

New Jersey Science Standards 2009	ESS Presentations	K-2 Product
<p><b>5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</b></p>		
<p><b>A. Properties of Matter : All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.</b></p>		
<p><b>By the end of grade 2...</b></p>		3-5 Product
<p>5.2.2.A.1 Living and nonliving things are made of parts and can be described in terms of the materials of which they are made and their physical properties. Sort and describe objects based on the materials of which they are made and their physical properties.</p>	<p>Marvellous Materials Materials Matter</p>	
<p>5.2.2.A.2 Matter exists in several different states; the most commonly encountered are solids, liquids, and gases. Liquids take the shape of the part of the container they occupy. Solids retain their shape regardless of the container they occupy. Identify common objects as solids, liquids, or gases.</p>	<p>Changing State</p>	
<p><b>By the end of grade 4...</b></p>		
<p>5.2.4.A.1 Identify objects that are composed of a single substance and those that are composed of more than one substance using simple tools found in the classroom.</p>		
<p>5.2.4.A.2 Each state of matter has unique properties (e.g., gases can be compressed, while solids and liquids cannot; the shape of a solid is independent of its container; liquids and gases take the shape of their containers). Plan and carry out an investigation to distinguish among solids, liquids, and gasses.</p>	<p>Changing State</p>	
<p>5.2.4.A.3 Objects and substances have properties, such as weight and volume, that can be measured using appropriate tools. Unknown substances can sometimes be identified by their properties. Determine the weight and volume of common objects using appropriate tools.</p>	<p>Gravity</p>	
<p>5.2.4.A.4 Objects vary in the extent to which they absorb and reflect light and conduct heat (thermal energy) and electricity. Categorize objects based on the ability to absorb or reflect light and conduct heat or electricity.</p>	<p>Insulators and Conductors Reflection and Refraction</p>	
<p><b>B. Changes in Matter : Substances can undergo physical or chemical changes to form new substances. Each change involves energy.</b></p>		
<p><b>By the end of grade 2...</b></p>		
<p>5.2.2.B.1 Generate accurate data and organize arguments to show that not all substances respond the same way when heated or cooled, using common materials, such as shortening or candle wax.</p>	<p>Hot and Cold Changing State</p>	

<b>By the end of grade 4...</b>	
5.2.4.B.1 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.	Changing State
<b>C. Forms of Energy : Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.</b>	
<b>By the end of grade 2...</b>	
5.2.2.C.1 Compare, citing evidence, the heating of different colored objects placed in full sunlight.	
5.2.2.C.2 An object can be seen when light strikes it and is reflected to a viewer's eye. If there is no light, objects cannot be seen. Apply a variety of strategies to collect evidence that validates the principle that if there is no light, objects cannot be seen.	Senses
5.2.2.C.3 When light strikes substances and objects through which it cannot pass, shadows result. Present evidence that represents the relationship between a light source, solid object, and the resulting shadow.	Shadows Light and Dark
<b>By the end of grade 4...</b>	
5.2.4.C.1 Heat (thermal energy), electricity, light, and sound are forms of energy. Compare various forms of energy as observed in everyday life and describe their applications.	Energy Forms
5.2.4.C.2 Heat (thermal energy) results when substances burn, when certain kinds of materials rub against each other, and when electricity flows through wires. Metals are good conductors of heat (thermal energy) and electricity. Increasing the temperature of any substance requires the addition of energy. Compare the flow of heat through metals and nonmetals by taking and analyzing measurements.	Insulators and Conductors
5.2.4.C.3 Energy can be transferred from one place to another. Heat energy is transferred from warmer things to colder things. Draw and label diagrams showing several ways that energy can be transferred from one place to another.	Energy Forms Predicting the Weather
5.2.4.C.4 Light travels in straight lines. When light travels from one substance to another (air and water), it changes direction. Illustrate and explain what happens when light travels from air into water.	Reflection and Refraction
<b>D. Energy Transfer and Conservation : The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.</b>	
<b>By the end of grade 2...</b>	
5.2.2.D.1 Predict and confirm the brightness of a light, the volume of sound, or the amount of heat when given the number of batteries, or the size of batteries.	Circuits
<b>By the end of grade 4...</b>	

