SCIENCE

Students in kindergarten begin their science studies by using their five senses to observe animals, earth materials, weather, and other objects. The class setting should provide a stimulating atmosphere in which students are intellectually challenged to explore the physical world around them. Young students' natural curiosity leads them to investigate the world by observing and manipulating common objects and materials in their environment. Students learn to interpret their observations by collecting data on which they base their scientific explanations. Student learning of all three science strands is guided by the unifying concepts of evidence, exploration, and measurement.

Physical Science

Forces and Motion

Understand the positions and motions of objects and organisms observed in the environment.

1. Compare the relative position of various objects observed in the classroom and outside, using position words such as *in front of*, *behind*, *between*, *on top of*, *under*, *above*, *below*, and *beside*.
2. Give examples of different ways objects and organisms move (to include falling to the ground when dropped): straight, zigzag, round and round, back and forth, fast and slow.

Properties and Change

Understand how objects are described based on their physical properties and how they are used.

1. Classify objects by observable physical properties (including size, color, shape, texture, weight, and flexibility).
2. Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc.) from which objects are made and how they are used.

Earth Science

Earth Systems, Structures, and Processes

Understand change and observable patterns of weather that occur from day to day and throughout the year.

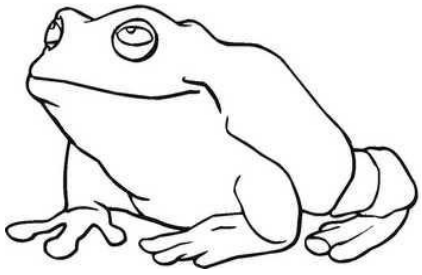
1. Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses.
2. Summarize daily weather conditions, noting changes that occur from day to day and throughout the year.
3. Compare weather patterns that occur from season to season.

Life Science

Structures and Functions of Living Organisms

Compare characteristics of animals that make them alike and different from other animals and nonliving things.

1. Compare different types of the same animal (i.e., different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal.
2. Compare characteristics of living and nonliving things in terms of their structure, growth, changes, movement, and basic needs.



SCIENCE

The goal for first grade focuses on students using their senses to make observations in the three strands of science. Students will explore forces and motion, Earth/Moon/Sun, and the characteristics of plants and animals, building on students' natural inclination to ask questions and investigate common objects in the natural world. Science education in first grade extends the foundation that began in kindergarten with the unifying concepts of evidence, explanation, and measurement. Students engage in active construction of ideas and explanations as they observe, collect data, and classify to provide types and levels of order and organization to their ideas.

Physical Science

Forces and Motion

Understand how forces (pushes or pulls) affect the motion of an object.

1. Explain the importance of a push or pull to changing the motion of an object.
2. Explain how some forces (pushes and pulls) can be used to make things move without touching them, such as magnets.
3. Predict the effect of a given force on the motion of an object, including balanced forces.

Earth Science

Earth in the Universe

Recognize the features and patterns of the Earth/Moon/Sun system as observed from Earth.

1. Recognize differences in the features of the day and night sky and apparent movement of objects across the sky as observed from Earth.
2. Recognize patterns of observable changes in the Moon's appearance from day to day.

Earth Systems, Structures, and Processes

Understand the physical properties of earth materials that make them useful in different ways.

1. Summarize the physical properties of Earth materials, including rocks, minerals, soils, and water that make them useful in different ways.
2. Compare the properties of soil samples from different places, relating their capacity to retain water, nourish, and support the growth of certain plants.

Life Science

Ecosystems

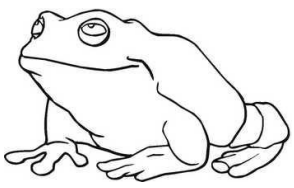
Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.

1. Recognize that plants and animals need air, water, light (plants only), space, food, and shelter and that these may be found in their environment.
2. Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places throughout the world.
3. Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering).

Molecular Biology

Summarize the needs of living organisms for energy and growth.

1. Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth.
2. Summarize the basic needs of a variety of different animals (including air, water, and food) for energy and growth.



SCIENCE

The goal for second grade students is focused on analyzing collected data over a period of time to make predictions and understand changes. Second graders are introduced to changes through the study of animal life cycles, weather, properties of matter, and sound. Changes vary in rate, scale, and pattern, including trends and cycles. Science education in the second grade builds on the unifying concepts previously introduced in kindergarten and first grade, including the use of evidence, explanation, measurement, order, and organization.

