ELD Standards Mapping ELD Standard 4: Language for Science Grades K-12

The English Language Development (ELD) Standards Mapping Documents are designed to show the connections between the ELD Language Expectations for the five ELD Standards and the content standards for English Language Arts, Mathematics, Science and Social Studies, as well as support integration of the ELD Language Expectations and content to support Multilingual Learners' (ML) learning. This specific ELD Standards Mapping Document focuses on ELD *Standard 4: Language for Science*.

The mapping document can be used by all teachers of MLs to explore the connections between language and content for a variety of purposes, such as developing and aligning curriculum, planning instruction, and co-teaching.

Please note that Standard 1 is not included in this Mapping Document. Standard 1 applies across a range of educational settings and is embedded throughout *ELD Standard 4: Language for Science*. This moves beyond the binary view of social language as a precursor to academic language and views students' everyday language as a legitimate component of academic language development and part of the system of choices students make in order to most effectively meet activity purpose and other contextual variables. The emphases in Standard 1 have heightened attention to the notion that language, social-emotional, and cognitive development are interrelated processes that contribute to students' success in school and beyond. As students make their thinking visible, they communicate to learn, to convey personal needs and wants, to affirm their own identities, and to form and maintain relationships (WIDA 2020). Standard 1 can also be interwoven throughout Science instruction.

The charts below appear in order of the ELD SCOS grade-level clusters (<u>K, 1, 2-3, 4-5, 6-8, 9-12</u>) in the left column with the connected Science standards in the right columns. Shading is used throughout the document to assist viewers in identifying mapping for each language expectation. This document does not include an exhaustive list of the possible connections. Educators should use their knowledge of the ELD standards and their professional judgment when selecting ELD language expectations and Science standards for integration.



ELD-SC.K.Inform.Interpretive	Kindergarten
Interpret scientific informational texts by: Determining what text is about	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.
Interpret scientific informational texts by: Defining or classifying a concept or entity	 K.P.2 Understand how objects are described based on their physical properties and how they are used. K.P.2.1 Classify objects by observable physical properties (including size, color, shape, texture, weight and flexibility). K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc) from which objects are made and how they are used. K.L.1 Compare characteristics of animals that make them alike and different from other animals and nonliving things. K.L.1.1 Compare different types of the same animal (i.e. different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal. K.L.1.2 Compare characteristics of living and nonliving things in terms of their: Structure Growth Changes Movement Basic needs

Language Expectation

Connected Grade-Level or Course-Specific Content Standards

(annotated format)



ELD Standard 4: Language for Science Kindergarten

ELD-SC.K.Inform.Interpretive	Kindergarten
Interpret scientific informational texts by: Determining what text is about	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.
Interpret scientific informational texts by: Defining or classifying a concept or entity	 K.P.2 Understand how objects are described based on their physical properties and how they are used. K.P.2.1 Classify objects by observable physical properties (including size, color, shape, texture, weight and flexibility). K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc) from which objects are made and how they are used. K.L.1 Compare characteristics of animals that make them alike and different from other animals and nonliving things. K.L.1.1 Compare different types of the same animal (i.e. different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal. K.L.1.2 Compare characteristics of living and nonliving things in terms of their: Structure Growth Changes Movement Basic needs
ELD-SC.K.Inform.Expressive	Kindergarten
Construct scientific informational texts that: Introduce others to a topic or entity	K.P.2 Understand how objects are described based on their physical properties and how they are used. K.P.2.1 Classify objects by observable physical properties (including



Construct scientific informational texts that: Provide details about an entity	 size, color, shape, texture, weight and flexibility). K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc) from which objects are made and how they are used. K.P.1 Understand the positions and motions of objects and organisms observed in the environment. K.P.1.1 Compare the relative position of various objects observed in the classroom and outside using position words such as: in front of, behind, between, on top of, under, above, below and beside. K.P.1.2 Give examples of different ways objects and organisms move (to include falling to the ground when dropped): Straight Zigzag Round and round Back and forth Fast and slow K.P.2.1 Classify objects by observable physical properties (including size, color, shape, texture, weight and flexibility) 	
	K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc) from which objects are made and how they are used.	
ELD-SC.K.Explain.Interpretive	Kindergarten	
Interpret scientific explanations by: Defining investigable questions or simple design problems based on observations and data about a phenomenon	 K.E.1 Understand change and observable patterns of weather that occur from day to day and throughout the year. K.E.1.1 Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses. K.E.1.2 Summarize daily weather conditions noting changes that occur from day to day and throughout the year. K.E.1.3 Compare weather patterns that occur from season to season. 	



Interpret scientific explanations by: Using information from observations to find patterns and to explain how or why a phenomenon occurs	 K.E.1 Understand change and observable patterns of weather that occur from day to day and throughout the year. K.E.1.1 Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses. K.E.1.2 Summarize daily weather conditions noting changes that occur from day to day and throughout the year. K.E.1.3 Compare weather patterns that occur from season to season. 	
ELD-SC.K.Explain.Expressive	Kindergarten	
Describe information from observations about a phenomenon: Relate how a series of events causes something to happen	 K.E.1 Understand change and observable patterns of weather that occur from day to day and throughout the year. K.E.1.1 Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses. K.E.1.2 Summarize daily weather conditions noting changes that occur from day to day and throughout the year. K.E.1.3 Compare weather patterns that occur from season to season. 	
Describe information from observations about a phenomenon: Compare multiple solutions to a problem	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.	



ELD Standard 4: Language for Science Grade 1

ELD-SC.1.Inform.Interpretive	Grade 1
Interpret scientific informational texts by: Determining what text is about	 1.E.2 Understand the physical properties of Earth materials that make them useful in different ways. 1.E.2.1 Summarize the physical properties of Earth materials, including rocks, minerals, soils and water that make them useful in different ways 1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive. 1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering). 1.L.2 Summarize the needs of living organisms for energy and growth. 1.L.2.1 Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth. 1.L.2.2 Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth.
Interpret scientific informational texts by: Defining or classifying concept or entity	 1.E.1 Recognize the features and patterns of the earth/moon/sun system as observed from Earth. 1.E.1.1 Recognize differences in the features of the day and night sky and apparent movement of objects across the sky as observed from Earth. 1.E.1.2 Recognize patterns of observable changes in the Moon's appearance from day to day. 1.E.2 Understand the physical properties of Earth materials that make them useful in different ways. 1.E.2.2 Compare the properties of soil samples from different places relating their capacity to retain water, nourish and support the growth of certain plants.



	 1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive. 1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering).
ELD-SC.1.Inform.Expressive	Grade 1
Construct scientific informational texts that: Introduce others to a topic or entity	 1.P.1 Understand how forces (pushes or pulls) affect the motion of an object. 1.P.1.1 Explain the importance of a push or pull to changing the motion of an object. 1.P.1.2 Explain how some forces (pushes and pulls) can be used to make things move without touching them, such as magnets.
Construct scientific informational texts that: Define, describe, and classify concept, topic, or entity	 1.P.1 Understand how forces (pushes or pulls) affect the motion of an object. 1.P.1.1 Explain the importance of a push or pull to changing the motion of an object. 1.P.1.2 Explain how some forces (pushes and pulls) can be used to make things move without touching them, such as magnets.
Construct scientific informational texts that: Summarize observations or factual information	 1.E.2 Understand the physical properties of Earth materials that make them useful in different ways. 1.E.2.1 Summarize the physical properties of Earth materials, including rocks, minerals, soils and water that make them useful in different ways. 1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive. 1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering). 1.L.2 Summarize the needs of living organisms for energy and growth 1.L.2.1 Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth. 1.L.2.2 Summarize the basic needs of a variety of different animals



	(including air, water, and food) for energy and growth.	
ELD-SC.1.Explain.Interpretive	Grade 1	
Interpret scientific explanations by: Defining investigable questions or simple design problems based on observations and data about a phenomenon	 1.P.1 Understand how forces (pushes or pulls) affect the motion of an object. 1.P.1.1 Explain the importance of a push or pull to changing the motion of an object. 1.P.1.2 Explain how some forces (pushes and pulls) can be used to make things move without touching them, such as magnets. 1.P.1.3 Predict the effect of a given force on the motion of an object, including balanced forces. 	
Interpret scientific explanations by: Analyzing several events and observations to help explain how or why a phenomenon occurs	 1.P.1 Understand how forces (pushes or pulls) affect the motion of an object. 1.P.1.1 Explain the importance of a push or pull to changing the motion of an object. 1.P.1.2 Explain how some forces (pushes and pulls) can be used to make things move without touching them, such as magnets. 	
Interpret scientific explanations by: Identifying information from observations (that supports particular points in explanations)	 1.E.2 Understand the physical properties of Earth materials that make them useful in different ways. 1.E.2.2 Compare the properties of soil samples from different places relating their capacity to retain water, nourish and support the growth of certain plants. 	
ELD-SC.1.Explain.Expressive	Grade 1	
Construct scientific explanations that: Describe observations and/or data about a phenomenon	/or 1.E.2 Understand the physical properties of Earth materials that make them useful in different ways. 1.E.2.2 Compare the properties of soil samples from different places relating their capacity to retain water, nourish and support the growth certain plants.	
	 1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive. 1.L.1.2 Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places 	



	throughout the world.	
Construct scientific explanations that: Relate how a series of events causes something to happen	 1.P.1 Understand how forces (pushes or pulls) affect the motion of an object 1.P.1.1 Explain the importance of a push or pull to changing the motion of an object. 1.P.1.2 Explain how some forces (pushes and pulls) can be used to make things move without touching them, such as magnets. 	
Construct scientific explanations that: Compare multiple solutions to a problem		



ELD Standard 4: Language for Science Grades 2-3

ELD-SC.2-3.Explain.Interpretive	Grade 2	Grade 3
Interpret scientific explanations by: Defining investigable questions or simple design problems based on observations, data, and prior knowledge about a phenomenon	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.	 3.L.2 Understand how plants survive in their environments. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
Interpret scientific explanations by: Obtaining and combining information from observations, and using evidence to help explain how or why a phenomenon occurs	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.1 Illustrate how sound is produced by vibrating objects and columns of air. 2.P.1.2 Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords. 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.1 Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container. 2.E.1 Understand patterns of weather and factors that affect weather. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.2 Compare the relative speeds (faster or slower) of objects that travel the same distance in different amounts of time. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.1.2 Explain why skin is necessary for protection and for the body to remain



	2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year.	healthy. 3.L.2 Understand how plants survive in their environments. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
Interpret scientific explanations by: Identifying information from observations as well as evidence that supports particular points in explanations	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.1 Illustrate how sound is produced by vibrating objects and columns of air. 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.1 Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.1.2 Explain why skin is necessary for protection and for the body to remain healthy. 3.L.2 Understand how plants survive in their



		 environments. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
ELD-SC.2-3.Explain.Expressive	Grade 2	Grade 3
Construct scientific explanations that: Describe observations and/or data about a phenomenon	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.1 Illustrate how sound is produced by vibrating objects and columns of air. 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.1 Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.2 Compare solids, liquids, and gases based on their basic properties. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water.



	time of day and time of year.	
	 2.L.1 Understand animal life cycles. 2.L.1.1 Summarize the life cycle of animals: Birth Developing into an adult Reproducing Aging and death 	
Construct scientific explanations that: Develop a logical sequence between data or evidence and claim	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.2 Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.1.2 Explain why skin is necessary for protection and for the body to remain healthy. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow.



		 3.L.2.3 Summarize the distinct stages of the life cycle of seed plants. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
Construct scientific explanations that: Compare multiple solutions to a problem considering how well they meet the criteria and constraints of the design solution	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.1 Illustrate how sound is produced by vibrating objects and columns of air. 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.1 Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.2 Explain why skin is necessary for protection and for the body to remain healthy. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.3 Summarize the distinct stages of the



	 2.L.1.1 Summarize the life cycle of animals: Birth Developing into an adult Reproducing Aging and death 	life cycle of seed plants. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
ELD-SELD-SC.2-3.Argue.Interpretive	Grade 2	Grade 3
Interpret scientific arguments by: Identifying potential evidence from data, models, and/or information from investigations of phenomena or design solutions	 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.3 Compare weather patterns that occur overtime and relate observable patterns to time of day and time of year. 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.1 Infer changes in speed or direction resulting from forces acting on an object. 3.P.1.2 Compare the relative speeds (faster or slower) of objects that travel the same distance in different amounts of time. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.2 Compare solids, liquids, and gases based on their basic properties. 3.E.2 Compare the structures of the Earth's surface using models or three-dimensional diagrams. 3.E.2.1 Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers). 3.E.2.2 Compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands) by using models, pictures, diagrams, and maps.
Interpret scientific arguments by: Analyzing whether evidence is relevant or not	 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.1 Infer changes in speed or direction resulting from forces acting on an object.



	after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.2 Summarize weather conditions using qualitative and quantitative measures to describe: • Temperature • Wind direction • Wind speed • Precipitation 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year.	
Interpret scientific arguments by: Distinguishing between evidence and opinions	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.
ELD-SC.2-3.Argue.Expressive	Grade 2	Grade 3
Construct scientific arguments that: Introduce topic/phenomenon for an issue related to the natural and designed world(s)	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.1 Illustrate how sound is produced by vibrating objects and columns of air. 2.P.1.2 Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change.



	 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.1 Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.2 Summarize weather conditions using qualitative and quantitative measures to describe: Temperature Wind direction Wind speed Precipitation 2.E.1.4 Recognize the tools that scientists use for observing, recording, and predicting weather changes from day to day and during the seasons. 	 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.1.2 Explain why skin is necessary for protection and for the body to remain healthy. 3.L.2 Understand how plants survive in their environments. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.3 Summarize the distinct stages of the life cycle of seed plants. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
Construct scientific arguments that: Make a claim supported by relevant evidence	 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth.
	2.L.2 Remember that organisms differ from or are similar to their parents based on the characteristics of the organism.	3.L.1 Understand human body systems and how they are essential for life: protection, movement and support.



	2.L.2.1 Identify ways in which many plants and animals closely resemble their parents in observed appearance and ways they are different.	 3.L.1.2 Explain why skin is necessary for protection and for the body to remain healthy. 3.L.2 Understand how plants survive in their environments. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
Construct scientific arguments that: Establish a neutral tone	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.2 Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year. 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.1 Illustrate how sound is produced by 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.1.2 Explain why skin is necessary for



	 2.P.2 Understand properties of solids and liquids and the changes they undergo. 2.P.2.1 Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.P.2.3 Compare what happens to water left in an open container over time as to water left in a closed container. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year. 2.L.1 Understand animal life cycles. 2.L.1.1 Summarize the life cycle of animals: Birth Developing into an adult Reproducing Aging and death 	 3.L.2 Understand how plants survive in their environments. 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.3 Summarize the distinct stages of the life cycle of seed plants. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
Construct scientific arguments that: Signal logical relationships among reasoning, evidence, data, and/or a model when making a claim	 2.P.1 Understand the relationship between sound and vibrating objects. 2.P.1.2 Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords. 2.P.2 Understand properties of solids and liquids 	 3.P.1 Understand motion and factors that affect motion. 3.P.1.2 Compare the relative speeds (faster or slower) of objects that travel the same distance in different amounts of time. 3.P.1.3 Explain the effects of earth's gravity on the motion of any object on or near the



 and the changes they undergo. 2.P.2.2 Compare the amount (volume and weight) of water in a container before and after freezing. 2.E.1 Understand patterns of weather and factors that affect weather. 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water. 	 earth. 3.P.2 Understand the structure and properties of matter before and after they undergo a change. 3.P.2.2 Compare solids, liquids, and gases based on their basic properties. 3.P.2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. 3.E.2 Compare the structures of the Earth's surface using models or three-dimensional diagrams. 3.E.2.1 Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes, ponds, streams, and glaciers). 3.E.2.2 Compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands) by using models, pictures, diagrams, and maps.
	 3.L.1 Understand human body systems and how they are essential for life: protection, movement and support. 3.L.1.1 Compare the different functions of the skeletal and muscular system. 3.L.1.2 Explain why skin is necessary for protection and for the body to remain healthy.
	 3.L.2 Understand how plants survive in their environments. 3.L.2.2 Explain how environmental conditions determine how well plants



	survive and grow. 3.L.2.3 Summarize the distinct stages of the life cycle of seed plants. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.
--	---



ELD Standard 4: Language for Science Grades 4-5

ELD-SC.4-5.Explain.Interpretive	Grade 4	Grade 5
Interpret scientific explanations by: Defining investigable questions or design problems based on observations, data, and prior knowledge about a phenomenon	ng investigable questions or design ms based on observations, data, and nowledge about a phenomenon A.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or
	4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction.	a change in mass on the motion of an object.
	4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak.	 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle
	 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the 	(including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction.
	moon's orbit around the Earth.	5.P.3 Explain how the properties of some materials change as a result of heating and cooling.
	4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their	5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation).
	needs by using behaviors in response to	5.P.3.2 Explain how heating and cooling



	 information received from the environment. 4.L1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
Interpret scientific explanations by: Obtaining and combining evidence and information to help explain how or why a phenomenon occurs	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object. 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy



 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth. 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
	5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.3 Infer the effects that may result



		from the interconnected relationship of plants and animals to their ecosystem. 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
Interpret scientific explanations by: Identifying evidence that supports particular points in an explanation	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth. 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object. 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction. 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of



	 changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or
--	--	--



a change in mass on the motion of an object.
5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).
 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.
 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while



		others require many cells that are specialized to survive. 5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem. 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
ELD-SC.4-5.Explain.Expressive	Grade 4	Grade 5
Construct scientific explanations that: Describe observations and/or data about a phenomenon	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 4.E.1 Explain the causes of day and night and phases of the moon. 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object. 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction.



 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth. 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise in maintaining a healthy body. 	 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.P.1 Understand force, motion and the
	relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects.



	5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object.
	5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).
	 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
	5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.
	5.L.1 Understand how structures and systems of



		 organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem. 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the
Construct scientific explanations that: Establish neutral or objective stance in communicating results	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all thing made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 	 characteristics of the organism. 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction.



 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth. 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 	 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects.



5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object.
5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).
 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.
 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are



		 capable of surviving as a single cell while others require many cells that are specialized to survive. 5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem. 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or the characteristics of the organism.
Construct scientific explanations that: Develop reasoning to show relationships between evidence and claims	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 4.E.1 Explain the causes of day and night and phases of the moon. 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object. 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).



 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth. 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Explain the role of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction. 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
	5.P.1 Understand force, motion and the relationship between them.



