



Mad Science Programming

Correlated to the

Science Standards of Learning

for
Virginia
Public Schools



**Board of Education
Commonwealth of Virginia**

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Science Standards of Learning

for Virginia Public Schools

**Adopted in January 2010 by the
Board of Education**

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Kindergarten

The kindergarten standards stress the use of basic science skills to explore common materials, objects, and living things and will begin the development of an understanding that scientific knowledge is based on evidence. Emphasis is placed on using the senses to gather information. Students are expected to develop skills in posing simple questions, measuring, sorting, classifying, and communicating information about the natural world. The science skills are an important focus as students learn about life processes and properties of familiar materials, such as magnets and water. Through phenomena including shadows, patterns of weather, and plant growth, students are introduced to the concept of change. The significance of natural resources and conservation is introduced in the kindergarten standards.

Scientific Investigation, Reasoning, and Logic

- K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- basic characteristics or properties of objects are identified by direct observation;
 - observations are made from multiple positions to achieve different perspectives;
 - a set of objects is sequenced according to size;
 - a set of objects is separated into two groups based on a single physical characteristic;
 - nonstandard units are used to measure the length, mass, and volume of common objects;
 - observations and predictions are made for an unseen member in a sequence of objects;
 - a question is developed and predictions are made from one or more observations;
 - observations are recorded;
 - picture graphs are constructed;
 - unusual or unexpected results in an activity are recognized; and
 - objects are described both pictorially and verbally.

Correlates with:

All Mad Science Programming

- K.2 The student will investigate and understand that humans have senses that allow them to seek, find, take in, and react or respond to information in order to learn about their surroundings. Key concepts include
- the five senses and corresponding sensing organs; and
 - sensory descriptors used to describe common objects and phenomena.

Correlates with:

Sonic Sounds – ASP

Tantalizing Taste – ASP

Harnessing Heat – ASP

Lights, Color, Action – ASP

Seeking Our Senses – WS K-2

Taste Buds – WS K-2

Force, Motion, and Energy

K.3 The student will investigate and understand that magnets have an effect on some materials, make some things move without touching them, and have useful applications. Key concepts include

- a) magnetism and its effects; and
- b) useful applications of magnetism.

Correlates with:

Magnetic Magic – ASP

Magnificent Magnets – WS K-2

Matter

K.4 The student will investigate and understand that the position, motion, and physical properties of an object can be described. Key concepts include

- a) colors of objects;
- b) shapes and forms of objects;
- c) textures and feel of objects;
- d) relative sizes and weights of objects; and
- e) relative positions and speed of objects.

Correlates with:

Lights, Color, Action – ASP

Mix It Up – ASP

Slime Time –ASP

Super Sticky Stuff – ASP

Junior Reactors – ASP

Slime – ASP

Slippery Science – WS K-2

K.5 The student will investigate and understand that water flows and has properties that can be observed and tested. Key concepts include

- a) water occurs in different phases;
- b) water flows downhill; and
- c) some materials float in water, while others sink.

Correlates with:

Dry Ice Capades – ASP

Harnessing Heat – ASP

Wacky Waves - ASP

Life Processes

K.6 The student will investigate and understand the differences between living organisms and nonliving objects. Key concepts include

- a) all things can be classified as living or nonliving; and
- b) living organisms have certain characteristics that distinguish them from nonliving objects including growth, movement, response to the environment, having offspring, and the need for food, air, and water.

Correlates with:

All about Animals – ASP

Life in the Sea – ASP

Bugs - ASP

Dinosaurs – WS K-2

Decomposers – WS K-2

- K.7 The student will investigate and understand basic needs and life processes of plants and animals. Key concepts include
- animals need adequate food, water, shelter, air, and space to survive;
 - plants need nutrients, water, air, light, and a place to grow to survive;
 - plants and animals change as they grow, have varied life cycles, and eventually die; and
 - offspring of plants and animals are similar but not identical to their parents or to one another.

Correlates with:

All about Animals – ASP

Life in the Sea – ASP

Bugs - ASP

Dinosaurs – WS K-2

Decomposers – WS K-2

Interrelationships in Earth/Space Systems

- K.8 The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include
- shadows occur in nature when sunlight is blocked by an object; and
 - shadows can be produced by blocking artificial light sources.

Correlates with:

Planets & Moons – ASP

Earth Patterns, Cycles, and Change

- K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. Key concepts include
- weather observations;
 - the shapes and forms of many common natural objects including seeds, cones, and leaves; and
 - animal and plant growth.

