GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

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(Updated February 2013)

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Kindergarten

Atmosphere GLOBE Protocols	**Standards**
Cloud Cover and Contrail Cover Protocol	K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
	K.4 The student will investigate and understand that the position, motion, and physical properties of an object can be described. **(Indirect)**
	K.8 The student will investigate and understand that shadows occur when light is blocked by an object. **(Indirect)**
	K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. **(Direct)**
Precipitation Protocol	K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
	K.4 The student will investigate and understand that the position, motion, and physical properties of an object can be described. **(Indirect)**
	K.5 The student will investigate and understand that water flows and has properties that can be observed and tested. **(Direct)**
	K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. **(Direct)**
Current Temperature Protocol	K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	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. **(Indirect)**
	K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. **(Direct)**
	K.10 The student will investigate and understand that change occurs over time and rates may be fast or slow. **(Indirect)**
Hydrology GLOBE Protocols	**Standards**
Water Temperature Protocol	K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
	K.5 The student will investigate and understand that water flows and has properties that can be observed and tested. **(Direct)**
	K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. **(Indirect)**
	K.10 The student will investigate and understand that change occurs over time and rates may be fast or slow. **(Indirect)**
Earth as a System GLOBE Protocols	**Standards**
Budburst Protocol	K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
	K.6 The student will investigate and understand the differences between living and nonliving objects.**(Indirect)**
	K.7 The student will investigate and understand the basic needs and life processes of plants and animals.**(Indirect)**
	K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. **(Indirect)**
	K.10 The student will investigate and understand that change occurs over time and rates may be fast or slow. **(Direct)**

Ruby-throated Hummingbird Protocol	K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
	K.6 The student will investigate and understand the differences between living and nonliving objects.**(Indirect)**
	K.7 The student will investigate and understand the basic needs and life processes of plants and animals. **(Indirect)**
	K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. **(Direct)**

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Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Addressed through Further Investigations Incorporating a Systems Based Approach

Grade One

Atmosphere GLOBE Protocols	**Standards**
Cloud Cover and Contrail Cover Protocol	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	1.7 The student will investigate and understand weather and seasonal changes. **(Direct)**
Precipitation Protocol	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	1.7 The student will investigate and understand weather and seasonal changes. **(Direct)**
Current Temperature Protocol	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	1.5 The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. **(Indirect)**
	1.6 The student will investigate and understand the basic relationships between the sun and Earth. **(Indirect)**
	1.7 The student will investigate and understand weather and seasonal changes. **(Direct)**
Hydrology GLOBE Protocols	**Standards**
Water Temperature Protocol	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	1.5 The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. **(Indirect)**
	1.6 The student will investigate and understand the basic relationships between the sun and Earth. **(Indirect)**

	1.8 The student will investigate and understand that natural resources are limited. **(Indirect)**
Earth as a System GLOBE Protocols	**Standards**
Budburst Protocol	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Direct)**
	1.7 The student will investigate and understand weather and seasonal changes. **(Direct)**
Ruby-throated Hummingbird Protocol	1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	1.5 The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. **(Direct)**
	1.7 The student will investigate and understand weather and seasonal changes. **(Direct)**

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Grade Two

Atmosphere GLOBE Protocols	Standards
Cloud Cover and Contrail Cover Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Direct)**
Precipitation Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.3 The student will investigate and understand basic properties of solids, liquids, and gases. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Direct)**
	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Indirect)**
Digital Mulit-Day Max/Min and Current Air and Soil Temperature Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.5 The student will investigate and understand that living things are part of a system. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Direct)**
	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Indirect)**
Digital Max/Min Current Air and Soil Temperature Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.5 The student will investigate and understand that living things are part of a system. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Direct)**

	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Indirect)**
Current Temperature Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.5 The student will investigate and understand that living things are part of a system. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Direct)**
	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Indirect)**
Barometric Pressure Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Hydrology GLOBE Protocols	**Standards**
Water Temperature Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.5 The student will investigate and understand that living things are part of a system. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Indirect)**
	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Indirect)**
Earth as a System GLOBE Protocols	**Standards**
Budburst Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. **(Direct)**
	2.5 The student will investigate and understand that living things are part of a system. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Indirect)**
	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Direct)**
Ruby-throated Hummingbird Protocol	2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. **(Indirect)**
	2.5 The student will investigate and understand that living things are part of a system. **(Indirect)**
	2.6 The student will investigate and understand basic types, changes, and patterns of weather. **(Indirect)**
	2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals and their surroundings. **(Direct)**