	 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel. 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object.
	5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).
	 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
	 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction


Construct scientific explanations that: Summarize and/or compare multiple	*Note: While there are no specific science standards listed, language instruction for this language	 and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem. 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism. *Note: While there are no specific science standards listed, language instruction for this
solutions to a problem based on how well they meet the criteria and constraints of the design solution	expectation can be integrated within all aspects of science instruction.	language expectation can be integrated within all aspects of science instruction.
ELD-SC.4-5.Argue.Interpretive	Grade 4	Grade 5



4.P.1.2 Explain how electrically charged objects push or pull on other electrically	5.P.2 Understand the interactions of matter and
charged objects and produce motion.	energy and the changes that occur.
charged objects and produce motion.	5.P.2.1 Explain how the sun's energy
4.P.2 Understand the composition and properties of	impacts the processes of the water cycle
matter before and after they undergo a change or	(including evaporation, transpiration,
interaction.	condensation, precipitation and runoff).
4.P.2.1 Compare the physical properties of	5.P.2.2 Compare the weight of an object to
samples of matter (strength, hardness,	the sum of the weight of its parts before
flexibility, ability to conduct heat, ability to	and after an interaction.
conduct electricity, ability to be attracted by	
magnets, reactions to water and fire).	5.P.3 Explain how the properties of some materials
4.P.2.2 Explain how minerals are identified	change as a result of heating and cooling.
using tests for the physical properties of	5.P.3.1 Explain the effects of the transfer of
hardness, color, luster, cleavage and streak.	heat (either by direct contact or at a
4 D2 Decompize that an array takes variage forms	distance) that occurs between objects at
4.P.3 Recognize that energy takes various forms	different temperatures. (conduction, convection or radiation)
that may be grouped based on their interaction with matter.	5.P.3.2 Explain how heating and
matter.	cooling affect some materials and how this
4.P.3.1 Recognize the basic forms of energy	relates to their purpose and practical
(light, sound, heat, electrical, and magnetic)	applications.
as the ability to cause motion or create	
change.	5.E.1 Understand weather patterns and
<u> </u>	phenomena, making connections to the weather in
4.P.3.2 Recognize that light travels in a	a particular place and time.
straight line until it strikes an object or travels	5.E.1.3 Explain how global patterns such
from one medium to another, and that light	as the jet stream and water currents
can be reflected, refracted, and absorbed.	influence local weather in measurable
	terms such as temperature, wind direction
4.E.1 Explain the causes of day and night and	and speed, and precipitation.
phases of the moon.	FI 4 Understand have structured and events are of
4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis.	5.L.1 Understand how structures and systems of
4.E.1.2 Explain the monthly changes in the	organisms (to include the human body) perform functions necessary for life.



appearance of the moon, based on the moon's orbit around the Earth.	5.L.1.1 Explain why some organisms are capable of surviving as a single cell while
	others require many cells that are
4.E.2 Understand the use of fossils and changes in	specialized to survive.
the surface of the earth as evidence of the history of	
Earth and its changing life forms.	5.P.1 Understand force, motion and the
4.E.2.1 Compare fossils (including molds,	relationship between them.
casts, and preserved parts of plants and	5.P.1.1 Explain how factors such as gravity,
animals) to one another and to living	friction, and change in mass affect the
organisms.	motion of objects.
4.E.2.2 Infer ideas about Earth's early	5.P.1.4 Predict the effect of a given force or
environments from fossils of plants and animals that lived long ago.	a change in mass on the motion of an object.
4.E.2.3 Give examples of how the surface of	object.
the earth changes due to slow processes	5.P.2 Understand the interactions of matter and
such as erosion and weathering, and rapid	energy and the changes that occur.
processes such as landslides, volcanic	5.P.2.1 Explain how the sun's energy
eruptions, and earthquakes.	impacts the processes of the water cycle (including evaporation, transpiration,
4.L.1 Understand the effects of environmental	condensation, precipitation and runoff).
changes, adaptations and behaviors that enable	
animals (including humans) to survive in changing habitats.	5.P.3 Explain how the properties of some materials change as a result of heating and cooling.
4.L.1.1 Give examples of changes in an	change as a result of heating and cooling.
organism's environment that are beneficial to	5.P.3.1 Explain the effects of the transfer of
it and some that are harmful.	heat (either by direct contact or at a
4.L.1.2 Explain how animals meet their	distance) that occurs between objects at
needs by using behaviors in response to	different temperatures. (conduction,
information received from the environment.	convection or radiation)
4.L1.3 Explain how humans can adapt their	5.P.3.2 Explain how heating and cooling
behavior to live in changing habitats (e.g.,	affect some materials and how this relates
recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding	to their purpose and practical applications.
and erosion).	5.E.1 Understand weather patterns and
4.L.1.4 Explain how differences among	phenomena, making connections to the weather in



	 animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.1 Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth and repair of the body. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 a particular place and time. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem. 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
Interpret scientific arguments by: Comparing reasoning and claims based on evidence	 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.1 Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by 	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.



	magnets, reactions to water and fire). 4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms. 4.E.2.1 Compare fossils (including molds, casts, and preserved parts of plants and animals) to one another and to living organisms.	
Interpret scientific arguments by: Distinguishing among facts, reasoned judgment based on research findings, and speculation in an explanation	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.
ELD-SC.4-5.Argue.Expressive	Grade 4	Grade 5
Construct scientific arguments that: Introduce topic/phenomenon in issues related to the natural and designed world(s)	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.1 Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire). 4.P.2.2 Explain how minerals are identified using tests for the physical properties of 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time. 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.3 Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.





		 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.2 Give examples of likenesses that are inherited and some that are not.
Construct scientific arguments that: Make and define a claim based on evidence, data, and/or model	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time.
	 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 	 5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.3 Summarize properties of original
	 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 	materials, and the new material(s) formed, to demonstrate that a change has occurred.
	4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth.	 5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a
	4.L.1 Understand the effects of environmental	distance) that occurs between objects at



 changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.2 Predict upcoming weather events from weather data collected through observation and measurements. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.2 Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.
	cardiovascular) in terms of their functions



		 serve: producers, consumers, or decomposers (biotic factors). 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.2 Give examples of likenesses that are inherited and some that are not.
Construct scientific arguments that: Establish a neutral tone or an objective stance	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time.
	 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak. 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 	5.P.2 Understand the interactions of matter and energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff). 5.P.2.3 Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.
	4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth.	5.P.3 Explain how the properties of some materials change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of



 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	 heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.1 Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns. 5.E.1.2 Predict upcoming weather events from weather data collected through observation and measurements. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life. 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
	5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.1 Compare the characteristics of



		 several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands 5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors). 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.2 Give examples of likenesses that are inherited and some that are not.
Construct scientific arguments that: Signal logical relationships among reasoning, relevant evidence, data, and/or a model when making a claim	 4.P.1 Explain how various forces affect the motion of an object. 4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them. 4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion. 4.P.2 Understand the composition and properties of 	 5.P.1 Understand force, motion and the relationship between them. 5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects. 5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time. 5.P.2 Understand the interactions of matter and
	 4.P.2 Onderstand the composition and properties of matter before and after they undergo a change or interaction. 4.P.2.1 Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to 	energy and the changes that occur. 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).



conduct electricity, ability to be attracted by magnets, reactions to water and fire). 4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak.	 5.P.2.3 Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred. 5.P.3 Explain how the properties of some materials
 4.E.1 Explain the causes of day and night and phases of the moon. 4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis. 4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth. 4.L.1 Understand the effects of environmental 	change as a result of heating and cooling. 5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation) 5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats. 	 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 5.E.1.1 Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns. 5.E.1.2 Predict upcoming weather events from weather data collected through observation and measurements. 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction
 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body. 	and speed, and precipitation. 5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.



	 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.L.1.2 Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.
	 5.L.2 Understand the interdependence of plants and animals with their ecosystem. 5.L.2.1 Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands. 5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).
	 5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.2 Give examples of likenesses that are inherited and some that are not.



ELD Standard 4: Language for Science Grades 6-8

ELD-SC.6-8.Explain. Interpretive	Grade 6	Grade 7	Grade 8
Interpret scientific explanations by: Defining investigable questions or design problems based on observations, information, and/or data about a phenomenon	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.1 Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements. 6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase. 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object. 7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy) using a model or diagram of a 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources 8.P.2.1 Explain the environmental consequences of the various methods of obtaining and distributing energy. 8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation.



	energy transfer and interactions of	moving object (roller coaster,	
	matter and energy.	pendulum, or cars on ramps	8.E.1 Understand the hydrosphere and
	6.P.3.2 Explain the effects of	as examples).	the impact of humans on local systems
	electromagnetic waves on	7.P.2.3 Recognize that energy	and the effects of the hydrosphere on
	various materials to include	can be transferred from one	humans.
	absorption, scattering, and	system to another when two	8.E.1.1 Explain the structure of
	change in temperature.	objects push or pull on each	the hydrosphere including:
	6.P.3.3 Explain the suitability of	other over a distance (work)	 Water distribution on
	materials for use in	and electrical circuits require	earth
	technological design based on	a complete loop through which	 Local river basins and
	a response to heat (to include	an electrical current can pass.	water availability.
	conduction, expansion, and	7.P.2.4 Explain how simple	8.E.1.2 Summarize evidence
	contraction) and electrical	machines such as inclined	that Earth's oceans are a
	energy (conductors and	planes, pulleys, levers and	reservoir of nutrients, minerals,
	insulators).	wheel and axles are used to	dissolved gases, and life forms:
		create mechanical advantage	 Estuaries
	6.E.1 Understand the earth/moon/sun	and increase efficiency.	 Marine ecosystems
	system, and the properties, structures	-	Upwelling
	and predictable motions of celestial	7.E.1 Understand how the cycling of	Behavior of gases in the
	bodies in the Universe.	matter (water and gases) in and out of	marine environment
	6.E.1.1 Explain how the relative	the atmosphere relates to Earth's	 Value and sustainability
	motion and relative position of	atmosphere, weather and climate and	of marine resources
	the sun, Earth and moon affect	the effects of the atmosphere on	Deep ocean technology
	the seasons, tides, phases of	humans.	and understandings
	the moon, and eclipses.	7.E.1.2 Explain how the cycling	gained.
	6.E.1.2 Explain why Earth	of water in and out of the	8.E.1.3 Predict the safety and
	sustains life while other planets	atmosphere and atmospheric	potability of water supplies in
	do not based on their	conditions relate to the weather	North Carolina based on
	properties (including types of	patterns on Earth.	physical and biological factors,
	surface, atmosphere and	7.E.1.3 Explain the relationship	including:
	gravitational force) and location	between the movement of air	Temperature
	to the Sun.	masses, high and low pressure	 Dissolved oxygen
		systems, and frontal	• pH
	6.E.2 Understand the structure of the	boundaries to storms (including	Nitrates and phosphates
	earth and how interactions of	thunderstorms, hurricanes, and	• Turbidity
L	· · ·	,,	,







environment. 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.	 than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis. 7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival. 	 8.L.2 Understand how biotechnology is used to affect living organisms. 8.L.2.1 Summarize aspects of biotechnology including: Specific genetic information available Careers Economic benefits to North Carolina Ethical issues Implications for agriculture 8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment. 8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem. 8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including: Coexistence and cooperation Competition (predator/prey) Parasitism Mutualism
		 Parasitism Mutualism 8.L.3.3 Explain how the flow of energy within food webs is



	interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).
	8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time. 8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution.
	 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the



			relationship between respiration and digestion).
Interpret scientific explanations by: Determining central ideas in complex evidence and information to help explain how or why a phenomenon occurs	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.1 Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements. 6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase. 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object. 7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples). 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources. 8.P.2.1 Explain the environmental consequences of the various methods of obtaining, managing, transforming and distributing energy. 8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation. 8.E.1 Understand the hydrosphere and



 6.P.3 Understand characteristics of energy transfer and interactions of matter and energy. 6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature. 6.P.3.3 Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators). 6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe. 6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses. 6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun. 6.E.1.3 Summarize space 	 7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require a complete loop through which an electrical current can pass. 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axles are used to create mechanical advantage and increase efficiency. 7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans. 7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth. 7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result. 	
exploration and the	7.E.1.4 Predict weather	

the impact of humans on local systems and the effects of the hydrosphere on humans.

8.E.1.1 Explain the structure of the hydrosphere including:

- Water distribution on earth
- Local river basins and water availability.

8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability of marine resources
- Deep ocean technology and understandings gained.

8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating). 8.E.2.2 Explain the use of fossils, ice cores, composition



understandings gained from them. 6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans. 6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density. 6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth. 6.E.2.3 Explain how the	 conditions and patterns based on information obtained from: Weather data collected from direct observations and measurement (wind speed and direction, air temperature, humidity and air pressure) Weather maps, satellites and radar Cloud shapes and types and associated elevation 7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions. 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and 	8.L.1 by ag organ
formation of soil is related to the parent rock type and the environment in which it develops.	stewardship. 7.L.2 Understand the relationship of the mechanisms of cellular	8.L.2 used
 6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce. 6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense. 6.L.1.2 Explain the significance 	reproduction, patterns of inheritance and external factors to potential variation among offspring. 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis).	

of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms.

8.L.1 Understand the hazards caused by agents of diseases that effect living organisms.

8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease.
8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease.

8.L.2 Understand how biotechnology is used to affect living organisms.

8.L.2.1 Summarize aspects of biotechnology including:

- Specific genetic
 information available
- Careers
- Economic benefits to
 North Carolina
- Ethical issues
- Implications for agriculture







			 biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).
Interpret scientific explanations by: Evaluating scientific reasoning that shows why data or evidence adequately supports conclusions	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.1.2 Explain the relationship among visible light, the 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements.



electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and	forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion.	8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass.8.P.2 Explain the environmental
hearing.	7.P.2 Understand forms of energy,	implications associated with the various methods of obtaining,
6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.2 Explain the effect of	energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to	managing, and using energy resources. 8.P.2.1 Explain the environmental consequences
heat on the motion of atoms through a description of what happens to particles during a change in phase. 6.P.2.3 Compare the physical	the mechanical energy of an object. 7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential	of the various methods of obtaining, transforming and distributing energy. 8.P.2.2 Explain the implications of the depletion of renewable
properties of pure substances that are independent of the amount of matter present including density, melting point,	energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps	and nonrenewable energy resources and the importance of conservation.
boiling point, and solubility to properties that are dependent on the amount of matter present to include volume, mass and weight.	as examples). 7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work)	 8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans. 8.E.1.1 Explain the structure of the hydrosphere including:
6.P.3 Understand characteristics of energy transfer and interactions of matter and energy. 6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature.	and electrical circuits require a complete loop through which an electrical current can pass. 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axles are used to create mechanical advantage	 Water distribution on earth Local river basins and water availability. 8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:



1		
 6.P.3.3 Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators). 6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe. 6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses. 6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun. 6.E.1.3 Summarize space exploration and the understandings gained from them. 	and increase efficiency. 7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans. 7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth. 7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result. 7.E.1.4 Predict weather conditions and patterns based on information obtained from: . Weather data collected from direct observations and measurement (wind speed and direction, air temperature, humidity and air pressure) . Weather maps	 Estuaries Marine ecosystems Upwelling Behavior of gases in the marine environment Value and sustainability of marine resources Deep ocean technology and understandings gained. 8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including: Temperature Dissolved oxygen pH Nitrates and phosphates Turbidity Bio-indicators. 8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms. 8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating)
6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the	 Weather maps, satellites and radar Cloud shapes and types and associated elevation 	dating and radioactive dating). 8.E.2.2 Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations



effects of the lithosphere on humans. 6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density. 6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth. 6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops. 6.E.2.4 Conclude that the good health of humans requires: monitoring the lithosphere, maintaining soil quality and stewardship.	 7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions. 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship. 7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring. 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.2 Infer patterns of 	found in rock layers as evidence of the history of the Earth and its changing life forms. 8.L.1 Understand the hazards caused by agents of diseases that effect living organisms. 8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease. 8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment. 8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem. 8.L.3.2 Summarize the
maintaining soil quality and	asexual reproduction (budding	space affect populations in an
6.L.1 Understand the structures, processes and behaviors of plants that	heredity using information from Punnett squares and pedigree	relationships among producers, consumers, and decomposers
enable them to survive and reproduce.	analysis.	including the positive and
6.L.1.1 Summarize the basic	7.L.2.3 Explain the impact of	negative consequences of such
structures and functions of	the environment and lifestyle	interactions including:
flowering plants required for survival, reproduction and	choices on biological inheritance (to include common	cooperation
defense.	genetic diseases) and survival.	Competition
6.L.1.2 Explain the significance		(predator/prey)
of the processes of photo- synthesis, respiration, and		ParasitismMutualism
transpiration to the survival of		8.L.3.3 Explain how the flow of



green plants and other organisms. 6.L.2 Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment. 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through	 energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen). 8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time. 8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of an energy and survival of an energy and survival of an energy and survival of a sur
grow, survive and/or create	molecules required for building



			body (emphasis on the relationship between respiration and digestion).
ELD-SC.6-8.Explain. Expressive	Grade 6	Grade 7	Grade 8
Construct scientific explanations that: Describe valid and reliable evidence from sources about a phenomenon	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase. 6.P.2.3 Compare the physical properties of pure substances that are independent of the amount of matter present including density, melting point, boiling point, and solubility to properties that are dependent 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object. 7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy) using a model or diagram of a 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources. 8.P.2.1 Explain the environmental consequences of the various methods of obtaining, managing, transforming and distributing energy. 8.P.2.2 Explain the implications of renewable and nonrenewable energy



on the amount of matter present to include volume, mass and weight. 6.P.3 Understand characteristics of energy transfer and interactions of matter and energy. 6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature. 6.P.3.3 Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators). 6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe. 6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses. 6.E.1.2 Explain why Earth sustains life while other planets

do not based on their

properties (including types of

surface, atmosphere and

moving object (roller coaster, pendulum, or cars on ramps as examples).

7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require a complete loop through which an electrical current can pass. 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axles are used to create mechanical advantage and increase efficiency.

7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans.

7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.
7.E.1.3 Explain the relationship

between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and resources and the importance of conservation.

8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans.

8.E.1.1 Explain the structure of the hydrosphere including:

- Water distribution on earth
- Local river basins and water availability.

8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability of marine resources
- Deep ocean technology and understandings gained.

8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH





tornadoes) and other weather conditions that may result. 7.E.1.4 Predict weather conditions and patterns based on information obtained from:

- Weather data collected from direct observations and measurement (wind speed and direction, air temperature, humidity and air pressure)
- Weather maps, satellites and radar
- Cloud shapes and types and associated elevation

7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions.
7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship.

7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.

7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation

- Nitrates and phosphates
- Turbidity
- Bio-indicators.

8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating). 8.E.2.2 Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms.

8.L.1 Understand the hazards caused by agents of diseases that effect living organisms.

8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease.

8.L.2 Understand how biotechnology is used to affect living organisms. 8.L.2.1 Summarize aspects of biotechnology including:







	grow, survive and/or create their own food through photosynthesis.		between genetic variation and an organism's ability to adapt to its environment. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion)
Construct scientific explanations that: Establish neutral or objective stance in how results are communicated	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy



classifications and physical properties of matter. 6.P.2.2 Explain the effect of	conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to	resources. 8.P.2.1 Explain the environmental consequences
heat on the motion of atoms	the mechanical energy of an	of the various methods of
through a description of what	object.	obtaining, transforming and
happens to particles during a	7.P.2.2 Explain how energy can	distributing energy.
change in phase. 6.P.2.3 Compare the physical	be transformed from one form to another (specifically potential	8.P.2.2 Explain the implications of the depletion of renewable
properties of pure substances	energy and kinetic energy)	and nonrenewable energy
that are independent of the	using a model or diagram of a	resources and the importance
amount of matter present	moving object (roller coaster,	of conservation.
including density, melting point,	pendulum, or cars on ramps	
boiling point, and solubility to	as examples).	8.E.1 Understand the hydrosphere and
properties that are dependent	7.P.2.3 Recognize that energy	the impact of humans on local systems
on the amount of matter	can be transferred from one	and the effects of the hydrosphere on
present to include volume, mass and weight.	system to another when two objects push or pull on each	humans. 8.E.1.1 Explain the structure of
	other over a distance (work)	the hydrosphere including:
6.P.3 Understand characteristics of	and electrical circuits require	Water distribution on
energy transfer and interactions of	a complete loop through which	earth
matter and energy.	an electrical current can pass.	 Local river basins and
6.P.3.2 Explain the effects of	7.P.2.4 Explain how simple	water availability.
electromagnetic waves on	machines such as inclined	8.E.1.2 Summarize evidence
various materials to include	planes, pulleys, levers and wheel and axles are used to	that Earth's oceans are a
absorption, scattering, and change in temperature.	create mechanical advantage	reservoir of nutrients, minerals, dissolved gases, and life forms:
6.P.3.3 Explain the suitability of	and increase efficiency.	Estuaries
materials for use in		Marine ecosystems
technological design based on	7.E.1 Understand how the cycling of	Upwelling
a response to heat (to include	matter (water and gases) in and out of	 Behavior of gases in the
conduction, expansion, and	the atmosphere relates to Earth's	marine environment
contraction) and electrical	atmosphere, weather and climate and	 Value and sustainability
energy (conductors and	the effects of the atmosphere on	of marine resources
insulators).	humans. 7.E.1.1 Compare the	 Deep ocean technology and understandings



6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe.

6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses.
6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun.

6.E.1.3 Summarize space exploration and the understandings gained from them.

6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans.

6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density. 6.E.2.2 Explain how crustal plates and ocean basins are composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers. 7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.

7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including

thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result. 7.E.1.4 Predict weather conditions and patterns based on information obtained from:

- Weather data collected from direct observations and measurement (wind speed and direction, air temperature, humidity and air pressure)
- Weather maps, satellites and radar Cloud shapes and ty
- Cloud shapes and types and associated elevation

7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and

gained.

8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH
- Nitrates and phosphates
- Turbidity
- Bio-indicators.

8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating). 8.E.2.2 Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms.

8.L.1 Understand the hazards caused by agents of diseases that effect living organisms.

8.L.1.1 Summarize the basic





characteristics of viruses,
bacteria, fungi and parasites
relating to the spread,
treatment and prevention of
disease.
8.L.1.2 Explain the difference
between epidemic and
pandemic as it relates to the
spread, treatment and

8.L.2 Understand how biotechnology is used to affect living organisms.

prevention of disease.

