



North Carolina Department of Public Instruction

INSTRUCTIONAL SUPPORT TOOLS

FOR ACHIEVING NEW STANDARDS

This document is designed to help North Carolina educators teach the Essential Standards (Standard Course of Study). NCDPI staff are continually updating and improving these tools to better serve teachers.

Essential Standards: Grade 4 Science • Unpacked Content

For the Essential Standards that will be effective in all North Carolina schools in the 2012-13 school year.

What is the purpose of this document?

To increase student achievement by ensuring educators understand specifically what the new standards mean a student must know, understand and be able to do.

What is in the document?

Descriptions of what each standard means a student will know, understand and be able to do. The “unpacking” of the standards done in this document is an effort to answer a simple question “What does this standard mean that a student must know and be able to do?” and to ensure the description is helpful, specific and comprehensive for educators.

How do I send Feedback?

We intend the explanations and examples in this document to be helpful and specific. That said, we believe that as this document is used, teachers and educators will find ways in which the unpacking can be improved and made ever more useful. Please send feedback to us at feedback@dpi.state.nc.us and we will use your input to refine our unpacking of the standards. Thank You!

Just want the standards alone?

You can find the standards alone at <http://www.ncpublicschools.org/docs/acre/standards/phase1/science/3-5.pdf>.

Forces and Motion

Essential Standard and Clarifying Objectives

4.P.1 Explain how various forces affect the motion of an object.

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.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.P.1.1

Students know that a magnet pulls on all things made of iron without touching them, and that this pulling can result in motion. Students know that a magnet attracts some metals, but not all of them. Students know that a magnet has a force field and poles that determine how a metal affected by the magnet will behave within its field.

4.P.1.2

Students know that an object that has been electrically charged pulls or pushes on all other charged objects and that this can result in motion. Students know that electrical charges can result in attraction, repulsion or electrical discharge.

Matter: Properties and Change

Essential Standard and Clarifying Objectives

4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction.

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.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.P.2.1

Students know that samples of matter have many observable properties that can be measured. Students know that samples of matter can be described according to the characteristics of the materials they are made from. Students are familiar with, and can test for the following properties: strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water (dissolve) and heat/fire (melt, evaporate).

4.P.2.2

Students know that minerals can be identified by using particular tests. Students know how to perform tests for hardness and streak. Students are able to describe the color, luster, and cleavage of a mineral.

4.P.2.3

Students know that rocks are classified as metamorphic, igneous or sedimentary, and that these classifications are based on the processes that created the rock. Igneous rocks are formed from molten rock. Sedimentary rocks are formed from deposited rock particles (sediments) that are then compacted. Igneous and sedimentary rocks can be transformed into metamorphic rocks through the application of heat and pressure over

long periods of time.

Energy: Conservation and Transfer

Essential Standard and Clarifying Objectives

4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.

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.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.P.3.1

Students know basic forms of energy: light, heat, sound, electrical, and energy of motion. Students know that electricity flowing through an electrical circuit produces magnetic effects in the wires. In an electrical circuit containing a battery, a bulb, and a bell, energy from the battery is transferred to the bulb and the bell, which in turn transfer the energy to their surroundings as light, sound, and heat (thermal energy).

4.P.3.2

Students know that light travels in a straight line. Students know that light can be refracted, reflected, and/or absorbed.

Earth in the Universe

Essential Standard and Clarifying Objectives

4.E.1 Explain the causes of day and night and phases of the moon.

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.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.E.1.1

Students know that the Earth rotates on an axis and that this rotation causes one side of our planet to receive light rays from the sun while the other side is in darkness (day/night). This rotation occurs over a 24-hour period.

4.E.1.2

Students know that the moon rotates and revolves around the Earth. The moon's appearance (phase) is determined by its position relative to the Earth and the Sun. The appearance of the moon changes in a specific pattern and repeats this sequence over the course of approximately 28 days. During part of this cycle, the moon's visible portion appears to grow larger (waxes). This is followed by a period during which the moon's visible portion appears to reduce in size (waning). Students are familiar with the following phases of the moon: New Moon, First Quarter, Full Moon, and Last Quarter.

Earth History

Essential Standard and Clarifying Objectives

4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of the Earth and its changing life forms.

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.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.E.2.1

Students know that fossils are evidence of living organisms that once existed on Earth. Students know that fossils share some characteristics based on where, how, and from what they formed. Students know that some organisms that lived long ago are similar to existing organisms, but some are quite different. Students know that organisms that are alive today, will, under the right conditions, leave fossil evidence.

4.E.2.2

Students know that fossils provide information about the environmental conditions that existed when the fossil organism was alive, as well as information about where, when and how, the organism lived.

4.E.2.3

Students know that the surface of the earth changes over time. Students know that there are many factors that contribute to these changes. Students know that such changes may be slow or rapid, subtle or drastic. Erosion and weathering are processes that change the Earth. Wind, water (including ice), and chemicals break down rock and can carry soil from one place to another. Under the right conditions, gravity can cause large sections of soil and rock to move suddenly down an incline. This is known as a landslide. Volcanic eruptions occur when heat and

pressure of melted rock and gases under the ground cause the crust of the Earth to crack and release these materials. Solid rock can deform or break if it is subject to sufficient pressure. The vibration produced by this is called an earthquake.

Ecosystems

Essential Standard and Clarifying Objectives

4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.

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.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.L.1.1

Students know that for any particular environment, some kinds of plants and animals survive well, some survive less well and some do not survive at all. When the insect population grows in an area that is frequented by insect eating birds, this is advantageous for the birds.

Conversely, if the insect populations are decreased by disease in a similar scenario, the population of birds would be stressed and likely, reduced.

4.L.1.2

Students know that animals collect information about the environment using their senses. Animals also exhibit instinctive (inborn) behaviors that help them to survive. Students know that in animals, the brain processes information, and signals the performance of behaviors that help the organism survive.

4.L.1.3

Students know that humans can adapt their behavior in order to conserve the materials and preserve the ecological systems that they depend on for survival.

4.L.1.4

Students know that there is variation among individuals of one kind within a population. Students know that sometimes this variation results in individuals having an advantage in surviving and reproducing. Survival advantage is not something that is acquired by an organism through choice; rather it is the result of characteristics that the organism already possesses.

Molecular Biology

Essential Standard and Clarifying Objectives

4.L.2 Understand food and the benefits of vitamins, minerals and exercise.

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 and minerals, and exercise in maintaining a healthy body.

Unpacking

What does this standard mean a child will know, understand and be able to do?

4.L.2.1

Students know that living things derive their energy from food. Plants produce their own food, while other organisms must consume plants or other organisms in order to meet their food (energy) needs.

4.L.2.2

Students know that humans have needs for vitamins, minerals, and exercise in order to remain healthy. Students know that vitamins and minerals are found in healthy foods, as well as dietary supplements. Students also know that movement is essential to the growth, development and maintenance of the human body and its systems.