Correlates with:

Walloping Weather – ASP

All About Animals – ASP

- K.10 The student will investigate and understand that change occurs over time and rates may be fast or slow. Key concepts include
- a) natural and human-made things may change over time; and
 - b) changes can be observed and measured.

Correlates with:

Sun and Stars - ASP

Earthworks - ASP

Decomposers – WS K-2

Earth Resources

- K.11 The student will investigate and understand that materials can be reused, recycled, and conserved. Key concepts include
- a) materials and objects can be used over and over again;
 - b) everyday materials can be recycled; and
 - c) water and energy conservation at home and in school helps ensure resources are available for future use.

Correlates with:

Super Power Sources – ASP

The Dirt of Garbage – WS K-2

Grade One

The first-grade standards continue to stress basic science skills in understanding familiar objects and events. Students are expected to begin conducting simple experiments and be responsible for some of the planning. Students are introduced to the concept of classifying plants and animals based on simple characteristics. Emphasis is placed on the relationships among objects and their interactions with one another. Students are expected to know the basic relationships between the sun and Earth, and between seasonal changes and plant and animal activities. Students will also begin to develop an understanding of moving objects, simple solutions, and important natural resources.

Scientific Investigation, Reasoning, and Logic

- 1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- the senses are used to observe differences in physical properties;
 - observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
 - objects or events are classified and arranged according to characteristics or properties;
 - simple tools are used to enhance observations;
 - length, mass, volume, and temperature are measured using nonstandard units;
 - inferences are made and conclusions are drawn about familiar objects and events;
 - a question is developed from one or more observations;
 - predictions are made based on patterns of observations;
 - observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
 - simple investigations and experiments are conducted to answer questions.

Correlates with:
All Mad Science Programming

Force, Motion, and Energy

- 1.2 The student will investigate and understand that moving objects exhibit different kinds of motion. Key concepts include
- objects may have straight, circular, and back-and-forth motions;
 - objects may vibrate and produce sound; and
 - pushes or pulls can change the movement of an object.

Correlates with:
Fantastic Fliers – ASP
Fun-damental Forces – ASP
Rocket Science – ASP
Space Travel –ASP
Moving Motion – ASP
Science of Toys – ASP
Sonic Sounds – ASP
Sound Basics – WS K-2
Seeking our Senses – WS K-2

Matter

- 1.3 The student will investigate and understand how different common materials interact with water. Key concepts include
- some liquids will separate when mixed with water, but others will not;
 - some solids will dissolve in water, but others will not; and
 - some substances will dissolve more readily in hot water than in cold water.

Correlates with:

Mix It Up – ASP

Wacky Waves – ASP

Life Processes

- 1.4 The student will investigate and understand that plants have basic life needs and functional parts and can be classified according to certain characteristics. Key concepts include
- plants need nutrients, air, water, light, and a place to grow;
 - basic parts of plants; and
 - plants can be classified based on a variety of characteristics.

Correlates with:

Mad Science Programming does not currently meet this standard

- 1.5 The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. Key concepts include
- basic needs include adequate air, food, water, shelter, and space (habitat);
 - animals, including humans, have many different physical characteristics; and
 - animals can be classified according to a variety of characteristics.

Correlates with:

All about Animals – ASP

Life in the Sea – ASP

Bugs - ASP

Dinosaurs – WS K-2

Decomposers – WS K-2

Interrelationships in Earth/Space Systems

- 1.6 The student will investigate and understand the basic relationships between the sun and Earth. Key concepts include
- the sun is the source of energy and light that warms the land, air, and water; and
 - the sun's relative position in the morning is east and in the late afternoon is west.

Correlates with:

Atmosphere & Beyond – ASP

Planets & Moons – ASP

Sun & Stars – ASP

Walloping Weather – ASP

Earth Patterns, Cycles, and Change

- 1.7 The student will investigate and understand weather and seasonal changes. Key concepts include
- changes in temperature, light, and precipitation affect plants and animals, including humans;
 - there are relationships between daily and seasonal changes; and
 - changes in temperature, light, and precipitation can be observed and recorded over time.

Correlates with:

Walloping Weather – ASP

Earth Resources

- 1.8 The student will investigate and understand that natural resources are limited. Key concepts include
- identification of natural resources;
 - factors that affect air and water quality; and
 - recycling, reusing, and reducing consumption of natural resources.