Physical Science

Forces and Motion

Understand the relationship between sound and vibrating objects.

1. Illustrate how sound is produced by vibrating objects and columns of air.
2. Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords.

Matter, Properties, and Change

Understand properties of solids and liquids and the changes they undergo.

1. Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling.
2. Compare the amount (volume and weight) of water in a container before and after freezing.
3. Compare what happens to water left in an open container over time as opposed to water left in a closed container.

Earth Science

Earth Systems, Structures, and Processes

Understand patterns of weather and factors that affect weather.

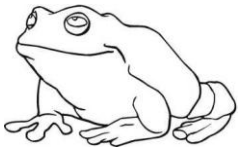
1. Summarize how energy from the sun serves as a source of light that warms the land, air, and water.
2. Summarize weather conditions using qualitative and quantitative measures to describe temperature, wind direction, wind speed, and precipitation.
3. Compare weather patterns that occur over time and relative observable patterns to time of day and time of year.
4. Recognize the tools that scientists use for observing, recording, and predicting weather changes from day to day and during the seasons.

Life Science

Structures and Functions of Living Organisms

Understand animal life cycles.

1. Summarize the life cycle of animals: birth; developing into an adult; reproducing; aging and death.
2. Compare life cycles of different animals such as, but not limited to, mealworms, ladybugs, crickets, guppies, or frogs.



Evolution and Genetics

Remember that organisms differ from or are similar to their parents based on the characteristics of the organism.

1. Identify ways in which many plants and animals closely resemble their parents in observed appearance and ways they are different.
2. Recognize that there is variation among individuals that are related.

SCIENCE

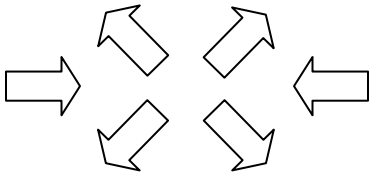
The goal for third grade students is focused on identifying systems and patterns in systems. Systems are the units of investigations. Students learn that a system is an interrelated group of objects or components that forms a functioning unit. The natural and human designed world is complex; it is too large and complicated for students to investigate and comprehend all at once. The third grade program allows students to identify small components of a system for in-depth investigation. Each investigational unit addresses a particular system. Force and motion, three states of matter, transfer of energy, plant life cycle, landforms, Earth/Moon/Sun, and the skeletal and muscle systems of the human body are investigated as systems.

Physical Science

Forces and Motion

Understand motion and factors that affect motion.

1. Infer changes in speed or direction resulting from forces acting on an object.
2. Compare the relative speeds (faster or slower) of objects that travel the same distance in different amounts of time.
3. Explain the effects of Earth's gravity on the motion of any object on or near the Earth.



Matter, Properties, and Change

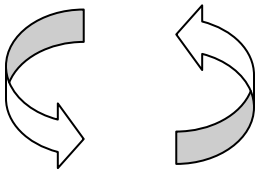
Understand the structure and properties of matter before and after they undergo a change.

1. Recognize that air is a substance that surrounds us, takes up space, and has mass.
2. Compare solids, liquids, and gases based on their basic properties.
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

Recognize how energy can be transferred from one object to another.

1. Recognize that energy can be transferred from one object to another by rubbing them against each other.
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 Science

Earth in the Universe

Recognize the major components and patterns observed in the Earth/Moon/Sun system.

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 that the Earth is the third planet from the sun in our solar system.
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, remain the same.

Earth Systems, Structures, and Processes

Compare the structures of the Earth's surface, using models or three-dimensional diagrams.

1. Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers).
2. Compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands) by using models, pictures, diagrams, and maps.

Life Science

Structures and Functions of Living Organisms

Understand human body systems and how they are essential for life: protection, movement, and support.

1. Compare the different functions of the skeletal and muscular systems.
2. Explain why skin is necessary for protection and for the body to remain healthy.

Ecosystems

Understand how plants survive in their environments.

1. Remember the function of the following structures as it relates to the survival of plants in their environments:
   - Roots – absorb nutrients
   - Stems – provide support
   - Leaves – synthesize food
   - Flowers – attract pollinators and produce seeds for reproduction
2. Explain how environmental conditions determine how well plants survive and grow.
3. Summarize the distinct stages of the life cycle of seed plants.
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.