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Grade Three

Atmosphere GLOBE Protocols	**Standards**
Cloud Cover and Contrail Cover Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.8 The student will investigate and understand basic patterns and cycles in nature.
Precipitation Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations.**(Direct)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
	3.9 The student will investigate and understand the water cycle and its relationship to life on Earth. **(Indirect)**
	3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. **(Indirect)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.7 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
	3.11 The student will investigate and understand different sources of energy. **(Indirect)**
Digital Max/Min and Current Air and Soil Temperature Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.7 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**

	3.11 The student will investigate and understand different sources of energy. **(Indirect)**
Current Temperature Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
Barometric Pressure Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
Hydrology GLOBE Protocols	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
	3.9 The student will investigate and understand the water cycle and its relationship to life on Earth. **(Indirect)**
	3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. **(Indirect)**
Water Temperature Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
	3.9 The student will investigate and understand the water cycle and its relationship to life on Earth. **(Indirect)**
	3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. **(Indirect)**
Soil GLOBE Protocols	**Standards**
Soil Characterization Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.3 The student will investigate and understand that objects are made of materials that can be described by their physical properties. **(Indirect)**

	3.7 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. **(Indirect)**
Soil Temperature Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.3 The student will investigate and understand that objects are made of materials that can be described by their physical properties. **(Indirect)**
	3.7 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. **(Indirect)**
Earth as a System GLOBE Protocols	**Standards**
Budburst Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
Ruby-throated Hummingbird Protocol	3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	3.4 The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to their environment. **(Direct)**
	3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. **(Indirect)**
	3.8 The student will investigate and understand basic patterns and cycles in nature. **(Indirect)**
	3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. **(Indirect)**

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Grade Four

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Relative Humidity Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Precipitation Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Digital Max/Min and Current Air and Soil Temperature Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Current Temperature Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**

Surface Temperature Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
	4.8 The student will investigate and understand the relationship among Earth, the moon, and the sun. **(Indirect)**
Barometric Pressure Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
AWS WeatherBug Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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 of the ecosystem. **(Indirect)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
Water Temperature Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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 of the ecosystem. **(Indirect)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
Electrical Conductivity Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.3 The student will investigate and understand the characteristics of electricity. **(Direct)**

	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 of the ecosystem. **(Indirect)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
Salinity Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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 of the ecosystem. **(Indirect)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
pH Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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 of the ecosystem. **(Indirect)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
Soil Temperature Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.9 The student will investigate and understand important Virginia natural resources. **(Indirect)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.4 The student will investigate and understand basic plant anatomy and life processes. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**

Green-up Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.4 The student will investigate and understand basic plant anatomy and life processes. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Green-down Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.4 The student will investigate and understand basic plant anatomy and life processes. **(Direct)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Ruby-throated Hummingbird Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
	4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. **(Indirect)**
Clonal and Common Lilac Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.4 The student will investigate and understand basic plant anatomy and life processes. **(Direct)**
	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. **(Indirect)**
Phenological Gardens Protocol	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	4.4 The student will investigate and understand basic plant anatomy and life processes. **(Direct)**
	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. **(Indirect)**

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Grade Five

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. **(Indirect)**
Relative Humidity Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Precipitation Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
Digital Mulit-Day Max/Min and Current Air and Soil Temperature Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Digital Max/Min and Current Air and Soil Temperature Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Current Temperature Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Surface Temperature Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Surface Ozone Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**

Barometric Pressure Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
AWS Weather Bug Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. **(Indirect)**
	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. **(Indirect)**
Water Temperature Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Electrical Conductivity Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Salinity Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	5.6 The student will investigate and understand characteristics of the ocean environment. **(Indirect)**
pH Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Alkalinity Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Nitrate Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	5.7 The student will investigate and understand how Earth's surface is constantly changing. **(Indirect)**

Soil Temperature Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Gravimetric Soil Moisture Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	5.7 The student will investigate and understand how Earth's surface is constantly changing. **(Indirect)**
Soil pH Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	5.7 The student will investigate and understand how Earth's surface is constantly changing. **(Indirect)**
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
Green-up Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
Green-down Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
Ruby-throated Hummingbird Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	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. **(Indirect)**
Clonal and Common Lilac Protocol	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**
Phenological Gardens Protocols	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. **(Indirect)**

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Grade Six

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. **Indirect)**
Aerosols Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. (**Indirect)**
	6.4 The student will investigate and understand that all matter is made up of atoms. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
	6.9 The student will investigate and understand public policy decisions relating to the environment. (**Indirect)**
Water Vapor Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. (**Indirect)**
	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. (**Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. (**Indirect)**

