



**Portsmouth School Department**  
**\*\*\*FINAL\*\*\***  
**Power Standards in Science**

**MAY 2010**

DGEORGE

## **Kindergarten Science Power Standards**

### **Earth Science**

- Describe weather changes from day to day and over the seasons.

**ESS1** - The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes

S:ESS1:2:1.1 Recognize that weather conditions change frequently, and that weather patterns change over the seasons.

S:ESS1:2:1.2 Describe and compare weather using observations and measurements of local weather conditions.

### **Life Science**

- Distinguish between living and non-living.
- Recognize that living things have a life cycle.
- Recognize that all living things have basic needs.

**LS1** - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:2:1.1 Differentiate between living and nonliving things, and categorize objects in each group using the significant observable characteristics they share, such as color, shape and size.

S:LS1:2:3.2 Recognize living things have a life cycle, during which they are born, grow, and die.

**LS2** – Energy flows and matter recycles through an ecosystem.

S:LS2:2:2.1 Identify the resources plants and animals need for growth and energy, and describe how their habitat provides these basic needs.

### **Physical Science**

- Demonstrate that magnets attract and repel different objects.
- Sort and describe properties of different objects such as color, shape and size.

**PS1** - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).

S:PS1:2:2.1 Identify the observable properties of different objects, such as color, size, shape, weight and texture.

**PS3** - The motion of an object is affected by force.

S:PS3:2:1.1 Describe the properties of magnetism and demonstrate how magnets can be used to move some things without touching them.

## **Tools**

- Demonstrate how to safely and properly use scientific tools and materials to gather data (thermometer and hand lens).

S:ESS4:2:2.1 Recognize, and with assistance, safely demonstrate the use of tools to gather data and extend the senses, such as thermometers, hand lens and balances.

## **Grade 1 Science Power Standards**

### **Earth Science**

**ESS1** - The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

S:ESS1:2:1.1 Recognize that weather conditions change frequently, and that weather patterns change over the seasons.

**ESS2** - The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.

S:ESS2:2:2.1 Recognize that the light and heat the Sun provides to the Earth is necessary for life.

### **Life Science**

**LS1** - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:2:1.2 Recognize plants and animals as living things and describe how they are alike and different.

S:LS1:2:2.1 Recognize that plants and animals have features that help them survive in different environments.

S:LS1:2:3.2 Recognize living things have a life cycle, during which they are born, grow, and die.

### **Physical Science**

**PS3** - The motion of an object is affected by force.

S:PS3:2:2.1 Describe the many different ways things can move, such as in a straight line, zigzag or circular motion, back and forth, and fast and slow.

S:PS3:2:2.2 Describe and demonstrate how the position and motion of an object can be changed by applying force, such as pushing and pulling, and explain that the greater the force, the greater the change.

**Tools** -Recognize, and with assistance, safely demonstrate the use of tools to gather data and extend the senses.

S:LS5:2:2.1 Recognize that some tools, such as magnifiers, balances and thermometers, have special uses, and can help gather information and extend the senses.

### **Units of Study**

Life Science: life cycles

Earth Science: water cycles, weather

Physical Science: forces and motion (balls and ramps)

## Grade 2 Science Power Standards

### Earth Science

- Recognize that Earth materials have a variety of properties (size, shape, color, texture) and use physical properties to sort, classify and/or describe them

**ESS1** - The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

S:ESS1:2:2.3 Recognize that Earth materials have a variety of properties, including size, shape, color and texture. (soil unit)

S:ESS1:2:6.1 Explain that large rocks can be broken down into smaller rocks. (soil unit)

**ESS4** - The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.

S:ESS4:2:3.3 Describe actions that can help the environment, such as recycling and proper disposal of waste materials. (landfill field trip, beach clean-up, ocean literacy, recycling)

### Life Science

- Identify the resources plants and animals need for growth and energy, and describe how their habitat provides these basic needs
- Observe and record the life cycle of an organism.

**LS1** - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:2:1.2 Recognize that plants and animals have features that help them survive in different environments. (Habitats unit, builds on first grade PS)

S:LS1:2:3.2 Recognize living things have a life cycle, during which they are born, grow, and die. (life cycle/butterflies unit, builds for grade 3 PS)

**LS2** – Energy flows and matter recycles through an ecosystem.

S:LS2:2:2.1 Identify the resources plants and animals need for growth and energy, and describe how their habitat provides these basic needs. (habitat unit, coordinates with grades 1 and 3 PS)

**PS1** - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).

S:PS1:2:2.1 Identify the observable properties of different objects, such as color, size, shape, weight and texture. (soil and liquids unit, builds for grade 3 PS)

**Tools:**

S:PS4:2:2.1 Identify tools and simple machines, such as a wheel, and explain how they work. (Lifting Heavy Objects unit)

**Other:**

S:SPS4:2:2.1 Communicate ideas and observations through a variety of tools and formats (e.g. oral , journals, drawing, projects, multimedia)

S:SPS4:2:4.1 Ask questions and take part in investigations.