SCIENCE

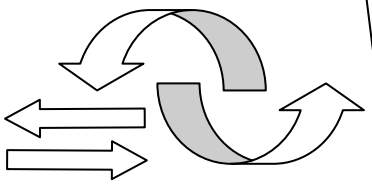
In fourth grade, students will analyze the systems of Forces and Motion, Properties of Matter, Rotation of the Earth, Fossils, Food and Nutrition, Environmental Changes, and Adaptations and Behaviors. Students will learn the properties of systems: they consist of combinations of organisms, objects, ideas, and numbers; they may be made up of subsystems; they have structure, function, feedback, and equilibrium; and they can be open or closed. Knowledge of these systems will give students an understanding of the interrelatedness of mass, energy, objects, and organization.

Physical Science

Forces and Motion

Explain how various forces affect the motion of an object.

1. Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them.
2. Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.



Matter, Properties, and Change

Understand the composition and properties of matter before and after they undergo a change or interaction.

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.
2. Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage, and streak.
3. Classify rocks as metamorphic, sedimentary or igneous based on their composition, how they are formed, and the processes that create them.

Solid **Liquid** **Gas**

Energy: Conservation and Transfer

Recognize that energy takes various forms that may be grouped based on their interaction with matter.

1. Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.
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 Science

Earth in the Universe

Explain the causes of day and night and phases of the moon.

1. Explain the cause of day and night, based on the rotation of Earth on its axis.
2. Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth.

Earth History

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.

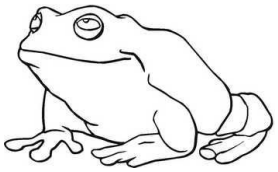
1. Compare fossils (including molds, casts, and preserved parts of plants and animals) to one another and to living organisms.
2. Infer ideas about Earth's early environments from fossils of plants and animals that lived long ago.
3. Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.

Life Science

Ecosystems

Understand the effects of environmental changes, adaptations, and behaviors that enable animals (including humans) to survive in changing habitats.

1. Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.
2. Explain how animals meet their needs by using behaviors in response to information received from the environment.
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. Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.



Molecular Biology

Understand food and the benefits of vitamins, minerals, and exercise.

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.
2. Explain the role of vitamins, minerals, and exercise in maintaining a healthy body.

SCIENCE

Fifth grade students focus on using evidence, models, and reasoning to form scientific explanations. Evidence consists of observations and data on which scientific explanations are based. Using evidence to understand interactions allows students to predict changes in natural and human-designed systems. Models are tentative schemes or structures constructed to represent real objects or processes. Models help students understand how things work. Explanations incorporate prior knowledge and new evidence from observations, experiments, or models into consistent, logical statements in the three strand of science. As students come to understand science concepts and processes, their explanations should become more accurate and logical.

Physical Science

Forces and Motion

Understand force, motion, and the relationship between them.

1. Explain how factors such as gravity, friction, and change in mass affect the motion of objects.
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.
3. Illustrate the motion of an object using a graph to show a change in position over a period of time.
4. Predict the effect of a given force or a change in mass on the motion of an object.

Matter, Properties, and Change

Understand the interactions of matter and energy and the changes that occur.

1. Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation, and runoff).
2. Compare the weight of an object to the sum of the weight of its parts before and after an interaction.
3. Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.

Energy: Conservation and Transfer

Explain how the properties of some materials change as a result of heating and cooling.

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).
2. Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.

Earth Science

Earth Systems, Structures, and Processes

Understand weather patterns and phenomena, making connections to the weather in a particular place and time.

1. Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.
2. Predict upcoming weather events from weather data collected through observation and measurements.
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.

Life Science

Structures and Functions of Living Organisms

Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.

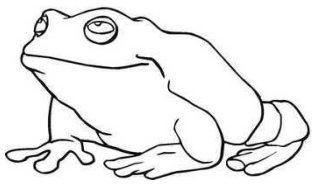
1. Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
2. Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.

Life Science (Continued)

Ecosystems

Understand the interdependence of plants and animals with their ecosystem.

1. Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.
2. Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).
3. Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.



Evolution and Genetics

Understand why organisms differ from or are similar to their parents, based on the characteristics of the organism.

1. Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
2. Give examples of likenesses that are inherited and some that are not.