	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
Relative Humidity	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. (**Indirect)**
	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. (**Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
Precipitation Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. (**Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Direct)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. (**Indirect)**
	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. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
Digital Max/Min and Current Air and Soil Temperature	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. (**Indirect)**
	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.(**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
Current Temperature Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
Surface Temperature Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. (**Indirect)**
Surface Ozone Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**
	6.9 The student will investigate and understand public policy decisions relating to the environment. (**Indirect)**
Barometric Pressure Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	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. (**Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. (**Indirect)**

AWS WeatherBug	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. **(Indirect)**
	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. **(Indirect)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. **(Indirect)**
Davis, Weatherhawk, Rainwise Weather Station, and Automated Soil and Air Temperature Monitoring Protocols	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. **(Indirect)**
	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. **(Indirect)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. **(Indirect)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk ad Transparency Tube	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Water Temperature Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Dissolved Oxygen Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Electrical Conductivity Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Salinity Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
pH Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**

	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Alkalinity Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Nitrate Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	6.5 The student will investigate and understand the unique properties and characteristics of water and its role in the natural and human-made environment. **(Indirect)**
	6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. **(Indirect)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Soil Temperature Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Gravimetric Soil Moisture Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	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. **(Indirect)**

Bulk Density Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Soil Particle Density	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Particle Size Distribution Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Soil pH Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Soil Fertility Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
Davis Soil Moisture and Temperature Station Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	6.4 The student will investigate and understand that all matter is made up of atoms. **(Indirect)**
	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. **(Indirect)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Biometry Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Manual Land Cover Mapping Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**

Fire Fuel Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. **(Indirect)**
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Green-Up Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Green-down Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Ruby-throated Hummingbird Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Clonal and Common Lilac Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Phenological Gardens Protocol	6.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Biology

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Aerosols Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Water Vapor Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
Relative Humidity Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Digital Mulit-Day Max/Min and Current Air and Soil Temperature Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Digital Max/Min and Current Air and Soil Temperature Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Current Temperature Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Surface Temperature Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Surface Ozone Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Barometric Pressure Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**

AWS WeatherBug	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations.**(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
Davis, Weatherhawk, Rainwise Weather Station, and Automated Soil and Air Temperature Monitoring Protocols	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Water Temperature Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Dissolved Oxygen Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Electrical Conductivity Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**

	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Salinity Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
pH Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Alkalinity Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Nitrate Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**

	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Soil Temperature Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations.**(Direct)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Gravimetric Soil Moisture Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Bulk Density Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Soil Particle Density Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Particle Size Distribution Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Soil pH Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Soil Fertility	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**

	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Davis Soil Moisture and Temperature Station Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations.
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Biometry Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Manual Land Cover Mapping Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. (**Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. (**Indirect)**

Computer-aided Land Cover Mapping Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. (**Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. (**Indirect)**
Land Cover Change Detection Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. (**Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. (**Indirect)**
Fire Fuel Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. (**Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. (**Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. (**Indirect)**
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**

	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Green-up Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Green-down Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Ruby-throated Hummingbird Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Clonal and Common Lilac Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**

	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Phenological Gardens Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**
Seaweed Reproductive Phenology Protocol	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations. **(Direct)**
	BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. **(Indirect)**
	BIO.5 The student will investigate and understand common mechanisms of inheritance and protein synthesis. **(Indirect)**
	BIO.6 The student will investigate and understand bases for modern classification systems. **(Indirect)**
	BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. **(Indirect)**

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Chemistry

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Aerosols Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Water Vapor Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Relative Humidity Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles.**(Indirect)**
Precipitation Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**

	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Digital Max/Min and Current Air and Soil Temperature Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Current Temperature Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Surface Temperature Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Surface Ozone Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Barometric Pressure Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles.**(Indirect)**
AWS WeatherBug	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Davis, Weatherhawk, Rainwise Weather Station, and Automted Soil and Air Temperature Monitoring Protocols	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**

	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk an Transparency Tube	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Water Temperature Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Dissolved Oxygen Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Electrical Conductivity Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Salinity Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
pH Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**

	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Alkalinity Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data.
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Nitrate Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Soil Temperature Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Gravimetric Soil Moisture Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Bulk Density	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**

Soil Particle Density Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Particle Size Distribution Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles.**(Indirect)**
Soil pH Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
Soil Fertility Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. **(Indirect)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. **(Indirect)**
Davis Soil Moisture and Temperature Station Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Biometry Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**