- 8.L.2.1 Summarize aspects of biotechnology including:
 - Specific genetic
 information available
 - Careers
 - Economic benefits to
 North Carolina
 - Ethical issues
 - Implications for agriculture

8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment.

8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem.
8.L.3.2 Summarize the relationships among producers, consumers, and decomposers






			repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).
Construct scientific explanations that: Develop reasoning to show relationships among independent and dependent variables in models and simple systems	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources. 8.P.2.1 Explain the



change in phase.

6.P.3 Understand characteristics of energy transfer and interactions of matter and energy.

6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature. 6.P.3.3 Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators).

6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe.

6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses. 6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun. potential energy contribute to the mechanical energy of an object.

7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples).

7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require a complete loop through which an electrical current can pass. 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axles are used to create mechanical advantage and increase efficiency.

7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans.

7.E.1.1 Compare the composition, properties and structure of Earth's atmosphere environmental consequences of the various methods of obtaining, transforming and distributing energy. 8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation.

8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans.

- 8.E.1.1 Explain the structure of the hydrosphere including:
 - Water distribution on earth
 - Local river basins and water availability.

8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability
 of marine resources
- Deep ocean technology and understandings gained.
- 8.E.1.3 Predict the safety and



6.E.1.3 Summarize space exploration and the understandings gained from them.

6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans.

6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth. 6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops.

6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce.

6.L.1.2 Explain the significance of the processes of photosynthesis, respiration, and transpiration to the survival of green plants and other organisms.

6.L.2 Understand the flow of energy

to include: mixtures of gases and differences in temperature and pressure within layers. 7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.

7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result.
7.E.1.4 Predict weather conditions and patterns based on information obtained from:

- Weather data collected from direct observations and measurement (wind speed and direction, air temperature, humidity and air pressure)
- Weather maps, satellites and radar
- Cloud shapes and types
 and associated
 elevation

7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions.7.E.1.6 Conclude that the good

potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH
- Nitrates and phosphates
- Turbidity
- Bio-indicators.

8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating). 8.E.2.2 Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms.

8.L.1 Understand the hazards caused by agents of diseases that effect living organisms.

8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites



through ecosystems and the responses of populations to the biotic and abiotic factors in their environment. 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.	 health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship. 7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. 7.L.1.1 Compare the structures and life functions of single- celled organisms that carry out all of the basic functions of life including: Euglena Amoeba Paramecium Volvox 7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles). 7.L.1.3 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general functions of the major systems 	relating to the spread, treatment and prevention of disease. 8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease. 8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment. 8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem. 8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including: . Coexistence and cooperation . Competition (predator/prey) . Parasitism . Mutualism 8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water,
	0	, ,





Construct scientific explanations that: Summarize patterns in evidence, making trade-offs, revising, and retesting	 6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe. 6.E.1.3 Summarize space exploration and the understandings gained from them. 6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans. 6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density. 6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce. 6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense. 6.L.1.2 Explain the significance of the processes of photosynthesis, respiration, and transpiration to the survival of green plants and other organisms. 	 7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. 7.L.1.3 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life. 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms: Estuaries Marine ecosystems Upwelling Behavior of gases in the marine environment Value and sustainability of marine resources Deep ocean technology and understandings gained. 8.L.1 Understand the hazards caused by agents of diseases that effect living organisms. 8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease. 8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease. 8.L.2 Understand how biotechnology is
--	---	---	---







			 evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants).
ELD-SC.6-8.Argue. Interpretive	Grade 6	Grade 7	Grade 8
Interpret scientific arguments by: Identifying convincing evidence from data, models, and/or information from investigations of phenomena or design solutions	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass.



vibrations travel, sound and	speed and variable motion.	8.P.2 Explain the environmental
hearing.	7 B 2 Understand forms of operation	implications associated with the various methods of obtaining,
6.P.2 Understand the structure,	7.P.2 Understand forms of energy, energy transfer and transformation and	0
		managing, and using energy
classifications and physical	conservation in mechanical systems.	resources.
properties of matter.	7.P.2.1 Explain how kinetic and	8.P.2.1 Explain the
6.P.2.1 Recognize that all	potential energy contribute to	environmental consequences
matter is made up of atoms and	the mechanical energy of an	of the various methods of
atoms of the same element are	object.	obtaining, transforming and
all alike, but are different from	7.P.2.2 Explain how energy can	distributing energy.
the atoms of other elements.	be transformed from one form	8.P.2.2 Explain the implications
6.P.2.2 Explain the effect of	to another (specifically potential	of the depletion of renewable
heat on the motion of atoms	energy and kinetic energy)	and nonrenewable energy
through a description of what	using a model or diagram of a	resources and the importance
happens to particles during a	moving object (roller coaster,	of conservation.
change in phase.	pendulum, or cars on ramps	
6.P.2.3 Compare the physical	as examples).	8.E.1 Understand the hydrosphere and
properties of pure substances	7.P.2.3 Recognize that energy	the impact of humans on local systems
that are independent of the	can be transferred from one	and the effects of the hydrosphere on
amount of matter present	system to another when two	humans.
including density, melting point,	objects push or pull on each	8.E.1.1 Explain the structure of
boiling point, and solubility to	other over a distance (work)	the hydrosphere including:
properties that are dependent	and electrical circuits require	 Water distribution on
on the amount of matter	a complete loop through which	earth
present to include volume,	an electrical current can pass.	 Local river basins and
mass and weight.	7.P.2.4 Explain how simple	water availability.
	machines such as inclined	8.E.1.2 Summarize evidence
6.P.3 Understand characteristics of	planes, pulleys, levers and	that Earth's oceans are a
energy transfer and interactions of	wheel and axles are used to	reservoir of nutrients, minerals,
matter and energy.	create mechanical advantage	dissolved gases, and life forms:
6.P.3.2 Explain the effects of	and increase efficiency.	 Estuaries
electromagnetic waves on		 Marine ecosystems
various materials to include	7.E.1 Understand how the cycling of	Upwelling
absorption, scattering, and	matter (water and gases) in and out of	Behavior of gases in the
change in temperature.	the atmosphere relates to Earth's	marine environment







		1
 surface of the Earth over time and the effects of the lithosphere on humans. 6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density. 6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth. 6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops. 6.E.2.4 Conclude that the good health of humans requires: monitoring the lithosphere, maintaining soil quality and stewardship. 6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce. 6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival reproduction and 	 7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions. 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship. 7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. 7.L.1.1 Compare the structures and life functions of single-celled organisms that carry out all of the basic functions of life including: Euglena Amoeba Paramecium Volvox 7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles). 7.L.2 Understand the relationship of the mechanisms of cellular. 	 8.L.1 Understand the hazards caused by agents of diseases that effect living organisms. 8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease. 8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease. 8.L.2 Understand how biotechnology is used to affect living organisms. 8.L.2.1 Summarize aspects of biotechnology including: Specific genetic information available Careers Economic benefits to North Carolina Ethical issues Implications for agriculture 8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment
flowering plants required for survival, reproduction and defense. 6.L.1.2 Explain the significance	7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential	and abiotic components of their environment. 8.L.3.1 Explain how factors such as food, water, shelter and



of the processes of photo- synthesis, respiration, and transpiration to the survival of green plants and other organisms. 6.L.2 Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment. 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.	 variation among offspring. 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis. 7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival. 	 space affect populations in an ecosystem. 8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including: Coexistence and cooperation Competition (predator/prey) Parasitism Mutualism 8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen) 8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time. 8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment.



			 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).
Interpret scientific arguments by: Comparing reasoning and claims based on evidence from two arguments on the same topic	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.3 Compare the physical properties of pure substances that are independent of the amount of matter present 	 7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans. 7.E.1.1 Compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers. 7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, 	8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.3 Compare physical changes such as size, shape and state to chemical changes that are the result of a chemical reaction to include changes in temperature, color, formation of a gas or precipitate.



	including density, melting point, boiling point, and solubility to properties that are dependent on the amount of matter present to include volume, mass and weight.	reproduce and carry out the basic functions of life. 7.L.1.1 Compare the structures and life functions of single- celled organisms that carry out all of the basic functions of life including: • Euglena • Amoeba • Paramecium • Volvox 7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles).	
Interpret scientific arguments by: Evaluating whether they emphasize similar or different evidence and/or interpretations of facts	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.











6.L.1 Understand the structures, processes and behaviors of plants that	clin 7.E
enable them to survive and reproduce.	hea
6.L.1.1 Summarize the basic	mo
structures and functions of	ma
flowering plants required for survival, reproduction and	ste
defense.	7.L.1 Unde
6.L.1.2 Explain the significance	structures
of the processes of photo-	organisms
synthesis, respiration, and	reproduce
transpiration to the survival of	functions c
green plants and other	7.L
organisms.	and
61.2 Understand the flow of energy	cell all (
6.L.2 Understand the flow of energy through ecosystems and the	incl
responses of populations to the biotic	IIICI
and abiotic factors in their	
environment.	
6.L.2.1 Summarize how energy	
derived from the sun is used by	7.L
plants to produce sugars	and
(photosynthesis) and is	ani
transferred within food chains	org
and food webs (terrestrial and	wa
aquatic) from producers to	mit
consumers to decomposers.	7.L
6.L.2.2 Explain how plants	hie
respond to external stimuli	mu
(including dormancy and forms	cell
of tropism) to enhance survival	sys
in an environment.	7.L

stewardship.

convection, global winds and the jet stream on weather and climatic conditions. 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship.

7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.

- 7.L.1.1 Compare the structures and life functions of singlecelled organisms that carry out all of the basic functions of life including:
 - Euglena
 - Amoeba
 - Paramecium
 - Volvox

7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles). 7.L.1.3 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general



ELD-SC.6-8.Argue.	temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.	respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life 7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring. 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis. 7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival.	Grade 8
Expressive			
Construct scientific arguments that: Introduce and contextualize topic/	6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound	7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion.	8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open



phenomenon in issues related to the natural and designed world(s)	 waves. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.1 Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements. 6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase. 6.P.3.2 Explain the effects of energy transfer and interactions of matter and energy. 6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature. 6.P.3.3 Explain the suitability of materials for use in 	 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object. 7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples). 7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require 	 and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.3 Compare physical changes such as size, shape and state to chemical changes in temperature, color, formation of a gas or precipitate. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources. 8.P.2.1 Explain the environmental consequences of the various methods of obtaining, transforming and distributing energy. 8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation.





8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans.

8.E.1.1 Explain the structure of the hydrosphere including:

- Water distribution on earth
- Local river basins and water availability.

8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability of marine resources
- Deep ocean technology and understandings gained.

8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH
- Nitrates and phosphates
- Turbidity
- Bio-indicators.







 environment. 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis. 	 Amoeba Paramecium Volvox 7.L.1.3 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life 7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring. 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival. 	used to affect living organisms. 8.L.2.1 Summarize aspects of biotechnology including: Specific genetic information available Careers Economic benefits to North Carolina Ethical issues Implications for agriculture 8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment. 8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem. 8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including: Coexistence and cooperation Competition (predator/prey) Parasitism Mutualism 8.L.3.3 Explain how the flow of energy within food webs is



	interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).
	8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time. 8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment.
	 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the



			relationship between respiration and digestion).
Construct scientific arguments that: Support or refute a claim based on data and evidence	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing.and hearing. 6.P.2 Understand the structure, classifications and physical properties of matter. 6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase. 6.P.2.3 Compare the physical properties of pure substances that are independent of the amount of matter present including density, melting point, boiling point, and solubility to 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). 7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion. 7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. 7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object. 7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples). 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. 8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources. 8.P.2.1 Explain the environmental consequences of the various methods of obtaining, managing, transforming and distributing energy. 8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation. 8.E.1 Understand the hydrosphere and





7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require a complete loop through which an electrical current can pass. 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axles are used to create mechanical advantage and increase efficiency.

7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans.

7.E.1.1 Compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers.
7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.
7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure

the impact of humans on local systems and the effects of the hydrosphere on humans.

8.E.1.1 Explain the structure of the hydrosphere including:

- Water distribution on earth
- Local river basins and water availability.

8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability of marine resources
- Deep ocean technology and understandings gained.

8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH
- Nitrates and phosphates
- Turbidity
- Bio-indicators.



interact with and respond to the biotic

surface, atmosphere and gravitational force) and location to the Sun.	systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather	8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.
6.E.2 Understand the structure of the earth and how interactions of	conditions that may result. 7.E.1.4 Predict weather	8.E.2.1 Infer the age of Earth and relative age of rocks and
constructive and destructive forces	conditions and patterns based	fossils from index fossils and
have resulted in changes in the	on information obtained from:	ordering of rock layers (relative
surface of the Earth over time and the	Weather data collected	dating and radioactive dating).
effects of the lithosphere on humans.	from direct observations	8.E.2.2 Explain the use of
6.E.2.2 Explain how crustal	and measurement (wind	fossils, ice cores, composition
plates and ocean basins are	speed and	of sedimentary rocks, faults,
formed, move and interact	direction, air temperature,	and igneous rock formations
using earthquakes, heat flow	humidity and air pressure)	found in rock layers as
and volcanoes to reflect forces	 Weather maps, satellites 	evidence of the history of the
within the earth.	and radar	Earth and its changing life
6.E.2.3 Explain how the	 Cloud shapes and types 	forms.
formation of soil is related to	and associated elevation	
the parent rock type and the	7.E.1.5 Explain the influence of	8.L.1 Understand the hazards caused
environment in which it	convection, global winds and	by agents of diseases that effect living
develops.	the jet stream on weather and	organisms.
6.E.2.4 Conclude that the good health of humans requires:	climatic conditions.	8.L.1.1 Summarize the basic characteristics of viruses,
monitoring the lithosphere,	7.E.1.6 Conclude that the good health of humans requires:	bacteria, fungi and parasites
maintaining soil quality and	monitoring the atmosphere,	relating to the spread,
stewardship.	maintaining air quality and	treatment and prevention of
Stewardship.	stewardship.	disease.
6.L.1 Understand the structures,		8.L.1.2 Explain the difference
processes and behaviors of plants that	7.L.1 Understand the processes,	between epidemic and
enable them to survive and reproduce.	structures and functions of living	pandemic as it relates to the
6.L.1.1 Summarize the basic	organisms that enable them to survive,	spread, treatment and
structures and functions of	reproduce and carry out the basic	prevention of disease.
flowering plants required for	functions of life.	
survival, reproduction and	7.L.1.1 Compare the structures	8.L.3 Understand how organisms

and life functions of single-

defense.



celled organisms that carry out all of the basic functions of life including:

- Euglena
- Amoeba
- Paramecium
- Volvox

7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles).

7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.

7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis).

7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival. and abiotic components of their environment.

8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem.

8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including:

- Coexistence and cooperation
- Competition (predator/prey)
- Parasitism
- Mutualism

8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).

8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time.

8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution.



			 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).
Construct scientific arguments that: Establish and maintain a neutral or objective stance	 6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound. 6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight. 	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. 7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and 	 8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. 8.P.1.3 Compare physical changes such as size, shape





7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion.

7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems.

7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object.

7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples).

7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require a complete loop through which an electrical current can pass. 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axles are used to create mechanical advantage and increase efficiency. and state to chemical changes that are the result of a chemical reaction to include changes in temperature, color, formation of a gas or precipitate. 8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass.

8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources.

8.P.2.1 Explain the environmental consequences of the various methods of obtaining, transforming and distributing energy.
8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation.

8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans.

- 8.E.1.1 Explain the structure of the hydrosphere including:
 - Water distribution on earth
 - Local river basins and





7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans.

7.E.1.1 Compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers. 7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.

7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result. 7.E.1.4 Predict weather conditions and patterns based on information obtained from:

 Weather data collected from direct observations and measurement (wind speed and direction, air temperature, humidity and air pressure)
 Weather maps, water availability. 8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability
 of marine resources
- Deep ocean technology and understandings gained.

8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH
- Nitrates and phosphates
- Turbidity
- Bio-indicators.

8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative







6.L.2 Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment.

6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.

hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life.

7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.

7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis).

7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis.

7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival. Implications for agriculture

8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment.

8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem.

8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including:

- Coexistence and cooperation
- Competition (predator/prey)
- Parasitism
- Mutualism

8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).

8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time. 8.L.4.1 Summarize the use of



			 evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms. 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).
Construct scientific arguments that: Signal logical relationships among reasoning, evidence, data, and/or a model when making or defending a claim or counterclaim	6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves. 6.P.1.1 Compare the properties of waves to the wavelike property of energy in	 7.P.1 Understand motion, the effects of forces on motion and the graphical representations of motion. 7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect 	8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container. 8.P.1.2 Explain how the physical properties of elements and their reactivity have been









planes, pulleys, levers and wheel and axles are used to create mechanical advantage and increase efficiency.

7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans.

7.E.1.1 Compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers.
7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on Earth.

7.E.1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including

thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result. 7.E.1.4 Predict weather conditions and patterns based on information obtained from:

• Weather data collected from direct observations

that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:

- Estuaries
- Marine ecosystems
- Upwelling
- Behavior of gases in the marine environment
- Value and sustainability
 of marine resources
- Deep ocean technology and understandings gained.

8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including:

- Temperature
- Dissolved oxygen
- pH
- Nitrates and phosphates
- Turbidity
- Bio-indicators.

8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.

