Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

This document serves as a resource for both teachers and students as they prepare for the New Jersey State Learning Assessment in Science. This resource provides both teachers and students with "test prep" storylines, standards-based questions and links to practice exams. This resource is meant for Grades 5, 8 and 11 teachers to facilitate students' review of material for the state assessment; teachers should work hand-in-hand with students as they prepare for this important assessment.

K-Grade 5 Information and Resources

Kindergarten students are able to:

- apply an understanding of the effects of different strengths or different directions of **pushes and pulls** on the motion of an object to **analyze a design solution**.
- Students develop understandings of what plants and animals (including humans) **need to survive** and the relationship between their **needs and where they live.**
- Students develop understandings of patterns and variations in local weather and the **purpose of weather forecasting** to prepare for, and respond to, severe weather.
- The *crosscutting concepts* of patterns; cause and effect; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.
- Students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understandings.

Students in Kindergarten formulate answers to questions such as:

1. What happens if you push or pull an object harder?
2. Where do animals live and why do they live there?
3. What is the weather like today and how is it different from yesterday?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

First Grade students are able to:

- Students develop an understanding of the **relationship between sound and vibrating** materials as well as between the availability of **light and ability to see** objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light.
- Students also develop understandings of how plants and animals use their external **parts to help them survive, grow, and meet their needs** as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents.
- Students also observe, describe, and predict some **patterns of the movement** of objects in the sky.
- The *crosscutting concepts* of patterns; cause and effect; structure and function; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. First grade students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understandings.

Students in First Grade formulate answers to questions such as:

1. What happens when materials vibrate?
2. What happens when there is no light?
3. What are some ways plants and animals meet their needs so that they can survive and grow?
4. How are parents and their children similar and different?
5. What objects are in the sky and how do they seem to move?

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Second Grade students are able to:

- Students apply their understanding of the idea that wind and water **can change the shape of the land** to compare design solutions to slow or **prevent such change**.
- Students use information and models to identify and represent the **shapes and kinds of land and bodies of water** in an area and where water is found on Earth. An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials.
- Students develop an understanding of what **plants need to grow** and how **plants depend on animals** for seed dispersal and pollination.
- Students also expected to compare the **diversity of life** in different habitats.
- The *crosscutting concepts* of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understandings.

Students in Second grade formulate answers to questions such as:

1. How does land change and what are some things that cause it to change?
2. What are the different kinds of land and bodies of water?
3. How are materials similar and different from one another, and how do the properties of the materials relate to their use?
4. What do plants need to grow?
5. How many types of living things live in a place?

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Third Grade students are able to:

- Students organize and use data to describe **typical weather conditions** expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about **the merit of a design solution** that reduces the impacts of such hazards.
- Students develop an understanding of the similarities and differences of **organisms' life cycles.** An understanding that organisms have **different inherited traits**, and that the **environment can also affect the traits** that an organism develops, is acquired by students at this level. In addition, students are able to **construct an explanation** using evidence for how **the variations in characteristics** among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
- Third graders develop an understanding of the idea that **when the environment changes** some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.
- Students are expected to develop an understanding of types of **organisms that lived long ago** and also about the nature of their environments.
- Students determine the effects of **balanced and unbalanced forces** on the motion of an object and the cause and effect relationships of **electric or magnetic interactions** between two objects not in contact with each other. They apply their understanding of magnetic interactions to **define a simple design problem** that can be solved with magnets.
- The *crosscutting concepts* of patterns; cause and effect; scale, proportion, and quantity; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understandings.

Students in Third grade formulate answers to questions such as:

1. "What is typical weather in different parts of the world and during different times of the year?
2. How can the impact of weather-related hazards be reduced?

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3. How do organisms vary in their traits? How are plants, animals, and environments of the past similar or different from current plants, animals, and environments?
4. What happens to organisms when their environment changes?
5. How do equal and unequal forces on an object affect the object?
6. How can magnets be used?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

Fourth Grade students are able to:

- Students use a model of waves to **describe patterns of waves** in terms of amplitude and wavelength, and that waves can cause objects to move.
- Students develop understanding of the **effects of weathering** or the rate of erosion by water, ice, wind, or vegetation. They apply their knowledge of natural Earth processes to generate and compare **multiple solutions** to reduce the impacts of such processes on humans.
- Fourth graders develop an understanding that plants and animals have internal and external structures that function to **support survival, growth, behavior, and reproduction.**
- Students use evidence to construct an explanation of the **relationship** between the **speed** of an object and the **energy** of that object.
- Students develop an understanding that **energy can be transferred** from place to place by sound, light, heat, and electric currents or from object to object through collisions. They apply their understanding of energy to **design, test, and refine a device** that converts energy from one form to another. In order to describe patterns of Earth's features, students analyze and interpret data from maps. By **developing a model**, they describe that an object can be seen when light reflected from its surface enters the eye.
- The *crosscutting concepts* of patterns; cause and effect; energy and matter; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

Students in Fourth grade formulate answers to questions such as:

1. What are waves and what are some things they can do?
2. How can water, ice, wind and vegetation change the land?
3. What patterns of Earth's features can be determined with the use of maps?
4. How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals?
5. What is energy and how is it related to motion?
6. How is energy transferred?
7. How can energy be used to solve a problem?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

Fifth Grade students are able to:

- Students describe that **matter is made of particles** too small to be seen through the development of a model. Students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved.
- Students determine whether the mixing of two or more substances results in new **substances**. Through the **development of a model** using an example, students are able to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. They describe and graph data to provide evidence about the distribution of water on Earth.
- Students develop an understanding of the idea that **plants** get the materials they need for growth chiefly from **air and water**. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment and that energy in animals' food was once energy from the sun.
- Students develop an understanding of **patterns of daily changes** in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
- The *crosscutting concepts* of patterns; cause and effect; scale, proportion, and quantity; energy and matter; and systems and systems models are called out as organizing concepts for these disciplinary core ideas. In the Fifth grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, engaging in argument from evidence, and obtaining, evaluating, and communicating information; and to use these practices to demonstrate understandings.