Manual Land Cover Mapping Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Computer-aided Land Cover Mapping Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Land Cover Change Detection Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Fire Fuel Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
	CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles.
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Green-up Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Green-down Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Ruby-throated Hummingbird Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Clonal and Common Lilac Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Phenological Gardens Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**
Seaweed Reproductive Phenology Protocol	CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed and evaluated produce observations and verifiable data. **(Direct)**

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Earth Science

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Aerosols Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.11 The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. **(Indirect)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Water Vapor Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Relative Humidity Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Precipitation Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**

	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. (**Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	E.S.1 The student will plan and conduct investigations. (**Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. (**Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Digital Max/Min and Current Air and Soil Temperature Protocol	E.S.1 The student will plan and conduct investigations. (**Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. (**Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Current Temperature Protocol	E.S.1 The student will plan and conduct investigations. (**Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. (**Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Surface Temperature Protocol	E.S.1 The student will plan and conduct investigations. (**Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. (**Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Surface Ozone Protocol	E.S.1 The student will plan and conduct investigations. (**Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. (**Direct)**
	E.S.11 The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. **(Indirect)**

	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Barometric Pressure Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
AWS WeatherBug	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Davis, Weatherhawk, Rainwise Weather Station, and Automated Soil an Air Temperature Monitoring Protocols	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
Water Temperature Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**

Dissolved Oxygen Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
Electrical Conductivity Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
Salinity Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
pH Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
Alkalinity Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
Nitrate Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
Soil GLOBE Investigations	**Standards**

Soil Characterization Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
Soil Temperature Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Gravimetric Soil Moisture Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
	E.S 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
	E.S.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Bulk Density Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
Soil Particle Density Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**

	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
Particle Size Distribution Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
Soil pH Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
Soil Fertility	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
Davis Soil Moisture and Temperature Station Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. **(Indirect)**
	E.S. 8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. **(Indirect)**
	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
Biometry Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**

	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
Manual Land Cover Mapping Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
Computer-aided Land Cover Mapping Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
Land Cover Change Detection Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
Fire Fuel Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Di**
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Green-up Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Green-down Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**

	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth.**(Indirect)**
Ruby-throated Hummingbird Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Clonal an Common Lilac Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Phenological Gardens Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. **(Indirect)**
Seaweed Reproductive Phenology Protocol	E.S.1 The student will plan and conduct investigations. **(Direct)**
	E.S. 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. **(Direct)**
	E.S. 10 The student will investigate and understand that oceans are complex, interactive physical, chemical and biological systems and are subject to long- and short-term variations. **(Indirect)**

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Life Science

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Aerosols Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations.**(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Water Vapor Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Relative Humidity Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Precipitation Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**

Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity.**(Indirect)**
Digital Max/Min and Current Air and Soil Temperature Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity.**(Indirect)**
Current Temperature Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**

	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Surface Temperature Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity.**(Indirect)**
Surface Ozone Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Barometric Pressure Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
AWS WeatherBug	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Davis, Weatherhawk, Rainwise Weather Station, and Automated Soil and Air Temperature Monitoring Protocols	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. (**Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**

Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Water Temperature Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Dissolved Oxygen Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**

	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Electrical Conductivity Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. (**Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. (**Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S. 11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Salinity Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
pH Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Alkalinity Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Nitrate Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity.**(Indirect)**

Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Soil Temperature Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Gravimetric Soil Moisture Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**

	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Bulk Density Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Soil Particle Density Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Particle Size Distribution Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Soil pH Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Soil Fertility	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**

Davis Soil Moisture and Temperature Station Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Biometry Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**

	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Manual Land Cover Mapping Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Computer-aided Land Cover Mapping Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Land Cover Change Detection Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. (**Direct)**

	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Fire Fuel Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	L.S. 1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Earth as a System Investigations	**Standards**
Budburst Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**

	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Green-up Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. **(Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. **(Indirect)**
Green-down Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations.(**Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. (**Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. (**Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. (**Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. (**Indirect)**
Ruby-throated Hummingbird Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. **(Direct)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. (**Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. (**Indirect)**
Clonal and Common Lilac Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. (**Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. (**Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. (**Indirect)**
Phenological Gardens Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. (**Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. (**Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. **(Direct)**

	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. (**Indirect)**
Seaweed Reproductive Phenology Protocol	L.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	L.S.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of their environment. (**Indirect)**
	L.S.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors. (**Indirect)**
	L.S.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. (**Indirect)**
	L.S.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. (**Indirect)**
	L.S12 The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. **(Direct)**