S:SPS4:2:6.1 Plan and carry out simple activities with a group.

**Units of Study**

Earth Science: soils, worms, composting

Life Science: habitats, insects, ocean life

Physical Science: liquids, balancing & weighing, lifting heavy things

## Grade 3 Science Power Standards

### Earth Science

**ESS1** - The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

S:ESS1:4:1.3 Based on data collected from daily weather observations, describe weather changes or weather patterns. [ESS1 (K-4) POC -5]

S:ESS1:4:1.4 Explain how the use of scientific tools helps to extend senses and gather data about weather. (i.e., weather/wind vane: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter sticks/rulers: snow depth; rain gauges: rain amount in inches) [ESS (K-4) NOS -3]

S:ESS1:4:2.4 Given certain Earth materials (soils, rocks, or minerals) use physical properties to sort, classify, and/or describe them.

S:ESS1:4:6.2 Distinguish between the three categories of rocks, metamorphic, igneous, and sedimentary, and describe the processes that create them.

### Life Science

**LS1** - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:4:2.3 Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire). [LS1 (K-4) FAF -4]

S:LS1:4:2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space) [no animals]

S:LS1:4:3.4 Predict, sequence, or compare the life stages of organisms- plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, and compare two organisms). [no animals]

**LS2** - Energy flows and matter recycles through an ecosystem.

S:LS2:4:2.2 Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy. [LS2 (K-4) SAE -5]

### Physical Science

**PS1** - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).

S:PS1:4:2.1 Recognize that substances can be classified by observable properties.

S:PS1:4:2.4 Make a prediction about what might happen to the state of common materials when heated or cooled or categorize materials as solid, liquid, or gas. [PS1 (K-4) POC –2] (modify by changing or to and)

**PS 3** - The motion of an object is affected by force.

S:PS3:4:1.5 Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect) [PS3 (K-4) INQ+ SAE –8]

S:PS3:4:2.1 Use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls) (modified) Use data to predict how a change in force (greater/less) might affect the position, or direction of motion (e.g., magnets).

**Tools**

S:PS4:4:2.1 Demonstrate how to use tools, such as magnifiers, scales, balances, rulers, and thermometers to gather data and extend the senses. [use metric]

**Other**

Design an experiment based on a question (including making predictions, collecting data, inquiry, and observing). (Modified from June 2006 Science Process Skills Standards)

Create graphs, charts, or tables to organize data (labeling as needed) and draw conclusions. (Modified from June 2006 **Science Process Skills Standards**)

**Units of Study:**

Rocks and Minerals

States of Matter (Chemistry)

Plant Growth and Development

Magnets

## Grade 4 Science Power Standards

### Earth Science

**ESS1** - The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

S:ESS1:4:1.1 Explain how water exists in the atmosphere in different forms and describe how it changes from one form to another through various processes such as freezing, condensation, precipitation, and evaporation

S:ESS1:4:5.1 Identify and describe processes that affect the features of the Earth's surface, including weathering, erosion, deposition of sediment. (Build into SS)

S:ESS1:4:5.2 Explain how wind, water, or ice shape and reshape the Earth's surface.

S:ESS1:4:6.4 Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves) [ESS1 (K-4) INQ -2] (Build into SS)

### Life Science

**LS1** - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:4:1.2 Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.[LS1 (K-4) INQ+POC -1]

S:LS1:4:2.3 Identify and explain how the physical structures of an organism allow it to survive in its habitat/environment (physical and structural adaptations of NH animals)

S:LS1:4:2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space). [LS1 (K-4) SAE -2]

S:LS1:4:3.4 Predict, sequence, or compare the life stages of organisms (i.e.: put images of life stages in order, predict the next stage in sequence, and compare two organisms)

**LS2** - Energy flows and matter recycles through an ecosystem.

S:LS2:4:3.2 Describe ways plants and animals depend on each other (e.g., shelter, nesting, food).[LS2 (K-4) SAE -6]

**LS3** - Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).

S:LS3:4:1.3 Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).[LS3 (K-4) SAE -7]