Correlates with:

Super Power Sources – ASP

The Dirt of Garbage – WS K-2

Grade Two

The second-grade standards continue to focus on using a broad range of science skills in understanding the natural world. Making detailed observations, drawing conclusions, and recognizing unusual or unexpected data are stressed as skills needed for using and validating information. Measurement in both English and metric units is stressed. The idea of living systems is introduced through habitats and the interdependence of living and nonliving things. The concept of change is explored in phases of matter, life cycles, weather patterns, and seasonal effects on plants and animals.

Scientific Investigation, Reasoning, and Logic

- 2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- observations and predictions are made and questions are formed;
 - observations are differentiated from personal interpretation;
 - observations are repeated to ensure accuracy;
 - two or more characteristics or properties are used to classify items;
 - length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;
 - time is measured using the proper tools;
 - conditions that influence a change are identified and inferences are made;
 - data are collected and recorded, and bar graphs are constructed using numbered axes;
 - data are analyzed, and unexpected or unusual quantitative data are recognized;
 - conclusions are drawn;
 - observations and data are communicated;
 - simple physical models are designed and constructed to clarify explanations and show relationships; and
 - current applications are used to reinforce science concepts.

Correlates with:
All Mad Science Programming

Force, Motion, and Energy

- 2.2 The student will investigate and understand that natural and artificial magnets have certain characteristics and attract specific types of metals. Key concepts include
- magnetism, iron, magnetic/nonmagnetic, poles, attract/repel; and
 - important applications of magnetism.

Correlates with:
Magnetic Magic – ASP
Magnificent Magnets – WS K-2

Matter

- 2.3 The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include
- identification of distinguishing characteristics of solids, liquids, and gases;
 - measurement of the mass and volume of solids and liquids; and

- c) changes in phases of matter with the addition or removal of energy.

Correlates with:

Dry Ice Capades – ASP
Harnessing Heat – ASP
Wacky Waves - ASP

Life Processes

- 2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. Key concepts include
 - a) animal life cycles; and
 - b) plant life cycles.

Correlates with:

All about Animals – ASP
Life in the Sea – ASP
Bugs - ASP
Decomposers – WS K-2

Living Systems

- 2.5 The student will investigate and understand that living things are part of a system. Key concepts include
 - a) living organisms are interdependent with their living and nonliving surroundings;
 - b) an animal’s habitat includes adequate food, water, shelter or cover, and space;
 - c) habitats change over time due to many influences; and
 - d) fossils provide information about living systems that were on Earth years ago.

Correlates with:

All about Animals – ASP
Life in the Sea – ASP
Bugs - ASP
Dinosaurs – WS K-2
Decomposers – WS K-2

Interrelationships in Earth/Space Systems

- 2.6 The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include
 - a) identification of common storms and other weather phenomena;
 - b) the uses and importance of measuring, recording, and interpreting weather data; and
 - c) the uses and importance of tracking weather data over time.

Correlates with:

Walloping Weather – ASP
Atmosphere & Beyond – ASP

Earth Patterns, Cycles, and Change

- 2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include
- effects of weather and seasonal changes on the growth and behavior of living things; and
 - weathering and erosion of land surfaces.

Correlates with:

Earthworks - ASP

Earth Resources

- 2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include
- important plant products are identified and classified;
 - the availability of plant products affects the development of a geographic area;
 - plants provide oxygen, homes, and food for many animals; and
 - plants can help reduce erosion.

Correlates with:

Mad Science Programming does not currently meet this standard.

Grade Three

The third-grade standards place increasing emphasis on conducting investigations. Students are expected to be able to develop questions, formulate simple hypotheses, make predictions, gather data, and use the metric system with greater precision. Using information to make inferences and draw conclusions becomes more important. In the area of physical science, the standards focus on simple and compound machines, energy, and a basic understanding of matter. Behavioral and physical adaptations are examined in relation to the life needs of animals. The notion of living systems is further explored in aquatic and terrestrial food chains and diversity in ecosystems. Patterns in the natural world are demonstrated in terms of the phases of the moon, tides, seasonal changes, the water cycle, and animal and plant life cycles. Geological concepts are introduced through the investigation of the components of soil.