5.2.4.D.1 Repair an electric circuit by completing a closed loop that includes wires, a battery (or batteries), and at least one other electrical component to produce observable change.	Circuits
<b>E. Forces and Motion : It takes energy to change the motion of objects. The energy change is understood in terms of forces.</b>	
<b>By the end of grade 2...</b>	
5.2.2.E.1 Objects can move in many different ways (fast and slow, in a straight line, in a circular path, zigzag, and back and forth). Investigate and model the various ways that inanimate objects can move.	Feel the Force Magnets Springs Friction
5.2.2.E.2 A force is a push or a pull. Pushing or pulling can move an object. The speed an object moves is related to how strongly it is pushed or pulled. When an object does not move in response to a push or a pull, it is because another push or pull (friction) is being applied by the environment. Predict an object's relative speed, path, or how far it will travel using various forces and surfaces.	Feel the Force Magnets Springs Friction
5.2.2.E.3 Some forces act by touching, while other forces can act without touching. Distinguish a force that acts by direct contact with an object (e.g., by pushing or pulling) from a force that can act without direct contact (e.g., the attraction between a magnet and a steel paper clip).	Feel the Force Magnets Springs
<b>By the end of grade 4...</b>	
5.2.4.E.1 Demonstrate through modeling that motion is a change in position over a period of time.	
5.2.4.E.2 There is always a force involved when something starts moving or changes its speed or direction of motion. A greater force can make an object move faster and farther. Identify the force that starts something moving or changes its speed or direction of motion.	Friction Forces
5.2.4.E.3 Magnets can repel or attract other magnets, but they attract all matter made of iron. Magnets can make some things move without being touched. Investigate and categorize materials based on their interaction with magnets.	Magnets
5.2.4.E.4 Earth pulls down on all objects with a force called gravity. Weight is a measure of how strongly an object is pulled down toward the ground by gravity. With a few exceptions, objects fall to the ground no matter where they are on Earth. Investigate, construct, and generalize rules for the effect that force of gravity has on balls of different sizes and weights.	Gravity

<p><b>5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.</b></p>	
<p><b>A. Organization and Development : Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.</b></p>	
<p><b>By the end of grade 2...</b></p>	
<p>5.3.2.A.1 Living organisms: exchange nutrients and water with the environment, reproduce, grow and develop in a predictable manner. Group living and nonliving things according to the characteristics that they share.</p>	<p>Animals and Plants Living Things Growing Up Habitats</p>
<p><b>By the end of grade 4...</b></p>	
<p>5.3.4.A.1 Living organisms: interact with and cause changes in their environment, exchange materials (such as gases, nutrients, water, and waste) with the environment, reproduce, grow and develop in a predictable manner. Develop and use evidence-based criteria to determine if an unfamiliar object is living or nonliving.</p>	<p>Living Things Growing Plants Growing Up Plant Reproduction</p>
<p>5.3.4.A.2 Essential functions required for the well-being of an organism are carried out by specialized structures in plants and animals. Compare and contrast structures that have similar functions in various organisms, and explain how those functions may be carried out by structures that have different physical appearances.</p>	<p>Body Systems Plant Reproduction</p>
<p>5.3.4.A.3 Essential functions of the human body are carried out by specialized systems: digestive, circulatory, respiratory, nervous, skeletal, muscular, reproductive. Describe the interactions of systems involved in carrying out everyday life activities.</p>	<p>Body Systems</p>
<p><b>B. Matter and Energy Transformations : Food is required for energy and building cellular materials. Organisms in an ecosystem have different ways of obtaining food, and some organisms obtain their food directly from other organisms.</b></p>	
<p><b>By the end of grade 2...</b></p>	
<p>5.3.2.B.1 A source of energy is needed for all organisms to stay alive and grow. Both plants and animals need to take in water, and animals need to take in food. Plants need light. Describe the requirements for the care of plants and animals related to meeting their energy needs.</p>	<p>Animals and Plants Living Things Growing Plants</p>
<p>5.3.2.B.2 Animals have various ways of obtaining food and water. Nearly all animals drink water or eat foods that contain water. Compare how different animals obtain food and water.</p>	