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Physical Science

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Aerosols Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Water Vapor Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S.2 The student will investigate and understand the nature of matter. **(Indirect)**
	P.S. 6 The student will investigate and understand forms of energy and how energy is transferred and transformed. **(Indirect)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Indirect)**
Relative Humidity Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Indirect)**
Precipitation Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S.2 The student will investigate and understand the nature of matter. **(Indirect)**
	P.S.5 the student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. **(Indirect)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Digital Max/Min and Current Air and Soil Temperature	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Current Temperature Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Surface Temperature Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 6 The student will investigate and understand forms of energy and how energy is transferred and transformed. **(Direct)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Surface Ozone Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Barometric Pressure Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
AWS WeatherBug	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 6 The student will investigate and understand forms of energy and how energy is transferred and transformed. **(Indirect)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Davis, Weatherhawk, Rainwise Weather Station, and Automated Soil and Air Temperature Monitoring Protocols	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 6 The student will investigate and understand forms of energy and how energy is transferred and transformed. **(Indirect)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer.**(Direct)**

Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations.**(Direct)**
Water Temperature Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Dissolved Oxygen Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Electrical Conductivity Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 6 The student will investigate and understand forms of energy and how energy is transferred and transformed. **(Indirect)**
	P.S.11 The student will investigate and understand basic principles of electricity and magnetism. **(Direct)**
Salinity Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
pH Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Alkalinity Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Nitrate Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Soil Temperature Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
	P.S. 6 The student will investigate and understand forms of energy and how energy is transferred and transformed. **(Direct)**

	P.S. 7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. **(Direct)**
Gravimetric Soil Moisture Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Bulk Density Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Soil Particle Density Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Particle Size Distribution Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Soil pH Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Soil Fertility Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Davis Soil Moisture and Temperature Station Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Biometry Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Manual Land Cover Mapping Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Computer-aided Land Cover Mapping Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Land Cover Change Detection Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

Fire Fuel Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Green-up Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Green-down Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Ruby-throated Hummingbird Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Clonal and Common Lilac Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Phenological Gardens Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**
Seaweed Reproductive Phenology Protocol	P.S.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations. **(Direct)**

GLOBE Protocols Correlated to Virginia Science Standards of Learning 2010

Direct: Standard Addressed within the Basic Components of the Protocol
Indirect: Standard Addressed through Further Investigations Incorporating a Systems Based Approach

Physics

Atmosphere GLOBE Investigations	**Standards**
Cloud Cover and Contrail Cover Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
	PH.4 The student will investigate and understand how applications of physics affect the world. **(Indirect)**
Aerosols Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
	PH.4 The student will investigate and understand how applications of physics affect the world. **(Indirect)**
	PH.8 The student will investigate and understand wave phenomena. **(Indirect)**
	PH.9 The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio through visible light to gamma radiation. **(Indirect)**
	PH.12 The student will investigate and understand that extremely large and extremely small quantities are not necessarily describe by the same laws as those studied in Newtonian physics. **(Indirect)**
Water Vapor Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**

Relative Humidity	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Precipitation Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Digital Multi-Day Max/Min and Current Air and Soil Temperature Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Digital Max/Min and Current Air and Soil Temperature Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Current Temperature Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Surface Temperature Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and0 demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Surface Ozone Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**

Barometric Pressure Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
AWS WeatherBug	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Davis, Weatherhawk, Rainwise Weather Station, and Automated Soil and Air Temperature Monitoring Protocols	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Hydrology GLOBE Investigations	**Standards**
Water Transparency Protocol: Secchi Disk and Transparency Tube	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Water Temperature Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Dissolved Oxygen Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Electrical Conductivity Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**

	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Salinity Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
pH Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Alkalinity Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Nitrate Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Soil GLOBE Investigations	**Standards**
Soil Characterization Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Soil Temperature Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**

Gravimetric Soil Moisture Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Bulk Density Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Soil Particle Density Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Particle Size Distribution Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Soil pH Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Soil Fertility Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Davis Soil Moisture and Temperature Station Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**

	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Land Cover/Biology GLOBE Investigations	**Standards**
Land Cover Sample Site Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Biometry Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Manual Land Cover Mapping Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Computer-aided Land Cover Mapping Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Land Cover Change Detection Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data.
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Fire Fuel Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**

GPS GLOBE Investigations	**Standards**
GPS Measurement Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Earth as a System GLOBE Investigations	**Standards**
Budburst Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Green-up Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Green-down Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**
Ruby-throated Hummingbird Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**

Clonal and Common Lilac Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Phenological Gardens Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes.**(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic. **(Direct)**
Seaweed Reproductive Phenology Protocol	PH.1 The student will plan and conduct investigations using experimental design and product design processes. **(Direct)**
	PH.2 The student will investigate and understand how to analyze and interpret data. **(Direct)**
	PH.3 The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning and logic.**(Direct)**