Scientific Investigation, Reasoning, and Logic

- 3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- observations are made and are repeated to ensure accuracy;
 - predictions are formulated using a variety of sources of information;
 - objects with similar characteristics or properties are classified into at least two sets and two subsets;
 - natural events are sequenced chronologically;
 - length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;
 - time is measured to the nearest minute using proper tools and techniques;
 - questions are developed to formulate hypotheses;
 - data are gathered, charted, graphed, and analyzed;
 - unexpected or unusual quantitative data are recognized;
 - inferences are made and conclusions are drawn;
 - data are communicated;
 - models are designed and built; and
 - current applications are used to reinforce science concepts.

Correlates with:

All Mad Science Programming

Force, Motion, and Energy

- 3.2 The student will investigate and understand simple machines and their uses. Key concepts include
- purpose and function of simple machines;
 - types of simple machines;
 - compound machines; and
 - examples of simple and compound machines found in the school, home, and work environments.

Correlates with:

Mad Science Machines - ASP

Matter

- 3.3 The student will investigate and understand that objects are made of materials that can be described by their physical properties. Key concepts include
- objects are made of one or more materials;
 - physical properties remain the same as the material is changed in visible size; and
 - visible physical changes are identified.

Correlates with:

Slime Time – ASP

Matter of Fact – WS 3-6

Playing with Polymers – WS 3-6

Life Processes

- 3.4 The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to the environment. Key concepts include
- behavioral adaptations; and
 - physical adaptations.

Correlates with:

All about Animals – ASP

Life in the Sea – ASP

Bugs - ASP

Ecosystem Explorations – WS 3-6

Living Systems

- 3.5 The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include
- producer, consumer, decomposer;
 - herbivore, carnivore, omnivore; and
 - predator and prey.

Correlates with:

All about Animals – ASP

Life in the Sea – ASP

Ecosystem Explorations – WS 3-6

- 3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. Key concepts include
- aquatic ecosystems;
 - terrestrial ecosystems;
 - populations and communities; and
 - the human role in conserving limited resources.

Correlates with:

Ecosystem Explorations – WKS 3-6

Interrelationships in Earth/Space Systems

- 3.7 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. Key concepts include
- soil provides the support and nutrients necessary for plant growth;
 - topsoil is a natural product of subsoil and bedrock;
 - rock, clay, silt, sand, and humus are components of soils; and
 - soil is a natural resource and should be conserved.

Correlates with:

Mineral Mania – WKS 3-6

Earth Patterns, Cycles, and Change

- 3.8 The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include
- patterns of natural events such as day and night, seasonal changes, simple phases of the moon, and tides;
 - animal life cycles; and
 - plant life cycles.

Correlates with:

All About Animals – ASP

Life in the Sea - ASP

Sun and Stars – ASP

Ecosystem Explorations – WS 3-6

Photosynthesis – WS 3-6

- 3.9 The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include
- there are many sources of water on Earth;
 - the energy from the sun drives the water cycle;
 - the water cycle involves several processes;
 - water is essential for living things; and
 - water on Earth is limited and needs to be conserved.

Correlates with:

Dry Ice Capades – ASP

Harnessing Heat – ASP

Wacky Water - ASP

Walloping Weather – ASP

Ecosystem Explorations – WS 3-6

Earth Resources

- 3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include
- the interdependency of plants and animals;
 - the effects of human activity on the quality of air, water, and habitat;
 - the effects of fire, flood, disease, and erosion on organisms; and
 - conservation and resource renewal.

Correlates with:

Black and Blue Oceans – WS 3-6

The Dirt on Garbage – WS 3-6

Ecosystem Explorations – WS 3-6

- 3.11 The student will investigate and understand different sources of energy. Key concepts include
- a) energy from the sun;
 - b) sources of renewable energy; and
 - c) sources of nonrenewable energy.

Correlates with:

Sun and Stars – ASP

Super Power Sources - ASP

Grade Four

The fourth-grade standards stress the importance of using information, analyzing data, and validating experimental results. Defining variables in experimentation is emphasized, and making simple predictions from picture, bar, and basic line graphs is underscored. Questioning and hypothesizing become more detailed at this level. Students are introduced to basic principles of electricity and to the concept of motion. Students explore basic information about our solar system and investigate the interactions among Earth, the moon, and the sun. Students explore basic plant anatomy, plant adaptations, and investigate relationships among plants and animals and their environments. In examining weather phenomena and conditions, students identify various factors, make predictions based on data, and evaluate the results. The importance of natural resources in Virginia is emphasized.