**LS4** - Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

S:LS4:4:3.1 Identify what the physical structures of humans do (e.g., sense organs – eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals. [LS4 (K-4) FAF -8]

S:LS4:4:3.2 Distinguish between characteristics of humans that are inherited from parents (i.e., hair color, height, skin color, eye color) and others that are learned (e.g., riding a bike, singing a song, playing a game, reading)[LS4 (K-4) POC -9]

### **Physical Science**

**PS 2** - Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

S:PS2:4:3.1 Identify the various forms of energy, such as electrical, light, heat, and sound

S:PS2:4:3.6 Given a specific example or illustration (solar, battery, friction), predict the observable effects of energy

S:PS2:4:3.7 Use observations of light in relation to other objects/substances to describe the properties of light (can be reflected, refracted, or absorbed).  
[PS2 (K-4) SAE – 5]

S:PS2:4:3.8 Experiment, observe, or predict how heat might move from one object to another. [PS2 (K-4) INQ+SAE –6]

### **Other**

-Utilize the **Scientific Process Skills** in order to record observations and data from experiments

-Observe, record, and analyze data in order to communicate findings within a small group(draw a conclusion)

### **Units of Study:**

Energy Sources

Water Cycle

Life Cycles/Wildlife of NH

Earth Studies – Erosion/Weathering

## **Grade 5 Science Power Standards**

### **Earth Science**

**ESS1** -The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

**ESS2** - The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.

**ESS4** - The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.

### **ATOMOSPHERE, CLIMATE, AND WEATHER**

S:ESS1:6:1.4 Describe weather in terms of temperature, wind speed and direction, precipitation, and cloud cover.

S:ESS4:6:2.3 Read and interpret data from barometers, sling psychrometers and anemometers.

S:ESS2:6:2.1 Recognize how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns.

### **COMPOSITION AND EARTH'S FEATURES**

S:ESS1:6:5.2 Explain how some changes to the Earth's surface happen abruptly, as a result of landslides, earthquakes and volcanic eruptions; while other changes, happen very slowly as a result of weathering, erosions and deposition of sediment caused by waves, wind, water and ice.

S:ESS1:6:2.2 Describe and define the different landforms on the Earth's surface, such as coastlines, rivers, mountains, deltas, canyons, etc.

### **Life Science**

**LS 2** - Energy flows and matter recycles through an ecosystem.

**LS 3** - Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).

### **ECOSYSTEMS**

S:LS2:6:1.1 Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, the composition of the soil, any disease, the threat of predators, and competition from other organisms.

S:LS2:6:2.1 Describe how energy is transferred in an ecosystem through food webs, and explain the roles and relationships between producers, consumers and decomposers.

S:LS2:6:2.2 Recognize that one of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which

consume energy-rich foods.

S:LS2:6:3.2 Identify and describe the ways in which organisms interact and depend on one another in an ecosystem, using food webs.

S:LS3:6:1.1 Provide examples of how all organisms, including humans, impact their environment and explain how some changes can be detrimental to other organisms.

**Other**

- Make observations and record measurements using a variety of tools and instruments.
- Identify and utilize the steps of the Scientific Method.
- Use appropriate tools to organize, represent, analyze and explain data.
- Formulate a scientific question and hypothesis, design and record a simple step-by-step procedure to follow in order to carry out a fair test.
- Effectively communicate the results and conclusions based on the observations of the investigation including asking future questions.

## Grade 6 Science Power Standards

### Life Science

- Identify the major systems of the human body and what their functions and responsibilities are.
- Recognize and describe the role cells, traits(physical & behavioral), genes, and chromosomes play in the human body.
- Recognize the importance cells play in the structure of the human body and how the environment can effect traits and be detrimental to health.

**LS1** - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:6:2.5 Explain that multicellular organisms have specialized cells, tissues, organs and organ systems that perform certain necessary functions, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease.

S:LS1:6:3.2 Explain that the same genetic information is copied in each cell of a new organism.

S:LS1:6:3.3 Explain that all living things reproduce in order to continue their species.

**LS3** - Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).

S:LS3:6:1.1 Provide examples of how all organisms, including humans, impact their environment and explain how some changes can be detrimental to other organisms.

S:LS3:6:1.2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.

## **Grade 7 Science Power Standards**

### **LIFE SCIENCE**

#### **Ecology**

- Students will be able to identify and define the differences between organisms, populations and communities.