8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating). 8.E.2.2 Explain the use of



 effects of the lithosphere on humans. 6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth. 6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops. 6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce. 6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense. 	 and measurement (wind speed and direction, air temperature, humidity and air pressure) Weather maps, satellites and radar Cloud shapes and types and associated elevation 7.E.1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions. 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship. 7.L.1 Understand the processes, structures and functions of living 	 fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms. 8.L.1 Understand the hazards caused by agents of diseases that effect living organisms. 8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease. 8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and
6.L.1.2 Explain the significance of the processes of photo-	organisms that enable them to survive, reproduce and carry out the basic	prevention of disease.
synthesis, respiration, and transpiration to the survival of	functions of life. 7.L.1.1 Compare the structures	8.L.3 Understand how organisms interact with and respond to the biotic
green plants and other organisms.	and life functions of single- celled organisms that carry out all of the basic functions of life	and abiotic components of their environment. 8.L.3.1 Explain how factors
6.L.2 Understand the flow of energy	including:	such as food, water, shelter and
through ecosystems and the	• Euglena	space affect populations in an
responses of populations to the biotic and abiotic factors in their	AmoebaParamecium	ecosystem. 8.L.3.2 Summarize the
environment.	Volvox	relationships among producers,
6.L.2.1 Summarize how energy derived from the sun is used by	7.L.1.2 Compare the structures and functions of plant and	consumers, and decomposers including the positive and


plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.	 animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles). 7.L.1.3 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life. 7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring. 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis. 	 negative consequences of such interactions including: Coexistence and cooperation Competition (predator/prey) Parasitism Mutualism 8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen). 8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time. 8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. 8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and
---	---	---



	the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival.	 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).
--	---	--



ELD Standard 4: Language for Science Grades 9-12

ELD-SC.9-12.Explain. Interpretive.	Biology	Chemistry	Earth and Environmental
Interpret scientific explanations by: Defining investigable questions or problems based on observations, information, and/or data about a phenomenon	 Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. Bio.1.2 Analyze the cell as a living system. Bio.1.2.1 Explain how homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH). Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis. Bio.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on unicellular organisms). Bio.2.1 Analyze the interdependence of living organisms within their 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.4 Interpret the name and formula of compounds using IUPAC convention. Chm.2.1 Understand the relationship among pressure, temperature, volume, and phase. Chm.2.1.1 Explain the energetic nature of phase changes. Chm.2.1.2 Explain heating and cooling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point). 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.1 Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes impact the lithosphere. EEn.2.1.2 Predict the locations of volcanoes, earthquakes, and faults based on information





 habitat destruction and introduction of nonnative species) may impact the environment. Bio. 2.1 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next. Bio. 3.1 Explain how traits are determined by the structure and function of DNA. Bio. 3.1 Explain the double- stranded, complementary nature of DNA as related to its function in the cell. Bio. 3.1.2 Explain how DNA and RNA code for proteins and determine traits. Bio. 3.1 Steplain how the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype. Bio. 3.2 Understand how the environment, and/or the interaction of 				
alleles, influences the expression of EEn.2.6 Analyze patterns of	dete fund Bio env	habitat destruction and introduction of nonnative species) may impact the environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next. 3.1 Explain how traits are ermined by the structure and ction of DNA. Bio.3.1.1 Explain the double- stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits. Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype.	 that affect the rate of a reaction (temperature, concentration, particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.3 Infer the quantitative nature of a solution (molarity, dilution, and titration with a 1:1 molar ratio). Chm.3.2.5 Interpret solubility diagrams. Chm.3.2.6 Explain the solution 	 EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality North Carolina's river basin: wetlands and tidal environments. EEn.2.5 Understand the structure of and processes within our atmosphere EEn.2.5.2 Explain the formator of typical air masses and th weather systems that result from air mass interactions. EEn.2.5.3 Explain how cycle storms form based on the interaction of air masses. EEn.2.5.4 Predict the weather using available weather mator and data (including surface upper atmospheric winds, a satellite imagery). EEn.2.5.5 Explain how humative affect air quality.
genetic traits. climate change over time. Bio.3.2.1 Explain the role of EEn.2.6.1 Differentia	alle	les, influences the expression of etic traits.		EEn.2.6 Analyze patterns of global climate change over time. EEn.2.6.1 Differentiate betw



meiosis in sexual reproduction and genetic variation. Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits). Bio.3.2.3 Explain how the environment can influence the expression of genetic traits.	weather and climate. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, green- house effect, and deforest- ation). EEn.2.6.4 Attribute changes in
	Earth systems to global climate
Bio.3.3 Understand the application of	change (temperature change,
DNA technology.	changes in pH of ocean, sea
Bio.3.3.1 Interpret how DNA is	level changes, etc.).
used for comparison and	
identification of organisms.	EEn.2.7 Explain how the lithosphere,
Bio.3.3.2 Summarize how	hydrosphere, and Atmosphere
transgenic organisms are	individually and collectively affect the
engineered to benefit society.	biosphere.
Bio.3.3.3 Evaluate some of the	EEn.2.7.1 Explain how abiotic
ethical issues surrounding the	and biotic factors interact to
use of DNA technology	create the various biomes in North Carolina.
(including cloning, genetically modified organisms, stem cell	EEn.2.7.2 Explain why bio-
research, and Human	diversity is important to the
Genome Project).	biosphere.
	EEn.2.7.3 Explain how human
Bio.3.4 Explain the theory of evolution	activities impact the biosphere.
by natural selection as a mechanism	
for how species change over time.	EEn.2.8 Evaluate human behaviors in
Bio.3.4.1 Explain how fossil,	terms of how likely they are to ensure
biochemical, and anatomical	the ability to live sustainably on Earth.
evidence support the theory of	EEn.2.8.1 Evaluate alternative
evolution.	energy technologies for use in



Bio.3.4.2 Explain how natural North Carolina. EEn.2.8.3 Explain the effects of selection influences the changes in species over time. uncontrolled population growth Bio.3.4.3 Explain how various on the Earth's resources. EEn.2.8.4 Evaluate the concept disease agents (bacteria, viruses, chemicals) can of "reduce, reuse, recycle" in terms of impact on natural influence natural selection. resources. Bio 3.5 Analyze how classification systems are developed based upon speciation. Bio.3.5.1 Explain the historical development and changing nature of classification systems. Bio.3.5.2 Analyze the classification of organisms according to their evolutionary relationships (including dichotomous keys and phylogenetic trees). Bio.4.1 Understand how biological molecules are essential to the survival of living organisms. Bio.4.1.2 Summarize the relationship among DNA, proteins and amino acids in carrying out the work of cells and how this is similar in all organisms. Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions. Bio 4.2 Analyze the relationships



	between biochemical processes and energy use in the cell. Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).		
Interpret scientific explanations by: Paraphrasing central ideas in complex evidence, concepts, processes, and information to help explain how or why a phenomenon occurs	 Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito-chondria, vacuoles, chloro-plasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. Bio.1.2 Analyze the cell as a living system. 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.2.1 Understand the relationship among pressure, temperature, volume, and phase. Chm.2.1.1 Explain the energetic nature of phase changes. Chm.2.1.2 Explain heating and cooling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point). 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere.



Bio.1.2.1 Explain how		
homeostasis is maintained in	Chm.2.1.5 Explain the	EEn.2.1.
the cell and within an organism	relationships between pressure,	cycle, pla
in various environments	temperature, volume, and	volcanoe
(including temperature and pH).	quantity of gas both qualitative	impact th
Bio.1.2.2 Analyze how cells	and quantitative.	EEn.2.1.
grow and reproduce in terms of		of volcan
interphase, mitosis and	Chm.2.2 Analyze chemical reactions in	faults ba
cytokinesis.	terms of quantities, product	containe
Bio.1.2.3 Explain how specific	formation, and energy.	EEn.2.1.
cell adaptations help cells	Chm.2.2.1 Explain the energy	actions s
survive in particular	content of a chemical reaction.	erosion (
environments (focus on	Chm.2.2.2 Analyze the	gravity),
unicellular organisms).	evidence of chemical change.	Earth's s
	Chm.2.2.3 Analyze the law of	EEn.2.1.
Bio.2.1 Analyze the interdependence	conservation of matter and how	of and pr
of living organisms within their	it applies to various types of	geohaza
environments.	chemical equations (synthesis,	avalanch
Bio.2.1.1 Analyze the flow of	decomposition, single	volcanoe
energy and cycling of matter	replacement, double	based or
(water, carbon, nitrogen and	replacement, and combustion).	
oxygen) through ecosystems	Chm.2.2.4 Analyze the	EEn.2.2 Unders
relating the significance of each	stoichiometric relationships	influences impa
to maintaining the health and	inherent in a chemical reaction.	Lithosphere.
sustainability of an ecosystem.	Chm.2.2.5 Analyze	EEn.2.2
Bio.2.1.2 Analyze the survival	quantitatively the composition	consequ
and reproductive success of	of a substance (empirical	activities
organisms in terms of	formula, molecular formula,	(such as
behavioral, structural, and	percent composition, and	agricultu
reproductive adaptations.	hydrates).	urbaniza
Bio.2.1.3 Explain various ways		past and
organisms interact with each	Chm.3.1 Understand the factors	EEn.2.2
other (including predation,	affecting rate of reaction and chemical	method
competition, parasitism,	equilibrium.	acquire
mutualism) and with their		sources

1.1 Explain how the rock plate tectonics, pes, and earthquakes the lithosphere. 1.2 Predict the locations anoes, earthquakes, and ased on information ed in a variety of maps. 1.3 Explain how natural such as weathering, (wind, water and , and soil formation affect surface. 1.4 Explain the probability preparation for ards such as landslides, ches, earthquakes and pes in a particular area on available data

EEn.2.2 Understand how human influences impact the Lithosphere.

EEn.2.2.1 Explain the consequences of human activities on the lithosphere (such as mining, deforestation, agriculture, overgrazing, urbanization, and land use) past and present. EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil,



1		
 environments resulting in stability within ecosystems. Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease). Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next. Bio.3.1 Explain how traits are determined by the structure and function of DNA. Bio.3.1.1 Explain the double-stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits. 	Chm.3.1.1 Explain the factors that affect the rate of a reaction (temperature, concentration, particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.4 Summarize the properties of solutions. Chm.3.2.5 Interpret solubility diagrams. Chm.3.2.6 Explain the solution process.	 natural gas, nuclear fission, and wood). EEn.2.3 Explain the structure and processes within the hydrosphere. EEn.2.3.1 Explain how water is an energy agent (currents and heat transfer). EEn2.3.2 Explain how groundwater and surface water interact. EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments. EEn.2.5.1 Summarize the structure of and processes within our atmosphere. EEn.2.5.2 Explain the formation of typical air masses and the
Bio.3.1.2 Explain how DNA and RNA code for proteins and		our atmosphere. EEn.2.5.2 Explain the formation



combinations in existing genes lead to changes in function and phenotype. Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traite	EEn.2.5.4 Predict the weather using available weather maps and data (including surface, upper atmospheric winds, and satellite imagery). EEn.2.5.5 Explain how human activities affect air quality.
genetic traits.	
Bio.3.2.1 Explain the role of	EEn.2.6 Analyze patterns of global
meiosis in sexual reproduction	climate change over time.
and genetic variation.	EEn.2.6.1 Differentiate between
Bio.3.2.3 Explain how the	weather and climate.
environment can influence the	EEn.2.6.2 Explain changes in
expression of genetic traits	global climate due to natural
	processes.
Bio.3.3 Understand the application of	EEn.2.6.3 Analyze the impacts
DNA technology.	that human activities have on
Bio.3.3.1 Interpret how DNA is	global climate change (such as
used for comparison and	burning hydrocarbons, green-
identification of organisms.	house effect, and deforest-
Bio.3.3.2 Summarize how	ation).
transgenic organisms are	EEn.2.6.4 Attribute changes in
engineered to benefit society.	Earth systems to global climate
Bio.3.3.3 Evaluate some of the	change (temperature change,
ethical issues surrounding the	changes in pH of ocean, sea
use of DNA technology	level changes, etc.).
(including cloning, genetically	
modified organisms, stem cell	EEn.2.7 Explain how the lithosphere,
research, and Human	hydrosphere, and Atmosphere
Genome Project).	individually and collectively affect the
, ,	biosphere.
Bio.3.4 Explain the theory of evolution	EEn.2.7.1 Explain how abiotic
by natural selection as a mechanism	and biotic factors interact to
for how species change over time. Bio.	create the various biomes in
Bio.3.4.1 Explain how fossil,	North Carolina.





	photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).		
Interpret scientific explanations by: Evaluating the extent to which reasoning, theory and/or models link evidence to claims and support conclusions	 Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mitochondria, vacuoles, chloroplasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. Bio.1.2 Analyze the cell as a living system. Bio.1.2.1 Explain how homeostasis is maintained in the cell and within an organism 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.2.1 Understand the relationship among pressure, temperature, volume, and phase. Chm.2.1.1 Explain the energetic nature of phase changes. Chm.2.1.2 Explain heating and cooling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point). Chm.2.1.5 Explain the relationships between pressure, temperature, volume, and 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.1 Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes





Bio.2.1.4 Explain why eco- systems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease).	Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle).	processes within the hydrosphere. EEn.2.3.1 Explain how water is an energy agent (currents and heat transfer). EEn2.3.2 Explain how ground- water and surface water interact.
 Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next. Bio.3.1 Explain how traits are 	Chm.3.2 Understand solutions and the solution process. Chm.3.2.5 Interpret solubility diagrams. Chm.3.2.6 Explain the solution process.	 EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments. EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.1 Summarize the structure and composition of our atmosphere. EEn.2.5.2 Explain the formation of typical air masses and the weather systems that result
determined by the structure and function of DNA. Bio.3.1.1 Explain the double- stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and		from air mass interactions. EEn.2.5.3 Explain how cyclonic storms form based on the interaction of air masses. EEn.2.5.4 Predict the weather using available weather maps and data (including surface, upper atmospheric winds, and



determine traits.	satellite imagery).
Bio.3.1.3 Explain how	EEn.2.5.5 Explain how human
mutations in DNA that res	
from interactions with the	
environment (i.e. radiation	
and chemicals) or new	climate change over time.
combinations in existing g	genes EEn.2.6.1 Differentiate between
lead to changes in function	on and weather and climate.
phenotype.	EEn.2.6.2 Explain changes in
	global climate due to natural
Bio.3.2 Understand how the	processes.
environment, and/or the interacti	on of EEn.2.6.3 Analyze the impacts
alleles, influences the expression	n of that human activities have on
genetic traits.	global climate change (such as
Bio.3.2.1 Explain the role	
meiosis in sexual reprodu	
and genetic variation.	ation).
Bio.3.2.2 Predict offspring	,
ratios based on a variety	
inheritance patterns (inclu	, ,
dominance, co-dominanc	
incomplete dominance, m	
alleles, and sex-linked tra	
Bio.3.2.3 Explain how the	
environment can influenc	
expression of genetic trai	3 1 7 1
	biosphere.
Bio.3.3 Understand the applicati	
DNA technology.	and biotic factors interact to
Bio.3.3.1 Interpret how D	
used for comparison and	North Carolina.
identification of organism	
Bio.3.3.2 Summarize how	
transgenic organisms are	
engineered to benefit soc	







	Bio.4.1 Understand how biological molecules are essential to the survival of living organisms. Bio.4.1.2 Summarize the relationship among DNA, proteins and amino acids in carrying out the work of cells and how this is similar in all organisms. Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions		
	Bio 4.2 Analyze the relationships between biochemical processes and energy use in the cell. Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).		
ELD-SC.9-12.Explain. Interpretive	Physical Science	Physics	
Interpret scientific explanations by: Defining investigable questions or problems based on observations, information,	PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference,	Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations.	



and/or data about a	distance, and displacement.	Phy.1.1.2 Analyze motion in
phenomenon	PSc.1.1.2 Compare speed,	one dimension using time,
	velocity, acceleration and	distance, displacement,
	momentum using investi-	velocity, and acceleration.
	gations, graphing, scalar	Phy.1.1.3 Analyze motion in
	quantities and vector quantities.	two dimensions using angle of
		trajectory, time, distance,
	Psc.1.2 Understand the relationship	displacement, velocity, and
	between forces and motion.	acceleration.
	PSc.1.2.1 Explain how	
	gravitational force affects the	Phy.1.2 Analyze systems of forces and
	weight of an object and the	their interaction with matter.
	velocity of an object in freefall.	Phy.1.2.1 Analyze forces and
	PSc.1.2.2 Classify frictional	systems of forces graphically
	forces into one of four types:	and numerically using vectors,
	static, sliding, rolling, and fluid.	graphs and calculations.
	PSc.1.2.3 Explain forces using	Phy.1.2.2 Analyze systems of
	Newton's three laws of motion.	forces in one dimension and
		two dimensions using free body
	PSc.2.1 Understand types, properties,	diagrams.
	and structure of matter.	Phy.1.2.3 Explain forces using
	PSc.2.1.1 Classify matter as:	Newton's laws of motion as well
	homogeneous or hetero-	as the universal law of
	geneous; pure substance or	gravitation.
	mixture; element or compound;	Phy.1.2.4 Explain the effects of
	metals, nonmetals or	forces (including weight,
	metalloids; solution, colloid or	normal, tension and friction) on
	suspension.	objects.
	PSc.2.1.2 Explain the phases	Phy.1.2.5 Analyze basic forces
	of matter and the physical	related to rotation in a circular
	changes that matter under-	path (centripetal force).
	goes.	Dhy 1.2 Analyza the motion of chiests
	PSc.2.1.3 Compare physical and chemical properties of	Phy.1.3 Analyze the motion of objects based on the principles of conservation
	· ·	
	various types of matter.	of momentum, conservation of energy



PSc.2.1.4 Interpret dat	
presented in Bohr mod	
diagrams and dot diag	
atoms and ions of elem	ments 1 elastic and completely inelastic
through 18.	collisions by using the
	principles of conservation of
PSc.2.2 Understand chemical	I bonding momentum and conservation of
and chemical interactions.	energy.
PSc.2.2.1 Infer valence	
electrons, oxidation nu	
and reactivity of an ele	
based on its location in	
Periodic Table.	
PSc.2.2.2 Infer the typ	be of Phy.2.1 Understand the concepts of
chemical bond that occ	
whether covalent, ionic	
metallic, in a given sub	
PSc.2.2.3 Predict cher	
formulas and names for	0,1
compounds based on	Phy.2.1.2 Compare the
knowledge of bond for	
and naming convention	
PSc.2.2.4 Exemplify th	0,
conservation of mass l	6,
balancing chemical eq	
PSc.2.3 Understand the role of	Phy.2.1.3 Explain the
	· · · · · · · · · · · · · · · · · · ·
nucleus in radiation and radio	
PSc.2.3.1 Compare nu	
reactions including alp	
decay, beta decay and	
decay; nuclear fusion a	
nuclear fission.	is transmitted through waves,
	using the fundamental
PSc.2.3.2 Exemplify th	ne characteristics of waves:



radioactive decay of unstable nuclei using the concept of half-life.	wavelength, period, frequency, amplitude, and wave velocity. Phy.2.2.2 Analyze wave behaviors in terms of
PSc.3.1 Understand the types of	transmission, reflection,
energy,conservation of energy and	refraction and interference.
energy transfer.	Phy.2.2.3 Compare mechanical
PSc.3.1.1 Explain thermal	and electromagnetic waves in
energy and its transfer.	terms of wave characteristics
PSc.3.1.2 Explain the law of	
	and behavior (specifically
conservation of energy in a	sound and light).
mechanical system in terms of	Dhy 2.2 Analyza the nature of maying
kinetic energy, potential energy and heat.	Phy.2.3 Analyze the nature of moving
	charges and electric circuits.
PSc.3.1.3 Explain work in terms	Phy.2.3.1 Explain Ohm's law in
of the relationship among the	relation to electric circuits.
applied force to an object, the	Phy.2.3.3 Compare the general
resulting displacement of the	characteristics of AC and DC
object and the energy trans-	systems without calculations.
ferred to an object.	Phy.2.3.4 Analyze electric
PSc.3.1.4 Explain the relation-	systems in terms of their
ship among work, power and	energy and power.
simple machines both quali-	Phy.2.3.5 Analyze systems with
tatively and quantitatively.	multiple potential differences
	and resistors connected in
PSc.3.2 Understand the nature of	series and parallel circuits, both
waves.	conceptually and mathema-
PSc.3.2.1 Explain the	tically, in terms of voltage,
relationships among wave	current and resistance.
frequency, wave period, wave	
velocity and wavelength	Phy.3.1 Explain charges and
through calculation and	electrostatic systems.
investigation.	Phy.3.1.4 Explain the
-	mechanisms for producing
PSc.3.2.2 Compare waves	electrostatic charges, in-



	(mechanical, electromagnetic, and surface) using their characteristics. PSc.3.2.3 Classify waves as transverse or compressional (longitudinal).	cluding charging by friction, conduction, and induction. Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects.	
	 PSc.3.3 Understand electricity and magnetism and their relationship. PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law. PSc.3.3.3 Explain how current is affected by changes in composition, length, temperature, and diameter of wire. PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields. PSc.3.3.5 Explain the practical applications of magnetism. 	 Phy.3.2 Explain the concept of Magnetism. Phy.3.2.1 Explain the relationship between magnetic domains and magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic fields. Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism. 	
Interpret scientific explanations by: Paraphrasing central ideas in complex evidence, concepts, processes, and information to help explain how or why a phenomenon occurs	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship 	Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation. Phy.1.2.4 Explain the effects of forces (including weight, normal, tension and friction) on objects. Phy.1.2.5 Analyze basic forces related to rotation in a circular path (centripetal force).	



between forces and motion. PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion.	Phy.1.3 Analyze the motion of objects based on the principles of conservation of momentum, conservation of energy and Impulse. Phy.1.3.1 Analyze the motion of objects involved in completely elastic and completely inelastic collisions by using the principles of conservation of momentum and conservation of	
PSc.2.1 Understand types, properties,	energy.	
and structure of matter.	Phy.1.3.2 Analyze the motion of	
PSc.2.1.2 Explain the phases	objects based on the	
of matter and the physical	relationship between	
changes that matter under-	momentum and impulse.	
goes.		
PSc.2.1.3 Compare physical	Phy.2.1 Understand the concepts of	
and chemical properties of	work, energy, and power, as well as	
various types of matter.	the relationship among them.	
PSc.2.1.4 Interpret data	Phy.2.1.1 Interpret data on	
presented in Bohr model	work and energy presented	
diagrams and dot diagrams for atoms and ions of elements 1	graphically and numerically.	
	Phy.2.1.2 Compare the	
through 18.	concepts of potential and	
PSc.2.2 Understand chemical bonding	kinetic energy and conservation of total mechanical energy in	
and chemical interactions.	the description of the motion of	
PSc.2.2.1 Infer valence	objects.	
electrons, oxidation number,	Phy.2.1.3 Explain the	
and reactivity of an element	relationship among work, power	
based on its location in the	and energy.	
Periodic Table.		
PSc.2.2.2 Infer the type of	Phy.2.2 Analyze the behavior of waves.	
	10100.	