Scientific Investigation, Reasoning, and Logic

- 4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- distinctions are made among observations, conclusions, inferences, and predictions;
 - objects or events are classified and arranged according to characteristics or properties;
 - appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
 - appropriate instruments are selected and used to measure elapsed time;
 - predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
 - independent and dependent variables are identified;
 - constants in an experimental situation are identified;
 - hypotheses are developed as cause and effect relationships;
 - data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
 - numerical data that are contradictory or unusual in experimental results are recognized;
 - data are communicated with simple graphs, pictures, written statements, and numbers;
 - models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
 - current applications are used to reinforce science concepts.

Correlates with:

All Mad Science Programming

Force, Motion, and Energy

- 4.2 The student will investigate and understand characteristics and interactions of moving objects. Key concepts include
- motion is described by an object's direction and speed;
 - changes in motion are related to force and mass;
 - friction is a force that opposes motion; and
 - moving objects have kinetic energy.

Correlates with:

Energy Burst – ASP

Fun-damental Forces – ASP

Mad Science Machines – ASP

Moving Motion - ASP

- 4.3 The student will investigate and understand the characteristics of electricity. Key concepts include
- conductors and insulators;
 - basic circuits;
 - static electricity;
 - the ability of electrical energy to be transformed into light and motion, and to produce heat;
 - simple electromagnets and magnetism; and
 - historical contributions in understanding electricity.

Correlates with:

Current Events – ASP

Magnetic Magic – ASP

Watts Up – ASP

Electricity – WS 3-6

Mischievous Magnets – WS 3-6

Life Processes

- 4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include
- the structures of typical plants and the function of each structure;
 - processes and structures involved with plant reproduction;
 - photosynthesis; and
 - adaptations allow plants to satisfy life needs and respond to the environment.

Correlates with:

Photosynthesis – WS 3-6

Living Systems

- 4.5 The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include
- plant and animal adaptations;
 - organization of populations, communities, and ecosystems and how they interrelate;
 - flow of energy through food webs;
 - habitats and niches;
 - changes in an organism's niche at various stages in its life cycle; and
 - influences of human activity on ecosystems.

Correlates with:

All about Animals – ASP

Life in the Sea – ASP

Ecosystem Explorations – WS 3-6

Black and Blue Oceans – WS 3-6

Interrelationships in Earth/Space Systems

- 4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include
- weather phenomena;
 - weather measurements and meteorological tools; and
 - use of weather measurements and weather phenomena to make weather predictions.

Correlates with:

Atmosphere & Beyond – ASP

Walloping Weather – ASP

Earth Patterns, Cycles, and Change

- 4.7 The student will investigate and understand the organization of the solar system. Key concepts include
- the planets in the solar system;
 - the order of the planets in the solar system; and
 - the relative sizes of the planets.

Correlates with:

Planets and Moons – ASP

- 4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include
- the motions of Earth, the moon, and the sun;
 - the causes for Earth's seasons;
 - the causes for the phases of the moon;
 - the relative size, position, age, and makeup of Earth, the moon, and the sun; and
 - historical contributions in understanding the Earth-moon-sun system.

Correlates with:

Planets and Moons – ASP

Sun & Stars – ASP

Earth Resources

- 4.9 The student will investigate and understand important Virginia natural resources. Key concepts include
- watersheds and water resources;
 - animals and plants;
 - minerals, rocks, ores, and energy sources; and
 - forests, soil, and land.

Correlates with:

No programming correlates

Grade Five

The fifth-grade standards emphasize the importance of selecting appropriate instruments for measuring and recording observations. The organization, analysis, and application of data continue to be an important focus of classroom inquiry. Science skills from preceding grades, including questioning, using and validating evidence, and systematic experimentation, are reinforced at this level. Students are introduced to more detailed concepts of sound and light and the tools used for studying them. Key concepts of matter, including those about atoms, molecules, elements, and compounds, are studied, and the properties of matter are defined in greater detail. The cellular makeup of organisms and the distinguishing characteristics of groups of organisms are stressed. Students learn about the characteristics of the oceans and Earth's changing surface.

The fifth-grade standards focus on student growth in understanding the nature of science. This scientific view defines the idea that explanations of nature are developed and tested using observation, experimentation, models, evidence, and systematic processes. The nature of science includes the concepts that scientific explanations are based on logical thinking; are subject to rules of evidence; are consistent with observational, inferential, and experimental evidence; are open to rational critique; and are subject to refinement and change with the addition of new scientific evidence. The nature of science includes the concept that science can provide explanations about nature, can predict potential consequences of actions, but cannot be used to answer all questions.

