



## North Carolina Essential Standards 3-5 Science

Note on Numbering:

*Physical Science (P) Earth Science (E) Life Science (L)*

The North Carolina Science Essential Standards maintain the respect for local control of each Local Education Authority (LEA) to design the specific curricular and instructional strategies that best deliver the content to their students. Nonetheless, engaging students in inquiry-based instruction is a critical way of developing conceptual understanding of the science content that is vital for success in the twenty-first century. The process of scientific inquiry, experimentation and technological design should not be taught nor tested in isolation of the core concepts drawn from physical science, earth science and life science. A seamless integration of science content, scientific inquiry, experimentation and technological design will reinforce in students the notion that "what" is known is inextricably tied to "how" it is known. A well-planned science curriculum provides opportunities for inquiry, experimentation and technological design. Teachers, when teaching science, should provide opportunities for students to engage in "hands-on/minds-on" activities that are exemplars of scientific inquiry, experimentation and technological design.

### 3<sup>rd</sup> Grade

#### Science as Inquiry

As students progress through the grade levels, their strategies for finding solutions to questions improve as they gain experience conducting simple investigations and working in small groups. They are capable of asking questions and make predictions that can be tested. Students must be encouraged to make more careful observations and measure things with increasing accuracy. During investigations, students must have opportunity to use more advanced tools such as calculators, computers, graduated cylinders, scales and meter sticks to gather data and extend their senses. They must keep accurate records and run enough trials to be confident of their results to test a prediction. They must have experiences that allow them to recognize patterns in data and use data to create reasonable explanations of results of an experiment or investigation. They should be encouraged to employ more sophisticated language, drawings, models, charts and graphs to communicate results and explanations. Students must always use appropriate safety procedures, including listening skills, when conducting simple investigations.

### Forces and Motion

	Essential Standard	Clarifying Objectives	
3.P.1	<b>Understand motion and factors that affect motion.</b>	3.P.1.1	Infer changes in speed or direction resulting from forces acting on an object.
		3.P.1.2	Compare the relative speeds (faster or slower) of objects that travel the same distance in different amounts of time.
		3.P.1.3	Explain the effects of earth's gravity on the motion of any object on or near the earth.

### Matter: Properties and Change

	Essential Standard	Clarifying Objectives	
3.P.2	<b>Understand the structure and properties of matter before and after they undergo a change.</b>	3.P.2.1	Recognize that air is a substance that surrounds us, takes up space and has mass.
		3.P.2.2	Compare solids, liquids, and gases based on their basic properties.
		3.P.2.3	Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water.

### Energy: Conservation and Transfer

	Essential Standard	Clarifying Objectives	
3.P.3	<b>Recognize how energy can be transferred from one object to another.</b>	3.P.3.1	Recognize that energy can be transferred from one object to another by rubbing them against each other.
		3.P.3.2	Recognize that energy can be transferred from a warmer object to a cooler one by contact or at a distance and the cooler object gets warmer.

### Earth in the Universe

	Essential Standard	Clarifying Objectives	
3.E.1	<b>Recognize the major components and patterns observed in the earth/moon/sun system.</b>	3.E.1.1	Recognize that the earth is part of a system called the solar system that includes the sun (a star), planets, and many moons and the earth is the third planet from the sun in our solar system.
		3.E.1.2	Recognize that changes in the length and direction of an object's shadow indicate the apparent changing position of the Sun during the day although the patterns of the stars in the sky, to include the Sun, stay the same.

### Earth Systems, Structures and Processes

	Essential Standard	Clarifying Objectives	
3.E.2	<b>Compare the structures of the Earth's surface using models or three-dimensional diagrams.</b>	3.E.2.1	Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers).
		3.E.2.2	Compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands) by using models, pictures, diagrams, and maps.

### Structures and Functions of Living Organisms

	Essential Standard	Clarifying Objectives	
3.L.1	<b>Understand human body systems and how they are essential for life: protection, movement and support.</b>	3.L.1.1	Compare the different functions of the skeletal and muscular system.
		3.L.1.2	Explain why skin is necessary for protection and for the body to remain healthy.

### Ecosystems

	Essential Standard	Clarifying Objectives	
3.L.2	<b>Understand how plants survive in their environments.</b>	3.L.2.1	Remember the function of the following structures as it relates to the survival of plants in their environments: <ul style="list-style-type: none"> <li>• Roots – absorb nutrients</li> <li>• Stems – provide support</li> <li>• Leaves – synthesize food</li> <li>• Flowers – attract pollinators and produce seeds for reproduction</li> </ul>
		3.L.2.2	Explain how environmental conditions determine how well plants survive and grow.
		3.L.2.3	Summarize the distinct stages of the life cycle of seed plants.
		3.L.2.4	Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.

**4<sup>th</sup> Grade**

**Science as Inquiry**

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**Forces and Motion**

	Essential Standard	Clarifying Objectives	
<b>4.P.1</b>	<b>Explain how various forces affect the motion of an object.</b>	4.P.1.1	Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them.
		4.P.1.2	Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.

