in motion.*		
A. Energy is needed to change the motion of objects and can be understood in terms of forces. **B. Define and introduce various types of forces including friction, gravity, and magnetism.**	**ACTIVITY** • Define and explore pushes and pulls. • Investigate and describe how different amounts of force can change the position or direction of motion. • Have students use hands-on objects to investigate what forces might be acting upon them. • Explain gravitational forces between two objects, such as the sun and planets, moon and Earth, Earth and object. **VOCABULARY** • Force- a motion that puts an object into motion • Push- a force that moves an object away from the source of the motion • Pull- a force that moves an object toward the source of the motion • Gravity- pulling force between two objects, such as you and the earth • Friction- a force that occurs when two forces rub against each other • Kinetic Energy- energy in motion • Potential Energy- energy at rest	

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Enduring Knowledge 9: *The motion of objects can be observed and measured.*		
A. Understand that everything is constantly moving. **B. Motion is a change in position over time.**	**ACTIVITY** • Collect evidence of motion and inertia using basketballs and marbles on ramps. • Measure and calculate speed using matchbox cars. • Predict speed, path or distance of various objects changing the amount of force and surfaces. **VOCABULARY** • Motion- change in the position of an object • Speed- how fast a certain object moves over a certain distance • Distance- the amount of space between two objects	

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Enduring Knowledge 10: *Mechanical Energy may cause a change in motion through the use of simple machines.*		
A. Investigate simple machines and their uses; purpose and function of simple machines. **B. Construct a problem solving machine using one or more simple machines.**	**ACTIVITY** • Provide hands-on activities in which students can explore various types of simple machines. • Assign a project in which students use a combination of simple machines to solve a problem (Leprechaun trap). **VOCABULARY** • Simple Machine- a machine with few or no moving parts • Lever- simple machine that contains a fixed bar that moves from one point called a fulcrum • Pulley- simple machine that uses a rope and wheel to move an object • Wedge- a simple machine that forces two objects apart • Wheel and Axle- simple machine that consists of a wheel that moves around a post • Inclined Plane- simple machine with a flat surface that is raised at one end • Screw- a simple machine where an inclined plane is wrapped into a spiral • Compound Machine- two or more simple machines working together	

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Enduring Knowledge 11: *Light Energy has a source and travels in a direction.*		
A. Light allows an object to be seen when it is reflected to a viewer's eye. Objects cannot be seen without light. **B. Light can be reflected and absorbed.** **C. Light maintains direction of motion until it interacts with another object.** **D. Demonstrate that shadows result from light not being able to pass through an object.**	**ACTIVITY** • Collect evidence that validates the principle that if there is no light, objects cannot be seen. • Investigate with flashlights as well as other light sources and describe how light rays reflect off objects. • Demonstrate how prisms can be used to show how visible light is made up of different colors combined. • Predict the path of reflected or refracted light using lasers. Investigate how telescopes use this process. • Explain what occurs when light rays are blocked (Shadows). • Model and explain current technologies used to capture solar energy for the purposes of converting to electrical energy. **VOCABULARY** • Light- a form of energy that allows you to see objects • Shadow- dark space that forms when light is blocked • Conductor- a material that allows energy to pass • Insulator- a material that does not allow energy to pass	

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Enduring Knowledge 12: *Sound is an energy that travels in a direction as a wave.*		
A. Discuss waves and wave properties. **B. Sound energy changes depending on direction, materials it travels through (medium) and reflection of the sound.**	**ACTIVITY** • Experiment with Slinkys and make observations. • Explore, observe and explain how sound is transmitted, reflected, absorbed through a variety of materials. Use various instruments or objects to demonstrate how sound energy travels. **VOCABULARY** • Sound- a form of energy that comes from things that vibrate • Waves- the way in which energy moves • Reflection- to bounce off a surface • Absorbed- to consume • Refract- to bend • Vibration- the rapid back and forth movement that produces sound	

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Enduring Knowledge 13: ***Thermal (heat) Energy moves in a predictable flow from warmer objects to cooler objects until all the objects are at the same temperature.***		
A. Discuss how thermal energy involves the movement of molecules. **B. Heat results when substances burn, when certain materials rub against each other, and when electricity flows through wires.** **C. Metals are good conductors of heat and other materials do not conduct (insulators)**	**ACTIVITY** • Experiment with food coloring in warm and cold water. • Compare the heating of different colors in sunlight. • Draw and label diagrams showing several examples that thermal energy can be transferred from one place to another. • Compare the flow of hear in metals and nonmetals. • Demonstrate friction with different materials. **VOCABULARY** • Heat- to flow of energy from warmer objects to cooler objects • Temperature- a measure of heat • Transfer- to change or move from one object to another • Conductor- a material that allows energy to flow • Insulator- a material that slows or stops the flow of energy	

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Enduring Knowledge 14: *Magnetism is a force of attraction.*		
A. Know that magnets have two poles, north and south, and that like poles repel while opposite poles attract. **B. Understand that magnets are attracted to objects containing iron and this understanding can be useful in everyday applications.**	**ACTIVITY** • Offer opportunities to explore what happens when like and opposite poles of magnets are placed near each other. • Have students build a simple compass or practice with compasses and use it to detect magnetic effects, including the earth's magnetic field. **VOCABULARY** • Magnetism- a force that attracts or repels	

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Enduring Knowledge 15: *Electricity is a form of energy that flows as electrical charges.*		
A. Electrical circuits require a complete loop through conducting materials in which an electrical current can pass. **B. Understand that simple circuits need an energy source, a path and a load.**	**ACTIVITY** • Repair an electrical circuit by completing a closed loop that includes wires, batteries, and at least one other electrical component to produce an observable change. • Build and compare series and parallel circuits, • Draw diagrams of the circuits, and predict if electricity will be able to flow through the circuit. • Experiment with materials to explore conductors and insulators of electricity. **VOCABULARY** • Circuit- path that is made of parts that work together to allow energy to move • Electric Current- flow of charged particles	