Scientific Investigation, Reasoning, and Logic

- 5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- a) items such as rocks, minerals, and organisms are identified using various classification keys;
 - b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
 - c) estimates are made and accurate measurements of elapsed time are made using proper tools;
 - d) hypotheses are formed from testable questions;
 - e) independent and dependent variables are identified;
 - f) constants in an experimental situation are identified;
 - g) data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements;
 - h) predictions are made using patterns from data collected, and simple graphical data are generated;
 - i) inferences are made and conclusions are drawn;
 - j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
 - k) current applications are used to reinforce science concepts.

Correlates with:

All Mad Science Programming

Force, Motion, and Energy

- 5.2 The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include
- compression waves;
 - vibration, compression, wavelength, frequency, amplitude;
 - the ability of different media (solids, liquids, and gases) to transmit sound; and
 - uses and applications of sound waves.

Correlates with:

Get Connected – ASP

Sonic Sounds – ASP

Good Vibrations – WS 3-6

- 5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include
- transverse waves;
 - the visible spectrum;
 - opaque, transparent, and translucent;
 - reflection of light from reflective surfaces; and
 - refraction of light through water and prisms.

Correlates with:

Lights, Color, Action –ASP

Optical Illusions - ASP

Matter

- 5.4 The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include
- distinguishing properties of each phase of matter;
 - the effect of temperature on the phases of matter;
 - atoms and elements;
 - molecules and compounds; and
 - mixtures including solutions.

Correlates with:

Slime Time – ASP

Junior Reactors - ASP

Dry Ice Capades – ASP

Chem in a Flash - ASP

Mix It Up – ASP

Matter of Fact – WS 3-6

Playing with Polymers – WS 3-6

Living Systems

- 5.5 The student will investigate and understand that organisms are made of one or more cells and have distinguishing characteristics that play a vital role in the organism's ability to survive and thrive in its environment. Key concepts include
- basic cell structures and functions;

- b) classification of organisms using physical characteristics, body structures, and behavior of the organism; and
- c) traits of organisms that allow them to survive in their environment.

Correlates with:

All About Animals – ASP

Bugs! – ASP

Life in the Sea – ASP

Cells – WS 3-6

Ecosystem Explorations – WS 3-6

Photosynthesis – WS 3-6

Interrelationships in Earth/Space Systems

- 5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include
- a) geological characteristics;
 - b) physical characteristics; and
 - c) ecological characteristics.

Correlates with:

Wacky Water – ASP

Life in the Sea - ASP

Black and Blue Oceans – WS 3-6

Earth Patterns, Cycles, and Change

- 5.7 The student will investigate and understand how Earth's surface is constantly changing. Key concepts include
- a) identification of rock types;
 - b) the rock cycle and how transformations between rocks occur;
 - c) Earth history and fossil evidence;
 - d) the basic structure of Earth's interior;
 - e) changes in Earth's crust due to plate tectonics;
 - f) weathering, erosion, and deposition; and
 - g) human impact.

Correlates with:

Earthworks – ASP

Mineral Mania – WS 3-6

Grade Six

The sixth-grade standards continue to emphasize data analysis and experimentation. Methods are studied for testing the validity of predictions and conclusions. Scientific methodology, focusing on precision in stating hypotheses and defining dependent and independent variables, is strongly reinforced. The concept of change is explored through the study of transformations of energy and matter. The standards present an integrated focus on the role of the sun's energy in Earth's systems, on water in the environment, on air and atmosphere, and on basic chemistry concepts. A more detailed understanding of the solar system and space exploration becomes a focus of instruction. Natural resource management, its relation to public policy, and cost/benefit tradeoffs in conservation policies are introduced.

The sixth-grade standards continue to focus on student growth in understanding the nature of science. This scientific view defines the idea that explanations of nature are developed and tested using observation, experimentation, models, evidence, and systematic processes. The nature of science includes the concepts that scientific explanations are based on logical thinking; are subject to rules of evidence; are consistent with observational, inferential, and experimental evidence; are open to rational critique; and are subject to refinement and change with the addition of new scientific evidence. The nature of science includes the concept that science can provide explanations about nature and can predict potential consequences of actions, but cannot be used to answer all questions.