 chemical bond that occurs, whether covalent, ionic or metallic, in a given substance. PSc.2.2.3 Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions. PSc.2.2.6 Summarize the characteristics and interactions of acids and bases. PSc.2.3 Understand the role of the nucleus in radiation and radioactivity. PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission. PSc.3.1 Understand the types of energy,conservation of energy and energy transfer. PSc.3.1.1 Explain thermal energy and its transfer. PSc.3.1.2 Explain the law of conservation of energy in a mechanical system in terms of 	 Phy.2.2.1 Analyze how energy is transmitted through waves, using the fundamental characteristics of waves: wavelength, period, frequency, amplitude, and wave velocity. Phy.2.2.2 Analyze wave behaviors in terms of transmission, reflection, refraction and interference. Phy.2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics and behavior (specifically sound and light). Phy.2.3.1 Explain Ohm's law in relation to electric circuits. Phy.2.3.3 Compare the general characteristics of AC and DC systems without calculations. Phy.2.3.4 Analyze electric systems in terms of their energy and power. Phy.2.3.5 Analyze systems with multiple potential differences 	
of the relationship among the applied force to an object, the resulting displacement of the object and the energy trans-	tically, in terms of voltage, current and resistance. Phy.3.1 Explain charges and	





	applications of magnetism.		
ELD-SC.9-12.Explain. Expressive	Biology	Chemistry	Earth and Environmental
Construct scientific explanations that: Describe reliable and valid evidence from multiple sources about a phenomenon	 Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito-chondria, vacuoles, chloro-plasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. Bio.1.2 Analyze the cell as a living system. Bio.1.2.1 Explain how homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH). Bio.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.2 Infer the type of bond and chemical formula formed between atoms. Chm.1.3 Understand the physical and chemical properties of atoms based on their position in the Periodic Table. Chm.1.3.2 Infer the physical properties (atomic radius, metallic and nonmetallic characteristics) of an element based on its position on the Periodic Table. Chm.1.3.3 Infer the atomic size, reactivity, electronegativity, and ionization energy of an element from its position in the Periodic 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.2 Predict the locations of volcanoes, earthquakes, and faults based on information contained in a variety of maps. EEn.2.1.3 Explain how natural



unicellular organisms).	Table.	actions such as weathering,
		erosion (wind, water and
Bio.2.1 Analyze the interdependence	Chm.2.1 Understand the relationship	gravity), and soil formation affect
of living organisms within their	among pressure, temperature,	Earth's surface.
environments.	volume, and phase.	EEn.2.1.4 Explain the probability
Bio.2.1.1 Analyze the flow of	Chm.2.1.1 Explain the	of and preparation for
energy and cycling of matter	energetic nature of phase	geohazards such as landslides,
(water, carbon, nitrogen and	changes.	avalanches, earthquakes and
oxygen) through ecosystems	Chm.2.1.2 Explain heating and	volcanoes in a particular area
relating the significance of each	cooling curves (heat of fusion,	based on available data.
to maintaining the health and	heat of vaporization, heat,	
sustainability of an ecosystem.	melting point, and boiling	EEn.2.2 Understand how human
Bio.2.1.2 Analyze the survival	point).	influences impact the
and reproductive success of	Chm.2.1.4 Infer simple	Lithosphere.
organisms in terms of	calorimetric calculations based	EEn.2.2.1 Explain the
behavioral, structural, and	on the concepts of heat lost	consequences of human
reproductive adaptations.	equals heat gained and	activities on the lithosphere
Bio.2.1.3 Explain various ways	specific heat.	(such as mining, deforestation,
organisms interact with each	Chm.2.1.5 Explain the	agriculture, overgrazing,
other (including predation,	relationships between pressure,	urbanization, and land use)
competition, parasitism,	temperature, volume, and	past and present.
mutualism) and with their	quantity of gas both qualitative	EEn.2.2.2 Compare the various
environments resulting in	and quantitative.	methods humans use to
stability within ecosystems.		acquire traditional energy
Bio.2.1.4 Explain why eco-	Chm.2.2 Analyze chemical reactions in	sources (such as peat, coal, oil,
systems can be relatively stable	terms of quantities, product	natural gas, nuclear fission, and
over hundreds or thousands of	formation, and energy.	wood).
years, even though populations	Chm.2.2.1 Explain the energy	
may fluctuate (emphasizing	content of a chemical reaction.	EEn.2.3 Explain the structure and
availability of food, availability	Chm.2.2.2 Analyze the	processes within the hydrosphere.
of shelter, number of predators	evidence of chemical change.	EEn.2.3.1 Explain how water is
and disease).	Chm.2.2.3 Analyze the law of	an energy agent (currents and
	conservation of matter and how	heat transfer).
Bio.2.2 Understand the impact of	it applies to various types of	EEn2.3.2 Explain how ground-
human activities on the environment	chemical equations (synthesis,	water and surface water



(one g	generation affects the next). Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from	decomposition, single replacement, double replacement, and combustion). Chm.2.2.4 Analyze the stoichiometric relationships inherent in a chemical reaction. Chm.2.2.5 Analyze quantitatively the composition of a substance (empirical formula, molecular formula, percent composition, and hydrates).	interact. EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environ- ments.
deterr	one generation to the next. .1 Explain how traits are mined by the structure and on of DNA. Bio.3.1.1 Explain the double- stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits. Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype. .2 Understand how the	 Chm.3.1 Understand the factors affecting rate of reaction and chemical equilibrium. Chm.3.1.1 Explain the factors that affect the rate of a reaction (temperature, concentration, particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.4 Summarize the properties of solutions. Chm.3.2.5 Interpret solubility diagrams. 	 EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.1 Summarize the structure and composition of our atmosphere. EEn.2.5.2 Explain the formation of typical air masses and the weather systems that result from air mass interactions. EEn.2.5.3 Explain how cyclonic storms form based on the interaction of air masses. EEn.2.5.4 Predict the weather using available weather maps and data (including surface, upper atmospheric winds, and satellite imagery). EEn.2.5.5 Explain how human activities affect air quality. EEn.2.6 Analyze patterns of global climate change over time.



 environment, and/or the interaction of alleles, influences the expression of genetic traits. Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation. Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits). Bio.3.2.3 Explain how the environment can influence the expression of genetic traits Bio.3.3 Understand the application of DNA technology. Bio.3.3.1 Interpret how DNA is used for comparison and identification of organisms. Bio.3.3.2 Summarize how transgenic organisms are engineered to benefit society. Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project). 	Chm.3.2.6 Explain the solution process.	 EEn.2.6.1 Differentiate between weather and climate. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation). EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.). EEn.2.7 Explain how the lithosphere, hydrosphere, and Atmosphere individually and collectively affect the biosphere. EEn.2.7.2 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina. EEn.2.7.2 Explain why biodiversity is important to the biosphere. EEn.2.7.3 Explain how human activities impact the biosphere.
Genome Project). Bio.3.4 Explain the theory of evolution by natural selection as a mechanism for how species change over time. Bio.		EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth. EEn.2.8.1 Evaluate alternative







	Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).		
Construct scientific explanations that: Establish neutral or objective stance in how results are communicated	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito- chondria, vacuoles, chloro- plasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.2 Infer the type of bond and chemical formula formed between atoms. Chm.1.3 Understand the physical and chemical properties of atoms based on their position in the Periodic Table. Chm.1.3.2 Infer the physical properties (atomic radius, 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.1 Explain how the rock cycle, plate tectonics,



organisms.	metallic and nonmetallic characteristics) of an element	volcanoes, and earthquakes impact the lithosphere.
Bio.1.2 Analyze the cell as a living	based on its position on the	EEn.2.1.2 Predict the locations
system.	Periodic Table.	of volcanoes, earthquakes, and
Bio.1.2.1 Explain how	Chm.1.3.3 Infer the atomic size,	faults based on information
homeostasis is maintained in	reactivity, electronegativity, and	contained in a variety of maps.
the cell and within an organis		EEn.2.1.3 Explain how natural
in various environments	from its position in the Periodic	actions such as weathering,
(including temperature and pl	•	erosion (wind, water and
Bio.1.2.2 Analyze how cells	,	gravity), and soil formation affect
grow and reproduce in terms	of Chm.2.1 Understand the relationship	Earth's surface.
interphase, mitosis and	among pressure, temperature,	EEn.2.1.4 Explain the probability
cytokinesis.	volume, and phase.	of and preparation for
Bio.1.2.3 Explain how specific	Chm.2.1.1 Explain the	geohazards such as landslides,
cell adaptations help cells	energetic nature of phase	avalanches, earthquakes and
survive in particular	changes.	volcanoes in a particular area
environments (focus on	Chm.2.1.2 Explain heating and	based on available data.
unicellular organisms).	cooling curves (heat of fusion,	
	heat of vaporization, heat,	EEn.2.2 Understand how human
Bio.2.1 Analyze the interdependence	•	influences impact the
of living organisms within their	point).	Lithosphere.
environments.	Chm.2.1.4 Infer simple	EEn.2.2.1 Explain the
Bio.2.1.1 Analyze the flow of	calorimetric calculations based	consequences of human
energy and cycling of matter	on the concepts of heat lost	activities on the lithosphere
(water, carbon, nitrogen and	equals heat gained and	(such as mining, deforestation,
oxygen) through ecosystems	specific heat.	agriculture, overgrazing,
relating the significance of ear		urbanization, and land use)
to maintaining the health and	relationships between pressure,	past and present.
sustainability of an ecosystem		EEn.2.2.2 Compare the various
Bio.2.1.2 Analyze the survival		methods humans use to
and reproductive success of	and quantitative.	acquire traditional energy
organisms in terms of	Chm 2 2 Analyza abamigal reactions in	sources (such as peat, coal, oil,
behavioral, structural, and reproductive adaptations.	Chm.2.2 Analyze chemical reactions in terms of quantities, product	natural gas, nuclear fission, and
Bio.2.1.3 Explain various way	· · · · · ·	wood).
DIU.2.1.3 Explain various way		



Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next.(temperature, concentration, particle size and presence of a catalyst).of typical air masses and the weather systems that result from air mass interactions.Bio.3.1 Explain how traits are determined by the structure andChm.3.1.2 Explain the conditions of a system at equilibrium.Storms form based on the interaction of air masses.			
determined by the structure and equilibrium when a stress is EEn.2.5.4 Predict the weather	 other (including predation, competition, parasitism, mutualism) and with their environments resulting in stability within ecosystems. Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease). Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next. 	 content of a chemical reaction. Chm.2.2.2 Analyze the evidence of chemical change. Chm.2.2.3 Analyze the law of conservation of matter and how it applies to various types of chemical equations (synthesis, decomposition, single replacement, double replacement, and combustion). Chm.2.2.4 Analyze the stoichiometric relationships inherent in a chemical reaction. Chm.2.2.5 Analyze quantitatively the composition of a substance (empirical formula, molecular formula, percent composition, and hydrates). Chm.3.1 Understand the factors affecting rate of reaction and chemical equilibrium. Chm.3.1.1 Explain the factors that affect the rate of a reaction (temperature, concentration, particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. 	 processes within the hydrosphere. EEn.2.3.1 Explain how water is an energy agent (currents and heat transfer). EEn2.3.2 Explain how ground- water and surface water interact. EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environ- ments. EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.1 Summarize the structure and composition of our atmosphere. EEn.2.5.2 Explain the formation of typical air masses and the weather systems that result from air mass interactions. EEn.2.5.3 Explain how cyclonic storms form based on the
tunction of DNA. applied to a chemical system using available weather maps	Bio.3.1 Explain how traits are	equilibrium. Chm.3.1.3 Infer the shift in	interaction of air masses.



1		
 Bio.3.1.1 Explain the double-stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits. Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype. Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits. Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation. Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits). Bio.3.2.3 Explain how the environment can influence the expression of genetic traits. 	(Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.4 Summarize the properties of solutions. Chm.3.2.6 Explain the solution process.	 and data (including surface, upper atmospheric winds, and satellite imagery). EEn.2.5.5 Explain how human activities affect air quality. EEn.2.6 Analyze patterns of global climate change over time. EEn.2.6.1 Differentiate between weather and climate. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation). EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.). EEn.2.7 Explain how the lithosphere, hydrosphere, and Atmosphere individually and collectively affect the biosphere. EEn.2.7.1 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina. EEn.2.7.2 Explain why bio-diversity is important to the



 Bio.3.3.1 Interpret how DNA is used for comparison and identification of organisms. Bio.3.3.2 Summarize how transgenic organisms are engineered to benefit society. Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project). Bio.3.4 Explain the theory of evolution by natural selection as a mechanism for how species change over time. Bio. Bio.3.4.1 Explain how fossil, biochemical, and anatomical evidence support the theory of evolution. Bio.3.4.2 Explain how natural selection influences the changes in species over time. Bio.3.4.3 Explain how various disease agents (bacteria, viruses, chemicals) can influence natural selection. Bio 3.5 Analyze how classification systems are developed based upon speciation. Bio.3.5.1 Explain the historical development and changing nature of classification systems. 	 biosphere. EEn.2.7.3 Explain how human activities impact the biosphere. EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth. EEn.2.8.1 Evaluate alternative energy technologies for use in North Carolina. EEn.2.8.2 Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts. EEn.2.8.3 Explain the effects of uncontrolled population growth on the Earth's resources. EEn.2.8.4 Evaluate the concept of "reduce, reuse, recycle" in terms of impact on natural resources.






	these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).		
Construct scientific explanations that: Develop reasoning to illustrate and/ or predict the relationships between variables in a system or between components of a system	 Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito-chondria, vacuoles, chloro-plasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. Bio.1.2.1 Explain how 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.1 Compare (qualitatively) the relative strengths of ionic, covalent, and metallic bonds. Chm.1.2.2 Infer the type of bond and chemical formula formed between atoms. Chm.1.2.3 Compare inter- and intra-particle forces. Chm.1.2.5 Compare the properties of ionic, covalent, metallic, and network compound. Chm.1.3 Understand the physical and 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.1 Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes impact the lithosphere. EEn.2.1.2 Predict the locations of volcanoes, earthquakes, and faults based on information



homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH). Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis. Bio.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on unicellular organisms).	chemical properties of atoms based on their position in the Periodic Table. Chm.1.3.2 Infer the physical properties (atomic radius, metallic and nonmetallic characteristics) of an element based on its position on the Periodic Table. Chm.1.3.3 Infer the atomic size, reactivity, electronegativity, and ionization energy of an element from its position in the Periodic Table.	contained in a variety of maps. EEn.2.1.3 Explain how natural actions such as weathering, erosion (wind, water and gravity), and soil formation affect Earth's surface. EEn.2.1.4 Explain the probability of and preparation for geohazards such as landslides, avalanches, earthquakes and volcanoes in a particular area based on available data.
		EEn.2.2 Understand how human
Bio.2.1 Analyze the interdependence	Chm.2.1 Understand the relationship	influences impact the
of living organisms within their	among pressure, temperature,	Lithosphere.
environments.	volume, and phase.	EEn.2.2.1 Explain the
Bio.2.1.1 Analyze the flow of	Chm.2.1.1 Explain the	consequences of human
energy and cycling of matter	energetic nature of phase	activities on the lithosphere
(water, carbon, nitrogen and	changes.	(such as mining, deforestation,
oxygen) through ecosystems	Chm.2.1.2 Explain heating and	agriculture, overgrazing,
relating the significance of each	cooling curves (heat of fusion,	urbanization, and land use)
to maintaining the health and	heat of vaporization, heat,	past and present.
sustainability of an ecosystem.	melting point, and boiling	EEn.2.2.2 Compare the various
Bio.2.1.2 Analyze the survival	point). Chm.2.1.4 Infer simple	methods humans use to
and reproductive success of organisms in terms of	calorimetric calculations based	acquire traditional energy sources (such as peat, coal, oil,
behavioral, structural, and	on the concepts of heat lost	natural gas, nuclear fission, and
reproductive adaptations.	equals heat gained and	wood).
Bio.2.1.3 Explain various ways	specific heat.	1000d).
organisms interact with each	Chm.2.1.5 Explain the	EEn.2.3 Explain the structure and
other (including predation,	relationships between pressure,	processes within the hydrosphere.
competition, parasitism,	temperature, volume, and	EEn.2.3.1 Explain how water is
mutualism) and with their environments resulting in	quantity of gas both qualitative and quantitative.	an energy agent (currents and heat transfer).



 stability within ecosystems. Bio.2.1.4 Explain why eco- systems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease). Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next. Bio.3.1 Explain how traits are determined by the structure and function of DNA. Bio.3.1.1 Explain the double- 	 Chm.2.2 Analyze chemical reactions in terms of quantities, product formation, and energy. Chm.2.2.1 Explain the energy content of a chemical reaction. Chm.2.2.2 Analyze the evidence of chemical change. Chm.2.2.3 Analyze the law of conservation of matter and how it applies to various types of chemical equations (synthesis, decomposition, single replacement, and combustion). Chm.2.2.4 Analyze the stoichiometric relationships inherent in a chemical reaction. Chm.2.2.5 Analyze quantitatively the composition of a substance (empirical formula, molecular formula, percent composition, and hydrates). Chm.3.1 Understand the factors affecting rate of reaction and chemical equilibrium. Chm.3.1.1 Explain the factors that affect the rate of a reaction (temperature, concentration, formula, percentration, formula, formula	 EEn2.3.2 Explain how groundwater and surface water interact. EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments. EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.2 Explain the formation of typical air masses and the weather systems that result from air mass interactions. EEn.2.5.3 Explain how cyclonic storms form based on the interaction of air masses. EEn.2.5.4 Predict the weather using available weather maps and data (including surface, upper atmospheric winds, and satellite imagery). EEn.2.5.5 Explain how human activities affect air quality.