**Matter: Properties and Change**

	Essential Standard	Clarifying Objectives	
<b>4.P.2</b>	<b>Understand the composition and properties of matter before and after they undergo a change or interaction.</b>	4.P.2.1	Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire).
		4.P.2.2	Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak.
		4.P.2.3	Classify rocks as metamorphic, sedimentary or igneous based on their composition, how they are formed and the processes that create them.

### Energy: Conservation and Transfer

	Essential Standard	Clarifying Objectives	
4.P.3	<b>Recognize that energy takes various forms that may be grouped based on their interaction with matter.</b>	4.P.3.1	Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.
		4.P.3.2	Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.

### Earth in the Universe

	Essential Standard	Clarifying Objectives	
4.E.1	<b>Explain the causes of day and night and phases of the moon.</b>	4.E.1.1	Explain the cause of day and night based on the rotation of Earth on its axis.
		4.E.1.2	Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth.

### Earth History

	Essential Standard	Clarifying Objectives	
4.E.2	<b>Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms.</b>	4.E.2.1	Compare fossils (including molds, casts, and preserved parts of plants and animals) to one another and to living organisms.
		4.E.2.2	Infer ideas about Earth's early environments from fossils of plants and animals that lived long ago.
		4.E.2.3	Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.

## Ecosystems

	Essential Standard	Clarifying Objectives	
<b>4.L.1</b>	<b>Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.</b>	4.L.1.1	Give examples of changes in an organism’s environment that are beneficial to it and some that are harmful.
		4.L.1.2	Explain how animals meet their needs by using behaviors in response to information received from the environment.
		4.L.1.3	Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).
		4.L.1.4	Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.

## Molecular Biology

	Essential Standard	Clarifying Objectives	
<b>4.L.2</b>	<b>Understand food and the benefits of vitamins, minerals and exercise.</b>	4.L.2.1	Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth and repair of the body.
		4.L.2.2	Explain the role of vitamins, minerals and exercise in maintaining a healthy body.

## 5<sup>th</sup> Grade

### Science as Inquiry

As students progress through the grade levels, their strategies for finding solutions to questions improve as they gain experience conducting simple investigations and working in small groups. They are capable of asking questions and make predictions that can be tested. Students must be encouraged to make more careful observations and measure things with increasing accuracy. During investigations, students must have opportunity to use more advanced tools such as calculators, computers, graduated cylinders, scales and meter sticks to gather data and extend their senses. They must keep accurate records and run enough trials to be confident of their results to test a prediction. They must have experiences that allow them to recognize patterns in data and use data to create reasonable explanations of results of an experiment or investigation. They should be encouraged to employ more sophisticated language, drawings, models, charts and graphs to communicate results and explanations. Students must always use appropriate safety procedures, including listening skills, when conducting simple investigations.

### Forces and Motion

	Essential Standard	Clarifying Objectives	
<b>5.P.1</b>	<b>Understand force, motion and the relationship between them.</b>	5.P.1.1	Explain how factors such as gravity, friction, and change in mass affect the motion of objects.
		5.P.1.2	Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel.
		5.P.1.3	Illustrate the motion of an object using a graph to show a change in position over a period of time.
		5.P.1.4	Predict the effect of a given force or a change in mass on the motion of an object.

### Matter: Properties and Change

	Essential Standard	Clarifying Objectives	
<b>5.P.2</b>	<b>Understand the interactions of matter and energy and the changes that occur.</b>	5.P.2.1	Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).
		5.P.2.2	Compare the weight of an object to the sum of the weight of its parts before and after an interaction.
		5.P.2.3	Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.

**Energy: Conservation and Transfer**

	Essential Standard	Clarifying Objectives	
5.P.3	<b>Explain how the properties of some materials change as a result of heating and cooling.</b>	5.P.3.1	Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation)
		5.P.3.2	Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.

**Earth Systems, Structures and Processes**

	Essential Standard	Clarifying Objectives	
5.E.1	<b>Understand weather patterns and phenomena, making connections to the weather in a particular place and time.</b>	5.E.1.1	Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.
		5.E.1.2	Predict upcoming weather events from weather data collected through observation and measurements.
		5.E.1.3	Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.

**Structures and Functions of Living Organisms**

	Essential Standard	Clarifying Objectives	
5.L.1	<b>Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.</b>	5.L.1.1	Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
		5.L.1.2	Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.

## Ecosystems

	Essential Standard	Clarifying Objectives	
<b>5.L.2</b>	<b>Understand the interdependence of plants and animals with their ecosystem.</b>	5.L.2.1	Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.
		5.L.2.2	Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).
		5.L.2.3	Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

## Evolution and Genetics

	Essential Standard	Clarifying Objectives	
<b>5.L.3</b>	<b>Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.</b>	5.L.3.1	Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
		5.L.3.2	Give examples of likenesses that are inherited and some that are not.