#### **Natural Selections**

- Students will recognize that in any given environment the growth and survival of organisms depend on the physical conditions that exist

#### **Energy**

- Students will be able to trace the flow of energy through an ecosystem beginning with the sun through the food web including photosynthesis and respiration.
- Students will describe how matter is recycled within ecosystems (conservation of matter)
- Students will be able to trace the path of matter through the water cycle and carbon/oxygen cycle.
- Students will distinguish between, renewable and non renewable energy sources and be familiar with the conservation of Energy.

#### **Classification**

- Students will construct and use a dichotomous key to identify objects
- Students will be able to recognize and list characteristics exhibited by all living organisms

### **PHYSICAL SCIENCE**

#### **Properties of Matter**

- Students will understand that all matter is made up of atoms, molecules and compounds with specific properties.
- Students will explain relationship between or among energy, molecular motion, temperature and states of matter (Kinetic molecular theory).
- Students will be able to apply the law of conservation of matter.
- Students will recognize that like atoms with specific properties are elements and elements combine to make molecules and compounds.
- Students will become familiar with the organization and information found in the Periodic Table of Elements

#### **Metric Measurement**

- Students will be able to measure with both accuracy and precision when using a variety of scientific tools (mass, volume, length, temperature, density).

## **Grade 8 Science Power Standards**

### **Scientific Inquiry Skills**

#### **Throughout all units**

- Create testable science questions and plausible experiments to explore the answer to the question
- Write a hypothesis that includes the relationship between the independent and dependent variable and a testable prediction
- Collect and display data in a way that helps to support conclusions
- Create scientific conclusions that are focused, use appropriate voice, are well organized and offer a reasonable explanation of the data (based on district rubric)
- Maintain an organized science binder and/or journal

### **Earth Science**

#### **Climate**

- Identify and describe how altitude, latitude, differential heating, proximity to water, landforms, prevailing winds and ocean currents create the three major climate zones: tropical, temperate and polar
- Connect changes in the water cycle with changes in climate patterns
- Draw conclusions from climate data (ex. ice core, tree core, atmosphere composition) about the impact of climate change
- Earth is part of a system with temporal and spatial interrelationships that create many of the cycles we experience (night/day, seasons, year, lunar cycle and tides)

#### **Geology**

- Explain the processes (ex. Tectonic plate movement, earthquakes, volcanoes, weathering and erosion) that abruptly and over time have led to the resurfacing of Earth
- Use data (ex. Fossils, hot spots, earthquakes, satellite images) to support the idea that Earth's crust is composed of plates that move
- Describe the layers of the Earth and how technology has advanced our understanding of Earth's interior
- Use data about a rock's physical characteristics to make and support inferences about the rock's history, composition and connection to the rock cycle

#### **Astronomy**

- Describe the size, scale and composition of the universe using appropriate units of measurement (ex. Light years and astronomical units)
- Explain what makes Earth and the solar system unique while acknowledging recent evidence that suggests similar systems exist elsewhere in the universe
- Compare and contrast the objects of our solar system (star, planets, dwarf planets, natural satellites, asteroids, meteors and comets) by composition, location, movement, and special features

- Explain how technological advances (ex. satellites, space telescopes, light/radio telescopes and probes) have made it possible for scientists to re-evaluate or extend existing ideas about the universe

## **Life Science**

### **Immune System**

- Use data and observations to support the concept that disease in an organism can be caused by failures of the body systems or infection from other organisms (ex. Viruses, bacteria, fungi and parasites)
- Identify the functions of the immune system and relate the functions to the specific parts (example detect invaders T-cells)
- Recall current and historic examples of how technology has enhanced the field of medicine

### **Reproduction of Organisms**

- Compare and contrast asexual and sexual reproduction in a variety of organisms across the five kingdoms
- Compare patterns of human development with those of other vertebrates
- Identify structures and functions of the human reproductive system
- Describe the major changes that occur over time in human development from a single cell through embryonic development to a new born

### **Heredity**

- Recognize that hereditary information is contained in genes on chromosomes in the cells of all living things
- Explain that in some kinds of organisms all the genes come from one parent while in organisms requiring two sexes to reproduce, typically half the genes come from each parent
- Recognize that traits are determined by a combination of inherited genes and environmental factors
- Using data, select evidence that supports the concept that genetic information is passed on from both parents to offspring

## **Physical Science**

### **Climate**

- Describe the ways light can interact with matter and how it affects the planet's surface
- Explain how technology allows us to measure invisible wavelengths parts of the electromagnetic spectrum and how this technology is used to monitor Earth's systems

### **Astronomy**

- Explain the general concepts of gravity and how it affects objects in the solar system and universe (ex. Planetary revolution and tides)
- Use data to determine or predict the overall net effect of multiple forces on the position, speed and direction of motion of objects in the solar system