 RNA code for proteins and determine traits. Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype. Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits. Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation. Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits). Bio.3.2.3 Explain how the environment can influence the expression of genetic traits. Bio.3.3 Understand the application of DNA technology. Bio.3.3.1 Interpret how DNA is used for comparison and identification of and identification of and genetic of and identification of and genetic traits. 	equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.5 Interpret solubility diagrams. Chm.3.2.6 Explain the solution process.	 weather and climate. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation). EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.). EEn.2.7 Explain how the lithosphere, hydrosphere, and Atmosphere individually and collectively affect the biosphere. EEn.2.7.1 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina. EEn.2.7.2 Explain why biodiversity is important to the biosphere. EEn.2.7.3 Explain how human activities impact the biosphere.
		FEn 2 8 Evaluate human behaviors in
identification of organisms.		terms of how likely they are to ensure
Bio.3.3.2 Summarize how		the ability to live sustainably on Earth.
		EEn.2.8.1 Evaluate alternative
transgenic organisms are		







	 relationship among DNA, proteins and amino acids in carrying out the work of cells and how this is similar in all organisms. Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions Bio 4.2 Analyze the relationships between biochemical processes and energy use in the cell. Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport). 		
Construct scientific explanations that: Summarize and refine solutions referencing scientific knowledge, evidence, criteria, and/or trade-offs	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito- chondria, vacuoles, chloro- plasts, and ribosomes) and ways that these organelles interact with each other to	Chm.3.2 Understand solutions and the solution process. Chm.3.2.2 Summarize the properties of acids and bases. Chm.3.2.4 Summarize the properties of solutions.	EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.5 Explain how human activities affect air quality.



	perform the function of the cell. Bio.3.3 Understand the application of DNA technology. Bio.3.3.2 Summarize how transgenic organisms are engineered to benefit society. Bio.4.1 Understand how biological molecules are essential to the survival of living organisms. Bio.4.1.2 Summarize the relationship among DNA, proteins and amino acids in carrying out the work of cells and how this is similar in all organisms.		
ELD-SC.9-12.Explain. Expressive	Physical Science	Physics	
Construct scientific explanations that: Describe reliable and valid evidence from multiple sources about a phenomenon	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.1 Explain how 	 Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations. Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration. Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration. 	



gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion. PSc.2.1 Understand types, properties, and structure of matter. PSc.2.1.1 Classify matter as: homogeneous or hetero- geneous; pure substance or mixture; element or compound; metals, nonmetals or metalloids; solution, colloid or suspension. PSc.2.1.2 Explain the phases of matter and the physical changes that matter under- goes. PSc.2.1.3 Compare physical and chemical properties of various types of matter. PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18.	 Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations. Phy.1.2.2 Analyze systems of forces in one dimension and two dimensions using free body diagrams. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation. Phy.1.2.4 Explain the effects of forces (including weight, normal, tension and friction) on objects. Phy.1.2.5 Analyze basic forces related to rotation in a circular path (centripetal force). Phy.1.3.1 Analyze the motion of objects based on the principles of conservation of objects involved in completely elastic and completely inelastic collisions by using the principles of conservation of 	
PSc.2.2 Understand chemical bonding and chemical interactions. PSc.2.2.1 Infer valence electrons, oxidation number,	momentum and conservation of energy. Phy.1.3.2 Analyze the motion of objects based on the	



,		
	and reactivity of an element	relationship between
	based on its location in the	momentum and impulse.
	Periodic Table.	
	PSc.2.2.2 Infer the type of	Phy.2.1 Understand the concepts of
	chemical bond that occurs,	work, energy, and power, as well as
	whether covalent, ionic or	the relationship among them.
	metallic, in a given substance.	Phy.2.1.1 Interpret data on
	PSc.2.2.3 Predict chemical	work and energy presented
	formulas and names for simple	graphically and numerically.
	compounds based on	Phy.2.1.2 Compare the
	knowledge of bond formation	concepts of potential and
	and naming conventions.	kinetic energy and conservation
	PSc.2.2.6 Summarize the	of total mechanical energy in
	characteristics and interactions	the description of the motion of
	of acids and bases.	objects.
		Phy.2.1.3 Explain the
	PSc.2.3 Understand the role of the	relationship among work, power
	nucleus in radiation and radioactivity.	and energy.
	PSc.2.3.1 Compare nuclear	
	reactions including alpha	Phy.2.2 Analyze the behavior of
	decay, beta decay and gamma	waves.
	decay; nuclear fusion and	Phy.2.2.1 Analyze how energy
	nuclear fission.	is transmitted through waves,
		using the fundamental
	PSc.3.1 Understand the types of	characteristics of waves:
	energy,conservation of energy and	wavelength, period, frequency,
	energy transfer	amplitude, and wave velocity.
	PSc.3.1.1 Explain thermal	Phy.2.2.2 Analyze wave
	energy and its transfer.	behaviors in terms of
	PSc.3.1.2 Explain the law of	transmission, reflection,
	conservation of energy in a	refraction and interference.
	mechanical system in terms of	Phy.2.2.3 Compare mechanical and electromagnetic waves in
	kinetic energy, potential energy and heat.	terms of wave characteristics
	PSc.3.1.3 Explain work in terms	and behavior (specifically
		and benavior (specifically



of the relationship among the applied force to an object, the resulting displacement of the object and the energy trans- ferred to an object. PSc.3.1.4 Explain the relation- ship among work, power and simple machines both quali- tatively and quantitatively.	sound and light Phy.2.3 Analyze the model charges and electric of Phy.2.3.1 Expression to electric Phy.2.3.3 Connot characteristics systems without
PSc.3.2 Understand the nature of waves. PSc.3.2.1 Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation. PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics. PSc.3.2.3 Classify waves as transverse or compressional (longitudinal).	Phy.2.3.4 Ana systems in ter energy and po Phy.2.3.5 Ana multiple poter and resistors series and pa conceptually a tically, in term current and re Phy.3.1 Explain charge electrostatic systems Phy.3.1.4 Exp mechanisms to electrostatic co
PSc.3.3 Understand electricity and magnetism and their relationship. PSc.3.3.1 Summarize static and current electricity. PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law. PSc.3.3.3 Explain how current is affected by changes in	cluding charge conduction, al Phy.3.1.5 Exp differences in potentials rela energy of cha Phy.3.2 Explain the c Magnetism.

ght).

nature of moving circuits. plain Ohm's law in ectric circuits. ompare the general cs of AC and DC out calculations.

alyze electric erms of their ower. alyze systems with ential differences connected in arallel circuits, both and mathemams of voltage, resistance.

rges and s.

plain the for producing charges, inging by friction, and induction. plain how n electrostatic late to the potential arged objects.

concept of



	composition, length, temp- erature, and diameter of wire. PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields. PSc.3.3.5 Explain the practical applications of magnetism.	Phy.3.2.1 Explain the relationship between magnetic domains and Magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic Fields. Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism.	
Construct scientific explanations that: Establish neutral or objective stance in how results are communicated	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion. 	 Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations. Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration. Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration. Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations. Phy.1.2.2 Analyze systems of forces in one dimension and two dimensions using free body 	



PSc.2.1 Understand types, properties, and structure of matter. PSc.2.1.1 Classify matter as: homogeneous or hetero- geneous; pure substance or mixture; element or compound; metals, nonmetals or matallaida; colution, colloid or	diagrams. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation. Phy.1.2.4 Explain the effects of forces (including weight, permale tension and friction) on	
metalloids; solution, colloid or suspension. PSc.2.1.2 Explain the phases of matter and the physical	normal, tension and friction) on objects. Phy.1.2.5 Analyze basic forces related to rotation in a circular	
changes that matter under- goes. PSc.2.1.3 Compare physical and chemical properties of	path (centripetal force). Phy.1.3 Analyze the motion of objects based on the principles of conservation	
various types of matter. PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for	of momentum, conservation of energy and Impulse. Phy.1.3.1 Analyze the motion of objects involved in completely	
atoms and ions of elements 1 through 18.	elastic and completely inelastic collisions by using the principles of conservation of	
PSc.2.2 Understand chemical bonding and chemical interactions. PSc.2.2.1 Infer valence electrons, oxidation number,	momentum and conservation of energy. Phy.1.3.2 Analyze the motion of objects based on the	
and reactivity of an element based on its location in the Periodic Table. PSc.2.2.2 Infer the type of	relationship between momentum and impulse. Phy.2.1 Understand the concepts of	
chemical bond that occurs, whether covalent, ionic or metallic, in a given substance. PSc.2.2.3 Predict chemical formulas and names for simple	work, energy, and power, as well as the relationship among them. Phy.2.1.1 Interpret data on work and energy presented graphically and numerically.	



compounds based on knowledge of bond formation and naming conventions. PSc.2.2.4 Exemplify the law of conservation of mass by balancing chemical equations. PSc.2.2.6 Summarize the characteristics and interactions of acids and bases.	Phy.2.1.2 Compare the concepts of potential and kinetic energy and conservation of total mechanical energy in the description of the motion of objects. Phy.2.1.3 Explain the relationship among work, power and energy.
PSc.2.3 Understand the role of the nucleus in radiation and radioactivity. PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission. PSc.2.3.2 Exemplify the radioactive decay of unstable nuclei using the concept of half-life.	Phy.2.2 Analyze the behavior of waves. Phy.2.2.1 Analyze how energy is transmitted through waves, using the fundamental characteristics of waves: wavelength, period, frequency, amplitude, and wave velocity. Phy.2.2.2 Analyze wave behaviors in terms of transmission, reflection, refraction and interference.
 PSc.3.1 Understand the types of energy,conservation of energy and energy transfer. PSc.3.1.1 Explain thermal energy and its transfer. PSc.3.1.2 Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat. PSc.3.1.3 Explain work in terms of the relationship among the applied force to an object, the 	 Phy.2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics and behavior (specifically sound and light). Phy.2.3 Analyze the nature of moving charges and electric circuits. Phy.2.3.1 Explain Ohm's law in relation to electric circuits. Phy.2.3.3 Compare the general characteristics of AC and DC systems without calculations.



resulting displacement of the object and the energy trans- ferred to an object. PSc.3.1.4 Explain the relation- ship among work, power and simple machines both quali- tatively and quantitatively. PSc.3.2 Understand the nature of waves. PSc.3.2.1 Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation. PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics. PSc.3.2.3 Classify waves as transverse or compressional (longitudinal).	 Phy.2.3.4 Analyze electric systems in terms of their energy and power. Phy.2.3.5 Analyze systems with multiple potential differences and resistors connected in series and parallel circuits, both conceptually and mathematically, in terms of voltage, current and resistance. Phy.3.1 Explain charges and electrostatic systems. Phy.3.1.4 Explain the mechanisms for producing electrostatic charges, including charging by friction, conduction, and induction. Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects.
BSo 2.2 Understand electricity and	Phy.3.2 Explain the concept of
PSc.3.3 Understand electricity and magnetism and their relationship. PSc.3.3.1 Summarize static and current electricity. PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law. PSc.3.3.3 Explain how current is affected by changes in composition, length, temp- erature, and diameter of wire.	Magnetism. Phy.3.2.1 Explain the relationship between magnetic domains and Magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic Fields. Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism.



	PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields. PSc.3.3.5 Explain the practical applications of magnetism.		
Construct scientific explanations that: Develop reasoning to illustrate and/ or predict the relationships between variables in a system or between components of a system	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion. PSc.2.1.1 Classify matter as: homogeneous or heterogeneous; pure substance or 	 Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations. Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration. Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration. Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations. Phy.1.2.2 Analyze systems of forces in one dimension and two dimensions using free body diagrams. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation. 	



mixture; element or compound;	Phy.1.2.4 Explain the effects of
metals, nonmetals or	forces (including weight,
metalloids; solution, colloid or	normal, tension and friction) on
suspension.	objects.
PSc.2.1.2 Explain the phases	Phy.1.2.5 Analyze basic forces
of matter and the physical	related to rotation in a circular
changes that matter under-	path (centripetal force).
goes.	
PSc.2.1.3 Compare physical	Phy.1.3 Analyze the motion of objects
and chemical properties of	based on the principles of conservation
various types of matter.	of momentum, conservation of energy
PSc.2.1.4 Interpret data	and Impulse.
presented in Bohr model	Phy.1.3.1 Analyze the motion of
diagrams and dot diagrams for	objects involved in completely
atoms and ions of elements 1	elastic and completely inelastic
through 18.	collisions by using the
	principles of conservation of
PSc.2.2 Understand chemical bonding	momentum and conservation of
and chemical interactions.	energy.
PSc.2.2.1 Infer valence	Phy.1.3.2 Analyze the motion of
electrons, oxidation number,	objects based on the
and reactivity of an element	relationship between
based on its location in the	momentum and impulse.
Periodic Table.	•
PSc.2.2.2 Infer the type of	Phy.2.1 Understand the concepts of
chemical bond that occurs,	work, energy, and power, as well as
whether covalent, ionic or	the relationship among them.
metallic, in a given substance.	Phy.2.1.1 Interpret data on
PSc.2.2.3 Predict chemical	work and energy presented
formulas and names for simple	graphically and numerically.
compounds based on	Phy.2.1.2 Compare the
knowledge of bond formation	concepts of potential and
and naming conventions.	kinetic energy and conservation
PSc.2.2.4 Exemplify the law of	of total mechanical energy in
conservation of mass by	the description of the motion of







	 waves. PSc.3.2.1 Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation. PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics. PSc.3.2.3 Classify waves as transverse or compressional (longitudinal). PSc.3.3 Understand electricity and magnetism and their relationship. PSc.3.3.1 Summarize static and current electricity. PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law. PSc.3.3.4 Explain how current is affected by changes in composition, length, temperature, and diameter of wire. PSc.3.3.5 Explain the practical applications of magnetism. 	 and resistors connected in series and parallel circuits, both conceptually and mathematically, in terms of voltage, current and resistance. Phy.3.1 Explain charges and electrostatic systems. Phy.3.1.4 Explain the mechanisms for producing electrostatic charges, including charging by friction, conduction, and induction. Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects. Phy.3.2 Explain the concept of Magnetism. Phy.3.2.1 Explain the relationship between magnetic domains and Magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic Fields. Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism. 	
Construct scientific explanations that: Summarize and refine	PSc.2.2 Understand chemical bonding and chemical interactions. PSc.2.2.6 Summarize the	*Note: While there are no specific science standards listed, language instruction for this language	



solutions referencing scientific knowledge, evidence, criteria, and/or trade-offs	characteristics and interactions of acids and bases. PSc.3.3 Understand electricity and magnetism and their relationship. PSc.3.3.1 Summarize static and current electricity.	expectation can be integrated within all aspects of science instruction.	
ELD-SC.9-12.Argue. Interpretive	Biology	Chemistry	Earth and Environmental
Interpret scientific arguments by: Identifying appropriate and sufficient evidence from data, models, and/ or information from investigations of a phenomenon or design solutions	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito- chondria, vacuoles, chloro- plasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.1 Compare (qualitatively) the relative strengths of ionic, covalent, and metallic bonds. Chm.1.2.2 Infer the type of bond and chemical formula formed between atoms. Chm.1.2.3 Compare inter- and intra-particle forces. Chm.1.2.5 Compare the properties of ionic, covalent, 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.1 Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes



 system. Bio. 1.2.1 Explain how homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH). Bio. 1.2.3 Explain how specific cell adaptations help cells survive in particular environments. Bio. 2.1.3 Explain how specific cell adaptations help cells survive in particular environments. Bio. 2.1 A nalyze the interdependence of living organisms within their environments. Bio. 2.1.1 Analyze the interdependence of living organisms within their environments. Bio. 2.1.1 Analyze the flow of energy and cycling of matting the aution their (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem. relating the significance of each to maintaining the health and sustainability of an ecosystem. relating the significance of each to maintaining the health and sustainability of an ecosystem. relating the significance of each to maintaining the health and sustainability of an ecosystem. relating the significance of each to maintaining the health and sustainability of an ecosystem. Bio. 2.1.3 Explain various ways 			1
of living organisms within their environments.among pressure, temperature, volume, and phase.Lithosphere.Bio.2.1.1 Analyze the flow of energy and cycling of matter (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem. Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations. Bio.2.1.3 Explain various waysamong pressure, temperature, volume, and phase. Chm.2.1.1 Explain the energetic nature of phase changes. Coling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point).Lithosphere. EEn.2.2.1 Explain the consequences of human activities on the lithosphere (such as mining, deforestatio agriculture, overgrazing, urbanization, and land use) past and present.Bio.2.1.2 Analyze the survival and reproductive adaptations. Bio.2.1.3 Explain various waysamong pressure, temperature, volume, and phase. Chm.2.1.1 Explain the energetic nature of phase coling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point).Lithosphere. (such as mining, deforestatio agriculture, overgrazing, urbanization, and land use) past and present.Bio.2.1.3 Explain various waysChm.2.1.4 Infer simple calorimetric calculations based on the concepts of heat lost equals heat gained and specific heat.Lithosphere. (such as mining, deforestatio agriculture, overgrazing, urbanization, and land use) past and present.	system. Bio.1.2.1 Explain how homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH). Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis. Bio.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on	compound. Chm.1.3 Understand the physical and chemical properties of atoms based on their position in the Periodic Table. Chm.1.3.2 Infer the physical properties (atomic radius, metallic and nonmetallic characteristics) of an element based on its position on the Periodic Table. Chm.1.3.3 Infer the atomic size, reactivity, electronegativity, and ionization energy of an element from its position in the Periodic	EEn.2.1.2 Predict the locations of volcanoes, earthquakes, and faults based on information contained in a variety of maps. EEn.2.1.3 Explain how natural actions such as weathering, erosion (wind, water and gravity), and soil formation affec Earth's surface. EEn.2.1.4 Explain the probability of and preparation for geohazards such as landslides, avalanches, earthquakes and volcanoes in a particular area based on available data.
organisms interact with each Chm.2.1.5 Explain the EEn.2.3 Explain the structure and	of living organisms within their environments. Bio.2.1.1 Analyze the flow of energy and cycling of matter (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem. Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations.	among pressure, temperature, volume, and phase. Chm.2.1.1 Explain the energetic nature of phase changes. Chm.2.1.2 Explain heating and cooling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point). Chm.2.1.4 Infer simple calorimetric calculations based on the concepts of heat lost equals heat gained and	Lithosphere. EEn.2.2.1 Explain the consequences of human activities on the lithosphere (such as mining, deforestation, agriculture, overgrazing, urbanization, and land use) past and present. EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil natural gas, nuclear fission, and



other (including predation, competition, parasitism, relationships between pressure, processes within the hydrosphere temperature, volume, and EEn.2.3.1 Explain how w	
mutualism) and with their environments resulting in stability within ecosystems.quantity of gas both qualitative and quantitative.an energy agent (current heat transfer). EEn2.3.2 Explain how grBio.2.1.4 Explain why eco-Chm.2.2 Analyze chemical reactions inwater and surface water	s and
systems can be relatively stable terms of quantities, product interact.	
over hundreds or thousands of formation, and energy.	
years, even though populations Chm.2.2.1 Explain the energy EEn.2.4 Evaluate how humans	ise
may fluctuate (emphasizing content of a chemical reaction. water.	
availability of food, availability Chm.2.2.2 Analyze the EEn.2.4.1 Evaluate hum	an
of shelter, number of predators evidence of chemical change. influences on freshwater	
and disease). Chm.2.2.3 Analyze the law of availability.	
conservation of matter and how EEn.2.4.2 Evaluate hum	
Bio.2.2 Understand the impact of it applies to various types of influences on water qual	2
human activities on the environment chemical equations (synthesis, North Carolina's river ba	
(one generation affects the next). decomposition, single wetlands and tidal enviro	n-
Bio.2.2.1 Infer how human replacement, double ments.	
activities (including population replacement, and combustion).	_
growth, pollution, global Chm.2.2.4 Analyze the EEn.2.5 Understand the structure	
warming, burning of fossil fuels, stoichiometric relationships and processes within our atmos	
habitat destruction and inherent in a chemical reaction. EEn.2.5.2 Explain the following and the following of the second	
introduction of nonnative Chm.2.2.5 Analyze of typical air masses and	
species) may impact the quantitatively the composition weather systems that res	
environment. of a substance (empirical from air mass interaction Big 2.2.2 Explain how the use formula melocular formula	-
Bio.2.2.2 Explain how the use, formula, molecular formula, EEn.2.5.3 Explain how c percent composition, and storms form based on th	
natural resources by humans hydrates).	
impact the environment from EEn.2.5.4 Predict the we	
one generation to the next. Chm.3.1 Understand the factors using available weather	
affecting rate of reaction and chemical and data (including surfa	
Bio.3.1 Explain how traits are equilibrium. equilibrium.	-
determined by the structure and Chm.3.1.1 Explain the factors satellite imagery).	,
function of DNA. that affect the rate of a reaction EEn.2.5.5 Explain how h	uman
Bio.3.1.1 Explain the double- (temperature, concentration, activities affect air quality	



 stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits. Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype. Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits. Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation. Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits). Bio.3.2.3 Explain how the environment can influence the expression of genetic traits. 	particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.5 Interpret solubility diagrams. Chm.3.2.6 Explain the solution process.	 EEn.2.6 Analyze patterns of global climate change over time. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation). EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.). EEn.2.7 Explain how the lithosphere, hydrosphere, and Atmosphere individually and collectively affect the biosphere. EEn.2.7.1 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina. EEn.2.7.2 Explain why biodiversity is important to the biosphere. EEn.2.7.3 Explain how human activities impact the biosphere.
Bio.3.3 Understand the application of DNA technology. Bio.3.3.1 Interpret how DNA is		EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth.







	1		
	 Bio.4.1 Understand how biological molecules are essential to the survival of living organisms. Bio.4.1.2 Summarize the relationship among DNA, proteins and amino acids in carrying out the work of cells and how this is similar in all organisms. Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions. Bio 4.2 Analyze the relationships between biochemical processes and energy use in the cell. Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis 		
	(active transport).		
Interpret scientific arguments by: Comparing reasoning and claims based on evidence from competing arguments or design solutions	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of	Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.1 Compare (qualitatively) the relative strengths of ionic, covalent, and metallic bonds.	EEn.2.2 Understand how human influences impact the Lithosphere. EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil, natural gas, nuclear fission, and



	complexity. Bio.4.1 Understand how biological molecules are essential to the survival of living organisms. Bio.4.1.1 Compare the structures and functions of the major biological molecules (carbohydrates, proteins, lipids, and nucleic acids) as related to the survival of living organisms.	Chm.1.2.3 Compare inter- and intra-particle forces. Chm.1.2.5 Compare the properties of ionic, covalent, metallic, and network compound.	wood).
Interpret scientific arguments by: Evaluating currently accepted explanations, new evidence, limitations (trade-offs), constraints, and ethical issues	Bio.3.3 Understand the application of DNA technology. Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project).	*Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction.	 En.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments. EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth. EEn.2.8.1 Evaluate alternative energy technologies for use in North Carolina. EEn.2.8.4 Evaluate the concept of "reduce, reuse, recycle" in terms of impact on natural resources.