5.3.2.B.3 Most plants have roots to get water and leaves to gather sunlight. Explain that most plants get water from soil through their roots and gather light through their leaves.	Growing Plants
<b>By the end of grade 4...</b>	
5.3.4.B.1 Almost all energy (food) and matter can be traced to the Sun. Identify sources of energy (food) in a variety of settings (farm, zoo, ocean, forest).	Food Chains
<b>C. Interdependence : All animals and most plants depend on both other organisms and their environment to meet their basic needs.</b>	
<b>By the end of grade 2...</b>	
5.3.2.C.1 Organisms interact and are interdependent in various ways; for example, they provide food and shelter to one another. Describe the ways in which organisms interact with each other and their habitats in order to meet basic needs.	Growing Plants Living Things Habitats Interdependence
5.3.2.C.2 Identify the characteristics of a habitat that enable the habitat to support the growth of many different plants and animals.	
5.3.2.C.3 Communicate ways that humans protect habitats and/or improve conditions for the growth of the plants and animals that live there, or ways that humans might harm habitats.	Habitats
<b>By the end of grade 4...</b>	
5.3.4.C.1 Predict the biotic and abiotic characteristics of an unfamiliar organism's habitat.	Habitats Adaptations
5.3.4.C.2 Explain the consequences of rapid ecosystem change (e.g., flooding, wind storms, snowfall, volcanic eruptions), and compare them to consequences of gradual ecosystem change (e.g., gradual increase or decrease in daily temperatures, change in yearly rainfall).	Adaptations
<b>D. Heredity and Reproduction : Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.</b>	
<b>By the end of grade 2...</b>	
5.3.2.D.1 Record the observable characteristics of plants and animals to determine the similarities and differences between parents and their offspring.	Growing Up
5.3.2.D.2 Determine the characteristic changes that occur during the life cycle of plants and animals by examining a variety of species, and distinguish between growth and development.	Growing Up
<b>By the end of grade 4...</b>	
5.3.4.D.1 Compare the physical characteristics of the different stages of the life cycle of an individual organism, and compare the characteristics of life stages among species.	Growing Up Plant Reproduction

<b>E. Evolution and Diversity: : Sometimes, differences between organisms of the same kind provide advantages for surviving and reproducing in different environments. These selective differences may lead to dramatic changes in characteristics of organisms in a population over extremely long periods of time.</b>	
<b>By the end of grade 2...</b>	
5.3.2.E.1 Describe similarities and differences in observable traits between parents and offspring.	Growing Up
5.3.2.E.2 Describe how similar structures found in different organisms (e.g., eyes, ears, mouths) have similar functions and enable those organisms to survive in different environments.	
<b>By the end of grade 4...</b>	
5.3.4.E.1 Individuals of the same species may differ in their characteristics, and sometimes these differences give individuals an advantage in surviving and reproducing in different environments. Model an adaptation to a species that would increase its chances of survival, should the environment become wetter, dryer, warmer, or colder over time.	Adaptations
5.3.4.E.2 In any ecosystem, some populations of organisms thrive and grow, some decline, and others do not survive at all. Evaluate similar populations in an ecosystem with regard to their ability to thrive and grow.	Adaptations
<b>5.4 Earth Systems Science: All students will understand that Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all-encompassing system of the universe.</b>	
<b>A. Objects in the Universe : Our universe has been expanding and evolving for 13.7 billion years under the influence of gravitational and nuclear forces. As gravity governs its expansion, organizational patterns, and the movement of celestial bodies, nuclear forces within stars govern its evolution through the processes of stellar birth and death. These same processes governed the formation of our solar system 4.6 billion years ago.</b>	
<b>By the end of grade 2...</b>	
5.4.2.A.1 The Sun is a star that can only be seen during the day. The Moon is not a star and can be seen sometimes at night and sometimes during the day. The Moon appears to have different shapes on different days. Determine a set of general rules describing when the Sun and Moon are visible based on actual sky observations.	Weather Shadows The Moon
<b>By the end of grade 4...</b>	
5.4.4.A.1 Formulate a general description of the daily motion of the Sun across the sky based on shadow observations. Explain how shadows could be used to tell the time of day.	Shadows