Scientific Investigation, Reasoning, and Logic

- 6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- observations are made involving fine discrimination between similar objects and organisms;
 - precise and approximate measurements are recorded;
 - scale models are used to estimate distance, volume, and quantity;
 - hypotheses are stated in ways that identify the independent and dependent variables;
 - a method is devised to test the validity of predictions and inferences;
 - one variable is manipulated over time, using many repeated trials;
 - data are collected, recorded, analyzed, and reported using metric measurements and tools;
 - data are analyzed and communicated through graphical representation;
 - models and simulations are designed and used to illustrate and explain phenomena and systems; and
 - current applications are used to reinforce science concepts.

Correlates with:
All Mad Science Programming

Force, Motion, and Energy

- 6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include
- potential and kinetic energy;
 - the role of the sun in the formation of most energy sources on Earth;
 - nonrenewable energy sources;
 - renewable energy sources; and
 - energy transformations.

Correlates with:

Sun and Stars – ASP

Mad Science Machines –ASP

Moving Motion - ASP

Energy Burst – ASP

Super Power Sources – ASP

- 6.3 The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on Earth's surface. Key concepts include
- Earth's energy budget;
 - the role of radiation and convection in the distribution of energy;
 - the motion of the atmosphere and the oceans;
 - cloud formation; and
 - the role of thermal energy in weather-related phenomena including thunderstorms and hurricanes.

Correlates with:

Atomosphere and Beyond – ASP

Harnessing Heat – ASP

Wacky Water – ASP

Walloping Weather – ASP

Ecosystem Explorations – WS 3-6

Matter

- 6.4 The student will investigate and understand that all matter is made up of atoms. Key concepts include
- atoms consist of particles, including electrons, protons, and neutrons;
 - atoms of a particular element are alike but are different from atoms of other elements;
 - elements may be represented by chemical symbols;
 - two or more atoms interact to form new substances, which are held together by electrical forces (bonds);
 - compounds may be represented by chemical formulas;
 - chemical equations can be used to model chemical changes; and
 - a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere.

Correlates with:

Dry Ice Capades – ASP

Junior Reactors – ASP

Slime Time – ASP

Matter of Fact – WS 3-6

Playing with Polymers – WS 3-6

- 6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include
- water as the universal solvent;
 - the properties of water in all three phases;

- c) the action of water in physical and chemical weathering;
- d) the ability of large bodies of water to store thermal energy and moderate climate;
- e) the importance of water for agriculture, power generation, and public health; and
- f) the importance of protecting and maintaining water resources.

Correlates with:

Life in the Sea – ASP
 Wacky Water – ASP
 Walloping Weather – ASP
 Black and Blue Oceans – WS 3-6

- 6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth’s atmosphere. Key concepts include
- a) air as a mixture of gaseous elements and compounds;
 - b) pressure, temperature, and humidity;
 - c) atmospheric changes with altitude;
 - d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality;
 - e) the relationship of atmospheric measures and weather conditions; and
 - f) basic information from weather maps, including fronts, systems, and basic measurements.

Correlates with:

Atmosphere and Beyond – ASP
 Walloping Weather – ASP
 Under Pressure – ASP

Living Systems

- 6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include
- a) the health of ecosystems and the abiotic factors of a watershed;
 - b) the location and structure of Virginia’s regional watershed systems;
 - c) divides, tributaries, river systems, and river and stream processes;
 - d) wetlands;
 - e) estuaries;
 - f) major conservation, health, and safety issues associated with watersheds; and
 - g) water monitoring and analysis using field equipment including hand-held technology.

Correlates with:

No current programming

Interrelationships in Earth/Space Systems

- 6.8 The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include
- a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets;
 - b) relative size of and distance between planets;
 - c) the role of gravity;
 - d) revolution and rotation;

- e) the mechanics of day and night and the phases of the moon;
- f) the unique properties of Earth as a planet;
- g) the relationship of Earth's tilt and the seasons;
- h) the cause of tides; and
- i) the history and technology of space exploration.

Correlates with:

Planets and Moons – ASP

Space Phenomena – ASP

Earth Resources

- 6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include
- a) management of renewable resources;
 - b) management of nonrenewable resources;
 - c) the mitigation of land-use and environmental hazards through preventive measures; and
 - d) cost/benefit tradeoffs in conservation policies.

Correlates with:

No current programming