ELD-SC.9-12.Argue. Interpretive	Physical Science	Physics	
Interpret scientific arguments by: Identifying appropriate and sufficient evidence from data, models, and/ or information from investigations of a phenomenon or design solutions	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion. PSc.2.1 Understand types, properties, and structure of matter. PSc.2.1.1 Classify matter as: homogeneous or heterogeneous; pure substance or mixture; element or compound; metals, nonmetals or 	 Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation. Phy.1.2.4 Explain the effects of forces (including weight, normal, tension and friction) on objects. Phy.2.1 Understand the concepts of work, energy, and power, as well as the relationship among them. Phy.2.1.1 Interpret data on work and energy presented graphically and numerically. Phy.2.1.2 Compare the concepts of potential and kinetic energy and conservation of total mechanical energy in the description of the motion of objects. Phy.2.1.3 Explain the relationship among work, power and energy. Phy.2.2.1 Analyze the behavior of waves. Phy.2.2.1 Analyze how energy is transmitted through waves, using the fundamental 	



metalloids; solution, colloid or suspension.	characteristics of waves: wavelength, period, frequency,
PSc.2.1.2 Explain the phases	amplitude, and wave velocity.
of matter and the physical	Phy.2.2.2 Analyze wave behaviors in terms of
changes that matter under- goes.	transmission, reflection,
PSc.2.1.3 Compare physical	refraction and interference.
and chemical properties of	Phy.2.2.3 Compare mechanical
various types of matter.	and electromagnetic waves in
PSc.2.1.4 Interpret data	terms of wave characteristics
presented in Bohr model	and behavior (specifically
diagrams and dot diagrams for	sound and light).
atoms and ions of elements 1	
through 18.	Phy.2.3 Analyze the nature of moving
	charges and electric circuits.
PSc.2.2 Understand chemical bonding	Phy.2.3.1 Explain Ohm's law in
and chemical interactions.	relation to electric circuits.
PSc.2.2.1 Infer valence	Phy.2.3.3 Compare the general
electrons, oxidation number,	characteristics of AC and DC
and reactivity of an element	systems without calculations.
based on its location in the	Phy.2.3.4 Analyze electric
Periodic Table.	systems in terms of their
PSc.2.2.2 Infer the type of chemical bond that occurs,	energy and power.
whether covalent, ionic or	Phy.3.1 Explain charges and
metallic, in a given substance.	electrostatic systems.
PSc.2.2.3 Predict chemical	Phy.3.1.4 Explain the
formulas and names for simple	mechanisms for producing
compounds based on	electrostatic charges, in-
knowledge of bond formation	cluding charging by friction,
and naming conventions.	conduction, and induction.
PSc.2.2.6 Summarize the	Phy.3.1.5 Explain how
characteristics and interactions	differences in electrostatic
of acids and bases.	potentials relate to the potential
	energy of charged objects.







	 through calculation and investigation. PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics. PSc.3.2.3 Classify waves as transverse or compressional (longitudinal). PSc.3.3 Understand electricity and magnetism and their relationship. PSc.3.1 Summarize static and gurrent electricity. 		
	and current electricity. PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law. PSc.3.3.3 Explain how current is affected by changes in composition, length, temp- erature, and diameter of wire. PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields. PSc.3.3.5 Explain the practical applications of magnetism.		
Interpret scientific arguments by: Comparing reasoning and claims based on evidence from competing arguments or design solutions	PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities.	Phy.2.1 Understand the concepts of work, energy, and power, as well as the relationship among them. Phy.2.1.1 Interpret data on work and energy presented graphically and numerically. Phy.2.1.2 Compare the concepts of potential and	



Interpret scientific arguments by: Evaluating currently accepted explanations, new evidence, limitations (trade-offs), constraints, and ethical	 PSc.2.1 Understand types, properties, and structure of matter. PSc.2.1.3 Compare physical and chemical properties of various types of matter. PSc.2.3 Understand the role of the nucleus in radiation and radioactivity. PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission. PSc.3.2 Understand the nature of waves. PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics. *Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction. 	 kinetic energy and conservation of total mechanical energy in the description of the motion of objects. Phy.2.1.3 Explain the relationship among work, power and energy. Phy.2.2 Analyze the behavior of waves. Phy.2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics and behavior (specifically sound and light). Phy.2.3 Analyze the nature of moving charges and electric circuits. Phy.2.3.3 Compare the general characteristics of AC and DC systems without calculations. *Note: While there are no specific science standards listed, language instruction for this language expectation can be integrated within all aspects of science instruction. 	
issues ELD-SC.9-12.Argue.	Biology	Chemistry	Earth and Environmental
Expressive Construct scientific	Bio.2.1 Analyze the interdependence	Chm.1.1 Analyze the structure of	EEn.2.1 Explain how processes and
arguments that: Introduce and contextualize topic/	of living organisms within their environments.	atoms and ions. Chm.1.1.3 Explain the emission	forces affect the lithosphere. EEn.2.1.2 Predict the locations



K, 1, 2-3, 4-5, 6-8, 9-12

phenomenon in current scientific or historical episodes in science

Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease).

Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the

environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans

impact the environment from

one generation to the next. Bio.3.1 Explain how traits are determined by the structure and function of DNA.

Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes of electromagnetic radiation in spectral form in terms of the Bohr model.

Chm.3.1 Understand the factors affecting rate of reaction and chemical equilibrium.

> Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle).

of volcanoes, earthquakes, and faults based on information contained in a variety of maps. EEn.2.1.3 Explain how natural actions such as weathering. erosion (wind, water and gravity), and soil formation affect Earth's surface. EEn.2.1.4 Explain the probability of and preparation for geohazards such as landslides, avalanches, earthquakes and volcanoes in a particular area based on available data. EEn.2.2.1 Explain the consequences of human activities on the lithosphere (such as mining, deforestation, agriculture, overgrazing,

EEn.2.2 Understand how human influences impact the Lithosphere.

> urbanization, and land use) past and present. EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil, natural gas, nuclear fission, and wood).

EEn.2.3 Explain the structure and processes within the hydrosphere.



 lead to changes in function and phenotype. Bio.3.3 Understand the application of DNA technology. Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project). Bio.3.4 Explain the theory of evolution by natural selection as a mechanism for how species change over time. Bio. 3.4.1 Explain how fossil, biochemical, and anatomical evidence support the theory of Evolution. Bio 3.5 Analyze how classification systems are developed based upon speciation. Bio.3.5.1 Explain the historical development and changing nature of classification systems 	 EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments. EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.5 Explain how human activities affect air quality. EEn.2.6 Analyze patterns of global climate change over time. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation). EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.). EEn.2.7.3 Explain how human activities impact the biosphere.
--	--



			ensure the ability to live sustainably on Earth. EEn.2.8.1 Evaluate alternative energy technologies for use in North Carolina. EEn.2.8.2 Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts. EEn.2.8.3 Explain the effects of uncontrolled population growth on the Earth's resources. EEn.2.8.4 Evaluate the concept of "reduce, reuse, recycle" in terms of impact on natural resources.
Construct scientific arguments that: Defend or refute a claim based on data and evidence	 Bio.2.1 Analyze the interdependence of living organisms within their environments. Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease). Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.1 Infer how human activities (including population growth, pollution, global 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.2 Infer the type of bond and chemical formula formed between atoms. 	 EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible



warming, burning of fossil fuels, habitat destruction and	Chm.1.3 Understand the physical and chemical properties of atoms based on	on Earth.
introduction of nonnative	their position in the Periodic Table.	EEn.2.1 Explain how processes and
species) may impact the	Chm.1.3.2 Infer the physical	forces affect the lithosphere.
environment.	properties (atomic radius,	EEn.2.1.1 Explain how the rock
Bio.2.2.2 Explain how the use,	metallic and nonmetallic	cycle, plate tectonics,
protection and conservation of	characteristics) of an element	volcanoes, and earthquakes
natural resources by humans	based on its position on the	impact the lithosphere.
impact the environment from	Periodic Table.	EEn.2.1.2 Predict the locations
one generation to the next.	Chm.1.3.3 Infer the atomic size,	of volcanoes, earthquakes, and
one generation to the next.	reactivity, electronegativity, and	faults based on information
Bio.3.2 Understand how the	ionization energy of an element	contained in a variety of maps.
environment, and/or the interaction of	from its position in the Periodic	EEn.2.1.3 Explain how natural
alleles, influences the expression of	Table.	actions such as weathering,
•		0
genetic traits.	Chr 2.4 Understand the relationship	erosion (wind, water and
Bio.3.2.3 Explain how the	Chm.2.1 Understand the relationship	gravity), and soil formation affect
environment can influence the	among pressure, temperature,	Earth's surface.
expression of genetic traits	volume, and phase.	EEn.2.1.4 Explain the probability
	Chm.2.1.1 Explain the	of and preparation for
Bio.3.3 Understand the application of	energetic nature of phase	geohazards such as landslides,
DNA technology.	changes.	avalanches, earthquakes and
Bio.3.3.3 Evaluate some of the	Chm.2.1.2 Explain heating and	volcanoes in a particular area
ethical issues surrounding the	cooling curves (heat of fusion,	based on available data.
use of DNA technology	heat of vaporization, heat,	
(including cloning, genetically	melting point, and boiling	EEn.2.2 Understand how human
modified organisms, stem cell	point).	influences impact the
research, and Human	Chm.2.1.4 Infer simple	Lithosphere.
Genome Project).	calorimetric calculations based	EEn.2.2.1 Explain the
	on the concepts of heat lost	consequences of human
Bio.3.4 Explain the theory of evolution	equals heat gained and	activities on the lithosphere
by natural selection as a mechanism	specific heat.	(such as mining, deforestation,
for how species change over time. Bio.	Chm.2.1.5 Explain the	agriculture, overgrazing,
Bio.3.4.1 Explain how fossil,	relationships between pressure,	urbanization, and land use)
biochemical, and anatomical	temperature, volume, and	past and present.
evidence support the theory of	quantity of gas both qualitative	EEn.2.2.2 Compare the various
		'



evolution. Bio.3.4.2 Explain how natural selection influences the changes in species over time. Bio.3.4.3 Explain how various disease agents (bacteria, viruses, chemicals) can influence natural selection.	and quantitative. Chm.2.2 Analyze chemical reactions in terms of quantities, product formation, and energy. Chm.2.2.2 Analyze the evidence of chemical change. Chm.3.1 Understand the factors affecting rate of reaction and chemical equilibrium. Chm.3.1.1 Explain the factors that affect the rate of a reaction (temperature, concentration, particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle).	 methods humans use to acquire traditional energy sources (such as peat, coal, oil, natural gas, nuclear fission, and wood). EEn.2.3 Explain the structure and processes within the hydrosphere. EEn.2.3.1 Explain how water is an energy agent (currents and heat transfer). EEn2.3.2 Explain how ground- water and surface water interact. EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environ-
	 (temperature, concentration, particle size and presence of a catalyst). Chm.3.1.2 Explain the conditions of a system at equilibrium. Chm.3.1.3 Infer the shift in equilibrium when a stress is applied to a chemical system (Le Chatelier's Principle). Chm.3.2 Understand solutions and the solution process. Chm.3.2.3 Infer the quantitative 	interact. EEn.2.4 Evaluate how humans use water. EEn.2.4.1 Evaluate human influences on freshwater availability. EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environ- ments. EEn.2.5 Understand the structure of
	nature of a solution (molarity, dilution, and titration with a 1:1 molar ratio). Chm.3.2.5 Interpret solubility diagrams. Chm.3.2.6 Explain the solution process.	and processes within our atmosphere. EEn.2.5.2 Explain the formation of typical air masses and the weather systems that result from air mass interactions. EEn.2.5.3 Explain how cyclonic storms form based on the interaction of air masses.



	EEn.2.5.4 Predict the weather using available weather maps and data (including surface, upper atmospheric winds, and satellite imagery). EEn.2.5.5 Explain how human activities affect air quality.
	 EEn.2.6 Analyze patterns of global climate change over time. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation). EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.).
	EEn.2.7 Explain how the lithosphere, hydrosphere, and Atmosphere individually and collectively affect the biosphere. EEn.2.7.1 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina. EEn.2.7.2 Explain why bio- diversity is important to the


			biosphere. EEn.2.7.3 Explain how human activities impact the biosphere. EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth. EEn.2.8.1 Evaluate alternative energy technologies for use in North Carolina. EEn.2.8.2 Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts. EEn.2.8.3 Explain the effects of uncontrolled population growth onthe Earth's resources. EEn.2.8.4 Evaluate the concept of "reduce, reuse, recycle" in terms of impact on natural resources.
Construct scientific arguments that: Establish and maintain an appropriate tone and stance (neutral/objective or biased/ subjective)	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mito- chondria, vacuoles, chloro- plasts, and ribosomes) and ways that these organelles interact with each other to	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that 	EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides.



 perform the function of the cell. Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. Bio.1.2 Analyze the cell as a living system. Bio.1.2.1 Explain how homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH). Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis. Bio.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on unicellular experience) 	occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.1 Compare (qualitatively) the relative strengths of ionic, covalent, and metallic bonds. Chm.1.2.2 Infer the type of bond and chemical formula formed between atoms. Chm.1.2.3 Compare inter- and intra-particle forces. Chm.1.2.5 Compare the properties of ionic, covalent, metallic, and network compound. Chm.1.3 Understand the physical and chemical properties of atoms based on their position in the Periodic Table. Chm.1.3.2 Infer the physical properties (atomic radius, metallic and nonmetallic characteristics) of an element based on its position on the Periodic Table. Chm.1.3.3 Infer the atomic size, reactivity, electronegativity, and ionization energy of an element from its position in the Periodic	 EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth. EEn.2.1 Explain how processes and forces affect the lithosphere. EEn.2.1.1 Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes impact the lithosphere. EEn.2.1.2 Predict the locations of volcanoes, earthquakes, and faults based on information contained in a variety of maps. EEn.2.1.3 Explain how natural actions such as weathering, erosion (wind, water and gravity), and soil formation affect Earth's surface. EEn.2.1.4 Explain the probability of and preparation for geohazards such as landslides, avalanches, earthquakes and volcanoes in a particular area based on available data.
environments (focus on unicellular organisms).	from its position in the Periodic Table.	
Bio.2.1 Analyze the interdependence of living organisms within their environments. Bio.2.1.1 Analyze the flow of	Chm.2.1 Understand the relationship among pressure, temperature, volume, and phase. Chm.2.1.1 Explain the	EEn.2.2 Understand how human influences impact the Lithosphere. EEn.2.2.1 Explain the consequences of human



energy and cycling of matter (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem. Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations. Bio.2.1.3 Explain various ways organisms interact with each other (including predation, competition, parasitism, mutualism) and with their	energetic nature of phase changes. Chm.2.1.2 Explain heating and cooling curves (heat of fusion, heat of vaporization, heat, melting point, and boiling point). Chm.2.1.4 Infer simple calorimetric calculations based on the concepts of heat lost equals heat gained and specific heat. Chm.2.1.5 Explain the relationships between pressure, temperature, volume, and quantity of gas both qualitative	 activities on the lithosphere (such as mining, deforestation, agriculture, overgrazing, urbanization, and land use) past and present. EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil, natural gas, nuclear fission, and wood). EEn.2.3 Explain the structure and processes within the hydrosphere. EEn.2.3.1 Explain how water is an energy agent (currents and
environments resulting in	and quantitative.	heat transfer).
stability within ecosystems. Bio.2.1.4 Explain why eco-	Chm.2.2 Analyze chemical reactions in	EEn2.3.2 Explain how ground- water and surface water
systems can be relatively stable	terms of quantities, product	interact.
over hundreds or thousands of	formation, and energy.	
years, even though populations	Chm.2.2.1 Explain the energy	EEn.2.4 Evaluate how humans use
may fluctuate (emphasizing availability of food, availability	content of a chemical reaction. Chm.2.2.2 Analyze the	water. EEn.2.4.1 Evaluate human
of shelter, number of predators	evidence of chemical change.	influences on freshwater
and disease).	Chm.2.2.3 Analyze the law of	availability.
Bio.2.2 Understand the impact of	conservation of matter and how it applies to various types of	EEn.2.4.2 Evaluate human influences on water quality in
human activities on the environment	chemical equations (synthesis,	North Carolina's river basins,
(one generation affects the next). Bio.2.2.1 Infer how human	decomposition, single replacement, double	wetlands and tidal environ- ments.
activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and	replacement, and combustion). Chm.2.2.4 Analyze the stoichiometric relationships inherent in a chemical reaction.	EEn.2.5 Understand the structure of and processes within our atmosphere. EEn.2.5.1 Summarize the



introduction of nonnative	Chm.2.2.5 Analyze	structure and composition of
species) may impact the	quantitatively the composition	our atmosphere.
environment.	of a substance (empirical	EEn.2.5.2 Explain the formation
Bio.2.2.2 Explain how the use,	formula, molecular formula,	of typical air masses and the
protection and conservation of	percent composition, and	weather systems that result
natural resources by humans	hydrates).	from air mass interactions.
impact the environment from		EEn.2.5.3 Explain how cyclonic
one generation to the next.	Chm.3.1 Understand the factors	storms form based on the
	affecting rate of reaction and chemical	interaction of air masses.
Bio.3.1 Explain how traits are	equilibrium.	EEn.2.5.4 Predict the weather
determined by the structure and	Chm.3.1.1 Explain the factors	using available weather maps
function of DNA.	that affect the rate of a reaction	and data (including surface,
Bio.3.1.1 Explain the double-	(temperature, concentration,	upper atmospheric winds, and
stranded, complementary	particle size and presence of a	satellite imagery).
nature of DNA as related to its	catalyst).	EEn.2.5.5 Explain how human
function in the cell.	Chm.3.1.2 Explain the	activities affect air quality.
Bio.3.1.2 Explain how DNA and	conditions of a system at	
RNA code for proteins and	equilibrium.	EEn.2.6 Analyze patterns of global
determine traits.	Chm.3.1.3 Infer the shift in	climate change over time.
Bio.3.1.3 Explain how	equilibrium when a stress is	EEn.2.6.1 Differentiate between
mutations in DNA that result	applied to a chemical system	weather and climate.
from interactions with the	(Le Chatelier's Principle).	EEn.2.6.2 Explain changes in
environment (i.e. radiation	(global climate due to natural
and chemicals) or new	Chm.3.2 Understand solutions and the	processes.
combinations in existing genes	solution process.	EEn.2.6.3 Analyze the impacts
lead to changes in function and	Chm.3.2.4 Summarize the	that human activities have on
phenotype.	properties of solutions.	global climate change (such as
p	Chm.3.2.6 Explain the solution	burning hydrocarbons, green-
Bio.3.2 Understand how the	process.	house effect, and deforest-
environment, and/or the interaction of	p.00000.	ation).
alleles, influences the expression of		EEn.2.6.4 Attribute changes in
genetic traits.		Earth systems to global climate
Bio.3.2.1 Explain the role of		change (temperature change,
meiosis in sexual reproduction		changes in pH of ocean, sea
and genetic variation.		level changes, etc.).











	Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions. Bio 4.2 Analyze the relationships between biochemical processes and energy use in the cell. Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).		
Construct scientific arguments that: Signal logical relationships among reasoning, evidence, data, and/or models when making and defending a claim, counterclaim, and/or rebuttal	 Bio.2.1 Analyze the interdependence of living organisms within their environments. Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease). Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next). Bio.2.2.1 Infer how human activities (including population 	 Chm.1.1 Analyze the structure of atoms and ions. Chm.1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model. Chm.1.1.4 Explain the process of radioactive decay by the use of nuclear equations and half-life. Chm.1.2 Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties. Chm.1.2.1 Compare (qualitatively) the relative strengths of ionic, covalent, and 	EEn.1.1 Explain the Earth's role as a body in space. EEn.1.1.1 Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy. EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides. EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation. EEn.1.1.4 Explain how incoming



	rowth, pollution, global varming, burning of fossil fuels,	metallic bonds. Chm.1.2.2 Infer the type of	solar energy makes life possible on Earth.
	nabitat destruction and	bond and chemical formula	
ir	ntroduction of nonnative	formed between atoms.	EEn.2.1 Explain how processes and
S	species) may impact the	Chm.1.2.3 Compare inter- and	forces affect the lithosphere.
e	environment.	intra-particle forces.	EEn.2.1.1 Explain how the rock
B	Bio.2.2.2 Explain how the use,	Chm.1.2.5 Compare the	cycle, plate tectonics,
р	protection and conservation of	properties of ionic, covalent,	volcanoes, and earthquakes
n	natural resources by humans	metallic, and network	impact the lithosphere.
ir	mpact the environment from	compound.	EEn.2.1.2 Predict the locations
0	one generation to the next.		of volcanoes, earthquakes, and
		Chm.1.3 Understand the physical and	faults based on information
Bio.3.2	Understand how the	chemical properties of atoms based on	contained in a variety of maps.
environm	nent, and/or the interaction of	their position in the Periodic Table.	EEn.2.1.3 Explain how natural
alleles, ir	nfluences the expression of	Chm.1.3.2 Infer the physical	actions such as weathering,
genetic t	traits.	properties (atomic radius,	erosion (wind, water and
B	Bio.3.2.3 Explain how the	metallic and nonmetallic	gravity), and soil formation affect
e	environment can influence the	characteristics) of an element	Earth's surface.
e	expression of genetic traits.	based on its position on the	EEn.2.1.4 Explain the probability
		Periodic Table.	of and preparation for
Bio.3.3	Understand the application of	Chm.1.3.3 Infer the atomic size,	geohazards such as landslides,
DNA tec	hnology.	reactivity, electronegativity, and	avalanches, earthquakes and
B	Bio.3.3.3 Evaluate some of the	ionization energy of an element	volcanoes in a particular area
e	ethical issues surrounding the	from its position in the Periodic	based on available data.
u	ise of DNA technology	Table.	
(i	including cloning, genetically		EEn.2.2 Understand how human
	nodified organisms, stem cell	Chm.2.1 Understand the relationship	influences impact the
re	esearch, and Human	among pressure, temperature,	Lithosphere.
	Genome Project).	volume, and phase.	EEn.2.2.1 Explain the
		Chm.2.1.1 Explain the	consequences of human
	Explain the theory of evolution	energetic nature of phase	activities on the lithosphere
	al selection as a mechanism	changes.	(such as mining, deforestation,
	species change over time.	Chm.2.1.2 Explain heating and	agriculture, overgrazing,
	Bio.3.4.1 Explain how fossil,	cooling curves (heat of fusion,	urbanization, and land use)
b	biochemical, and anatomical	heat of vaporization, heat,	past and present.



evidence support the theory of evolution. Bio.3.4.2 Explain how natural selection influences the changes in species over time. Bio.3.4.3 Explain how various disease agents (bacteria, viruses, chemicals) can influence natural selection.	melting point, and boiling point). Chm.2.1.4 Infer simple calorimetric calculations based on the concepts of heat lost equals heat gained and specific heat. Chm.2.1.5 Explain the relationships between pressure, temperature, volume, and quantity of gas both qualitative and quantitative.	 EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil, natural gas, nuclear fission, and wood). EEn.2.3 Explain the structure and processes within the hydrosphere. EEn.2.3.1 Explain how water is an energy agent (currents and heat transfer). EEn2.3.2 Explain how ground-
	Chm.2.2 Analyze chemical reactions in terms of quantities, product formation, and energy.	water and surface water interact.
	Chm.2.2.1 Explain the energy	EEn.2.4 Evaluate how humans use
	content of a chemical reaction.	water.
	Chm.2.2.2 Analyze the	EEn.2.4.1 Evaluate human
	evidence of chemical change.	influences on freshwater
	Chm.2.2.3 Analyze the law of	availability.
	conservation of matter and how	EEn.2.4.2 Evaluate human
	it applies to various types of	influences on water quality in
	chemical equations (synthesis,	North Carolina's river basins,
	decomposition, single replacement, double	wetlands and tidal environ-
	replacement, and combustion).	ments.
	Chm.2.2.4 Analyze the	EEn.2.5 Understand the structure of
	stoichiometric relationships	and processes within our atmosphere.
	inherent in a chemical reaction.	F
	Chm.2.2.5 Analyze	EEn.2.5.2 Explain the formation
	quantitatively the composition	of typical air masses and the
	of a substance (empirical	weather systems that result
	formula, molecular formula,	from air mass interactions.
	percent composition, and	EEn.2.5.3 Explain how cyclonic



hydrates). Chm.3.1 Understand the f affecting rate of reaction a equilibrium. Chm.3.1.1 Explain that affect the rate (temperature, cond particle size and pr catalyst). Chm.3.1.2 Explain conditions of a sys equilibrium. Chm.3.1.3 Infer the equilibrium when a applied to a chemin (Le Chatelier's Prir Chm.3.2 Understand solu solution process. Chm.3.2.6 Interpre diagrams. Chm.3.2.6 Explain process.	nd chemicalusing available weather maps and data (including surface, upper atmospheric winds, and satellite imagery). EEn.2.5.5 Explain how human activities affect air quality.the tem atEEn.2.6 Analyze patterns of global climate change over time. EEn.2.6.1 Differentiate between weather and climate. EEn.2.6.2 Explain changes in global climate due to natural processes. EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, green- house effect, and deforest-



			create the various biomes in North Carolina. EEn.2.7.2 Explain why bio- diversity is important to the biosphere. EEn.2.7.3 Explain how human activities impact the biosphere. EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth. EEn.2.8.1 Evaluate alternative energy technologies for use in North Carolina. EEn.2.8.2 Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts. EEn.2.8.3 Explain the effects of uncontrolled population growth on the Earth's resources. EEn.2.8.4 Evaluate the concept of "reduce, reuse, recycle" in terms of impact on natural resources.
ELD-SC.9-12.Argue. Expressive	Physical Science	Physics	
Construct scientific arguments that: Introduce and contextualize topic/ phenomenon in current scientific or historical episodes in science	 Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.3 Explain forces using Newton's three laws of motion. PSc.2.1 Understand types, properties, 	Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation.	



	and structure of matter. PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18.	 Phy.2.3 Analyze the nature of moving charges and electric circuits. Phy.2.3.1 Explain Ohm's law in relation to electric circuits. Phy.3.1 Explain charges and electrostatic systems. Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects. Phy.3.2 Explain the concept of magnetism. Phy.3.2.1 Explain the relationship between magnetic domains and magnetism. 	
Construct scientific arguments that: Defend or refute a claim based on data and evidence	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship between forces and motion. 	 Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations. Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration. Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration. 	



PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion.	Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations. Phy.1.2.2 Analyze systems of forces in one dimension and two dimensions using free body	
PSc.2.1 Understand types, properties, and structure of matter.	diagrams. Phy.1.2.3 Explain forces using	
PSc.2.1.1 Classify matter as:	Newton's laws of motion as well	
homogeneous or hetero-	as the universal law of	
geneous; pure substance or mixture; element or compound;	gravitation. Phy.1.2.4 Explain the effects of	
metals, nonmetals or	forces (including weight,	
metalloids; solution, colloid or	normal, tension and friction) on	
suspension.	objects.	
PSc.2.1.2 Explain the phases of matter and the physical	Phy.1.2.5 Analyze basic forces related to rotation in a circular	
changes that matter under- goes.	path (centripetal force).	
PSc.2.1.3 Compare physical	Phy.1.3 Analyze the motion of objects	
and chemical properties of	based on the principles of conservation	
various types of matter. PSc.2.1.4 Interpret data	of momentum, conservation of energy and Impulse.	
presented in Bohr model	Phy.1.3.1 Analyze the motion of	
diagrams and dot diagrams for	objects involved in completely	
atoms and ions of elements 1 through 18.	elastic and completely inelastic collisions by using the principles of conservation of	
PSc.2.2 Understand chemical bonding and chemical interactions. PSc.2.2.1 Infer valence	momentum and conservation of energy. Phy.1.3.2 Analyze the motion of	
	, , , , , , , , , , , , , , , , , , ,	



electrons, oxidation number,	objects based on the	
and reactivity of an element	relationship between	
based on its location in the	momentum and impulse.	
Periodic Table.		
PSc.2.2.2 Infer the type of	Phy.2.1 Understand the concepts of	
chemical bond that occurs,	work, energy, and power, as well as	
whether covalent, ionic or	the relationship among them.	
metallic, in a given substance.	Phy.2.1.1 Interpret data on	
PSc.2.2.3 Predict chemical	work and energy presented	
formulas and names for simple	graphically and numerically.	
compounds based on	Phy.2.1.2 Compare the	
knowledge of bond formation	concepts of potential and	
and naming conventions.	kinetic energy and conservation	
PSc.2.2.6 Summarize the	of total mechanical energy in	
characteristics and interactions	the description of the motion of	
of acids and bases.	objects.	
	Phy.2.1.3 Explain the	
PSc.2.3 Understand the role of the	relationship among work, power	
nucleus in radiation and radioactivity.	and energy.	
PSc.2.3.1 Compare nuclear	and chergy.	
reactions including alpha	Phy.2.2 Analyze the behavior of	
decay, beta decay and gamma	waves.	
decay; nuclear fusion and	Phy.2.2.1 Analyze how energy	
nuclear fission.	is transmitted through waves,	
PSc.2.3.2 Exemplify the	using The fundamental	
radioactive decay of unstable	characteristics of waves:	
nuclei using the concept of	wavelength, period, frequency,	
half-life.	amplitude, and wave	
nan-me.	Velocity.	
PSc.3.1 Understand the types of	Phy.2.2.2 Analyze wave	
energy,conservation of energy and	behaviors in terms of	
energy transfer.	transmission, reflection,	
PSc.3.1.1 Explain thermal	refraction and interference.	
energy and its transfer.	Phy.2.2.3 Compare mechanical	
PSc.3.1.2 Explain the law of	and electromagnetic waves in	



conservation of energy in a		
	terms of wave characteristics	
mechanical system in terms of	and behavior (specifically	
kinetic energy, potential energy	sound and light).	
and heat. PSc.3.1.3 Explain work in terms	Bby 2.2 Applying the potyre of maying	
of the relationship among the	charges and electric circuits.	
applied force to an object, the	Phy.2.3.1 Explain Ohm's law in relation to electric circuits.	
resulting displacement of the		
object and the energy trans-	Phy.2.3.3 Compare the general	
ferred to an object.	characteristics of AC and DC	
PSc.3.1.4 Explain the relation-	systems without calculations.	
ship among work, power and	Phy.2.3.4 Analyze electric	
simple machines both quali-	systems in terms of their	
tatively and quantitatively.	energy and power.	
DCe 2.0 Indepetend the network of	Phy.2.3.5 Analyze systems with	
PSc.3.2 Understand the nature of	multiple potential differences	
Waves.	and resistors connected in	
PSc.3.2.1 Explain the	series and parallel circuits, both	
relationships among wave	conceptually and mathema-	
frequency, wave period, wave	tically, in terms of voltage,	
velocity and wavelength	current and resistance.	
through calculation and	Dhu 2.4 Evalain abarras and	
investigation.	Phy.3.1 Explain charges and	
PSc.3.2.2 Compare waves	electrostatic systems.	
(mechanical, electromagnetic,	Phy.3.1.4 Explain the	
and surface) using their	mechanisms for producing	
characteristics.	electrostatic charges, in-	
PSc.3.2.3 Classify waves as	cluding charging by friction,	
transverse or compressional	conduction, and induction.	
(longitudinal).	Phy.3.1.5 Explain how	
	differences in electrostatic	
PSc.3.3 Understand electricity and	potentials relate to the potential	
magnetism and their relationship.	energy of charged objects.	
PSc.3.3.1 Summarize static		
and current electricity.	Phy.3.2 Explain the concept of	



	PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law. PSc.3.3.3 Explain how current is affected by changes in composition, length, temp- erature, and diameter of wire. PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields. PSc.3.3.5 Explain the practical applications of magnetism.	Magnetism. Phy.3.2.1 Explain the relationship between magnetic domains and Magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic Fields. Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism.	
Construct scientific arguments that: Establish and maintain an appropriate tone and stance (neutral/objective or biased/ subjective)	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. 	 Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations. Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration. Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration. Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations. Phy.1.2.2 Analyze systems of 	



 Newton's three laws of motion. PSc.2.1 Understand types, properties, and structure of matter. PSc.2.1.1 Classify matter as: homogeneous or hetero-geneous; pure substance or mixture; element or compound; metals, nonmetals or metalloids; solution, colloid or Suspension. PSc.2.1.2 Explain the phases of matter and the physical changes that matter undergoes. PSc.2.1.3 Compare physical and chemical properties of various types of matter. PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18. PSc.2.2 Understand chemical bonding and chemical interactions. PSc.2.2.1 Infer valence electrons, oxidation number, and reactivity of an element based on its location in the Periodic Table. PSc.2.2.2 Infer the type of chemical bond that occurs, whether excepted is provident of the type of chemical bond that occurs, whether excepted is provident of the type of chemical bond that occurs, whether excepted is provident of the type of chemical bond that occurs, whether excepted is provident is provident of the type of chemical bond that occurs, whether excepted is provident is provident of the type of chemical bond that occurs, whether excepted is provident is provident of the provident is provident of the provident of the provident of the provident is provident of the provident is provident of the provident is provident of the provident of the provident is provident of the provident of the provident is provident of the p	 forces in one dimension and two dimensions using free body diagrams. Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation. Phy.1.2.4 Explain the effects of forces (including weight, normal, tension and friction) on objects. Phy.1.2.5 Analyze basic forces related to rotation in a circular path (centripetal force). Phy.1.3 Analyze the motion of objects based on the principles of conservation of momentum, conservation of energy and Impulse. Phy.1.3.1 Analyze the motion of objects involved in completely elastic and completely inelastic collisions by using the principles of conservation of momentum and conservation of energy. Phy.1.3.2 Analyze the motion of objects based on the principles of conservation of momentum and conservation of momentum and conservation of momentum and impulse. Phy.2.1 Understand the concepts of work, energy, and power, as well as the principles of conservation of work, energy, and power, as well as the principles of conservation of work.
whether covalent, ionic or metallic, in a given substance.	the relationship among them. Phy.2.1.1 Interpret data on



PSc.2.2.3 Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions. PSc.2.2.4 Exemplify the law of conservation of mass by balancing chemical equations. PSc.2.2.6 Summarize the characteristics and interactions of acids and bases.	work and energy presented graphically and numerically. Phy.2.1.2 Compare the concepts of potential and kinetic energy and conservation of total mechanical energy in the description of the motion of objects. Phy.2.1.3 Explain the relationship among work, power and energy.
 PSc.2.3 Understand the role of the nucleus in radiation and radioactivity. PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission. PSc.2.3.2 Exemplify the radioactive decay of unstable nuclei using the concept of half-life. 	Phy.2.2 Analyze the behavior of waves. Phy.2.2.1 Analyze how energy is transmitted through waves, using The fundamental characteristics of waves: wavelength, period, frequency, amplitude, and wave Velocity. Phy.2.2.2 Analyze wave behaviors in terms of transmission, reflection, refraction and interference.
PSc.3.1 Understand the types of energy,conservation of energy and energy transfer. PSc.3.1.1 Explain thermal energy and its transfer. PSc.3.1.2 Explain the law of	Phy.2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics and behavior (specifically sound and light).
conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat. PSc.3.1.3 Explain work in terms	Phy.2.3 Analyze the nature of moving charges and electric circuits. Phy.2.3.1 Explain Ohm's law in relation to electric circuits. Phy.2.3.3 Compare the general





characteristics of AC and DC systems without calculations. Phy.2.3.4 Analyze electric systems in terms of their energy and power. Phy.2.3.5 Analyze systems with multiple potential differences and resistors connected in series and parallel circuits, both conceptually and mathematically, in terms of voltage, current and resistance.

Phy.3.1 Explain charges and electrostatic systems.

Phy.3.1.4 Explain the mechanisms for producing electrostatic charges, including charging by friction, conduction, and induction. Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects.

Phy.3.2 Explain the concept of

Phy.3.2.1 Explain the relationship between magnetic domains and magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic fields. Phy.3.2.3 Explain how transformers and power



	composition, length, temp- erature, and diameter of wire. PSc.3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields. PSc.3.3.5 Explain the practical applications of magnetism.	distributions are applications of electromagnetism.	
Construct scientific arguments that: Signal logical relationships among reasoning, evidence, data, and/or models when making and defending a claim, counterclaim, and/or rebuttal	 PSc.1.1 Understand motion in terms of speed, velocity, acceleration and momentum. PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement. PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities. Psc.1.2 Understand the relationship between forces and motion. PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in freefall. PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid. PSc.1.2.3 Explain forces using Newton's three laws of motion. 	 Phy.1.1 Analyze the motion of objects. Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations. Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration. Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration. Phy.1.2 Analyze systems of forces and their interaction with matter. Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations. Phy.1.2.2 Analyze systems of forces in one dimension and two dimensions using free body diagrams. Phy.1.2.3 Explain forces using Newton's laws of motion as well 	



 homogeneous or hetero- geneous; pure substance or mixture; element or compound; metals, nonmetals or metalloids; solution, colloid or Suspension. PSc.2.1.2 Explain the phases of matter and the physical changes that matter under- goes. PSc.2.1.3 Compare physical and chemical properties of various types of matter. PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18. 	as the u gravitation Phy.1.2. forces (i normal, objects. Phy.1.2. related t path (ce Phy.1.3 Analyze based on the pr of momentum, of and Impulse. Phy.1.3. objects i elastic a collision
PSc.2.2 Understand chemical bonding and chemical interactions. PSc.2.2.1 Infer valence electrons, oxidation number, and reactivity of an element based on its location in the Periodic Table. PSc.2.2.2 Infer the type of chemical bond that occurs, whether covalent, ionic or metallic, in a given substance.	principle moment energy. Phy.1.3. objects b relations moment Phy.2.1 Unders work, energy, an the relationship Phy.2.1.
Figure 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	concepts kinetic e of total n the desc objects.

as the universal law of gravitation. Phy.1.2.4 Explain the effects of forces (including weight, normal, tension and friction) on objects. Phy.1.2.5 Analyze basic forces related to rotation in a circular path (centripetal force).

Phy.1.3 Analyze the motion of objects based on the principles of conservation of momentum, conservation of energy and Impulse.

Phy.1.3.1 Analyze the motion of objects involved in completely elastic and completely inelastic collisions by using the principles of conservation of momentum and conservation of energy.

Phy.1.3.2 Analyze the motion of objects based on the relationship between momentum and impulse.

Phy.2.1 Understand the concepts of work, energy, and power, as well as the relationship among them.

Phy.2.1.2 Compare the concepts of potential and kinetic energy and conservation of total mechanical energy in the description of the motion of objects.



PSc.2.2.4 Exemplify the law of conservation of mass by balancing chemical equations. PSc.2.2.6 Summarize the characteristics and interactions of acids and bases.	 Phy.2.1.3 Explain the relationship among work, power and energy. Phy.2.2 Analyze the behavior of waves.
PSc.2.3 Understand the role of the nucleus in radiation and radioactivity. PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission. PSc.2.3.2 Exemplify the radioactive decay of unstable nuclei using the concept of half-life.	Phy.2.2.1 Analyze how energy is transmitted through waves, using the fundamental characteristics of waves: wavelength, period, frequency, amplitude, and wave velocity. Phy.2.2.2 Analyze wave behaviors in terms of transmission, reflection, refraction and interference. Phy.2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics
PSc.3.1 Understand the types of energy,conservation of energy and energy transfer	and behavior (specifically sound and light).
PSc.3.1.1 Explain thermal energy and its transfer. PSc.3.1.2 Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat. PSc.3.1.3 Explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object and the energy trans- ferred to an object.	Phy.2.3 Analyze the nature of moving charges and electric circuits. Phy.2.3.1 Explain Ohm's law in relation to electric circuits. Phy.2.3.3 Compare the general characteristics of AC and DC systems without calculations. Phy.2.3.4 Analyze electric systems in terms of their energy and power. Phy.2.3.5 Analyze systems with multiple potential differences and resistors connected in
	 conservation of mass by balancing chemical equations. PSc.2.2.6 Summarize the characteristics and interactions of acids and bases. PSc.2.3 Understand the role of the nucleus in radiation and radioactivity. PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission. PSc.2.3.2 Exemplify the radioactive decay of unstable nuclei using the concept of half-life. PSc.3.1 Understand the types of energy,conservation of energy and energy transfer. PSc.3.1.1 Explain thermal energy and its transfer. PSc.3.1.2 Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat. PSc.3.1.3 Explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object and the energy trans-





series and parallel circuits, both conceptually and mathematically, in terms of voltage, current and resistance.

Phy.3.1 Explain charges and electrostatic systems.

Phy.3.1.4 Explain the mechanisms for producing electrostatic charges, including charging by friction, conduction, and induction. Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects.

Phy.3.2 Explain the concept of magnetism.

Phy.3.2.1 Explain the relationship between magnetic domains and magnetism. Phy.3.2.2 Explain how electric currents produce various magnetic fields. Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism.





Works Cited

WIDA. WIDA English Language Development Standards Framework, 2020 Edition: Kindergarten–Grade 12. Board of Regents of the University of Wisconsin System, 2020.