5.4.4.A.2 The observable shape of the Moon changes from day to day in a cycle that lasts 29.5 days. Identify patterns of the Moon's appearance and make predictions about its future appearance based on observational data.	The Moon
5.4.4.A.3 Earth is approximately spherical in shape. Objects fall towards the center of the Earth because of the pull of the force of gravity. Generate a model with explanatory value that explains both why objects roll down ramps as well as why the Moon orbits Earth.	Gravity Forces Our Solar System
5.4.4.A.4 Earth is the third planet from the Sun in our solar system, which includes seven other planets. Analyze and evaluate evidence in the form of data tables and photographs to categorize and relate solar system objects (e.g., planets, dwarf planets, moons, asteroids, and comets).	Our Solar System
<b>B. History of Earth : From the time that Earth formed from a nebula 4.6 billion years ago, it has been evolving as a result of geologic, biological, physical, and chemical processes.</b>	
<b>By the end of grade 4...</b>	
5.4.4.B.1 Fossils provide evidence about the plants and animals that lived long ago, including whether they lived on the land or in the sea as well as ways species changed over time. Use data gathered from observations of fossils to argue whether a given fossil is terrestrial or marine in origin.	Fossils
<b>C. Properties of Earth Materials : Earth's composition is unique, is related to the origin of our solar system, and provides us with the raw resources needed to sustain life.</b>	
<b>By the end of grade 2...</b>	
5.4.2.C.1 Soils are made of many living and nonliving substances. The attributes and properties of soil (e.g., moisture, kind and size of particles, living/organic elements, etc.) vary depending on location. Describe Earth materials using appropriate terms, such as hard, soft, dry, wet, heavy, and light.	Soil
<b>By the end of grade 4...</b>	
5.4.4.C.1 Rocks can be broken down to make soil. Create a model to represent how soil is formed.	
5.4.4.C.2 Categorize unknown samples as either rocks or minerals.	
<b>D. Tectonics : The theory of plate tectonics provides a framework for understanding the dynamic processes within and on Earth.</b>	
<i>No standards at this level.</i>	
<b>E. Energy in Earth Systems : Internal and external sources of energy drive Earth systems.</b>	
<b>By the end of grade 2...</b>	

5.4.2.E.1 Describe the relationship between the Sun and plant growth.	Growing Plants
<b>By the end of grade 4...</b>	
5.4.4.E.1 Land, air, and water absorb the Sun's energy at different rates. Develop a general set of rules to predict temperature changes of Earth materials, such as water, soil, and sand, when placed in the Sun and in the shade.	
<b>F. Climate and Weather : Earth's weather and climate systems are the result of complex interactions between land, ocean, ice, and atmosphere.</b>	
<b>By the end of grade 2...</b>	
5.4.2.F.1 Current weather conditions include air movement, clouds, and precipitation. Observe and document daily weather conditions and discuss how the weather influences your activities for the day.	Weather
<b>By the end of grade 4...</b>	
5.4.4.F.1 Weather changes that occur from day to day and across the seasons can be measured and documented using basic instruments such as a thermometer, wind vane, anemometer, and rain gauge. Identify patterns in data collected from basic weather instruments.	Weather Predicting the Weather
<b>G. Biogeochemical Cycles : The biogeochemical cycles in the Earth systems include the flow of microscopic and macroscopic resources from one reservoir in the hydrosphere, geosphere, atmosphere, or biosphere to another, are driven by Earth's internal and external sources of energy, and are impacted by human activity.</b>	
<b>By the end of grade 2...</b>	
5.4.2.G.1 Observe and discuss evaporation and condensation.	Changing State
5.4.2.G.2 There are many sources and uses of water. Identify and use water conservation practices.	Water Cycle Pollution
5.4.2.G.3 Identify and categorize the basic needs of living organisms as they relate to the environment.	Living Things Growing Plants Growing Up
5.4.2.G.4 Identify the natural resources used in the process of making various manufactured products.	Marvellous Materials Materials Matter Changing Materials
<b>By the end of grade 4...</b>	
5.4.4.G.1 Clouds and fog are made of tiny droplets of water and, at times, tiny particles of ice. Explain how clouds form.	Water Cycle Predicting the Weather
5.4.4.G.2 Observe daily cloud patterns, types of precipitation, and temperature, and categorize the clouds by the conditions that form precipitation.	Weather Predicting the Weather

5.4.4.G.3 Trace a path a drop of water might follow through the water cycle.	Water Cycle
5.4.4.G.4 Model how the properties of water can change as water moves through the water cycle.	Water Cycle Changing State