Fifth grade students formulate answers to questions such as:

1. When matter changes, does its weight change?
2. How much water can be found in different places on Earth?
3. Can new substances be created by combining other substances?
4. How does matter cycle through ecosystems?
5. Where does the energy in food come from and what is it used for?
6. How do lengths and directions of shadows or relative lengths of day and night change from day to day, and how does the appearance of some stars change in different seasons?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

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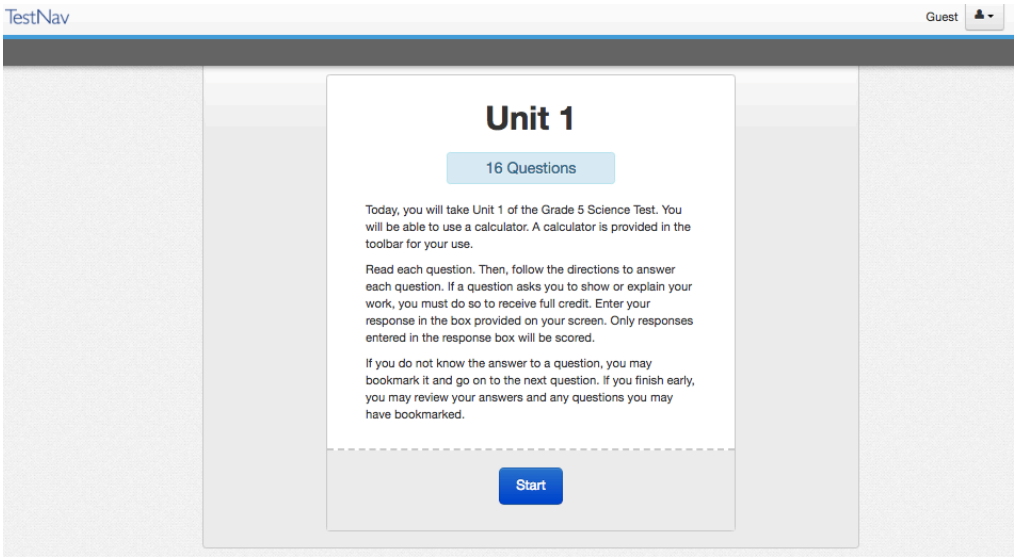

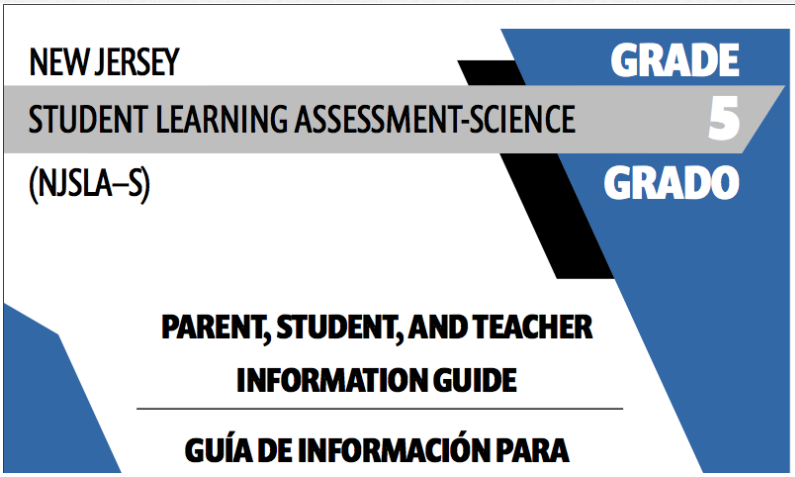

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Grade 6-8 Information and Resources

With respect to **Earth and Space Science ("Earth's Place in the Universe")**, Middle School science students are able to:

- Students use a systems approach, **using models of the solar system** to explain astronomical and other observations of the cyclic patterns of eclipses, tides, and seasons.
- Students connect to engineering through the instruments and technologies used to explore the objects in our solar system and obtain the data that support the theories that explain the **formation and evolution of the universe**.
- Students examine geoscience data in order to understand the processes and events in **Earth's history.**
- The *crosscutting concepts* of patterns, scale, proportion, and quantity, and systems and systems modeling are called out as organizing concepts for these disciplinary core ideas.
- Students demonstrate proficiency in developing and using models, analyzing data, and constructing explanations and designing solutions; and to use these practices to demonstrate understanding of the core ideas.

Middle School science students formulate an answer to questions such as:

1. What is Earth's place in the Universe?
2. What makes up our solar system and how can the motion of Earth explain seasons and eclipses?
3. How do people figure out that the Earth and life on Earth have changed through time?"

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Earth and Space Science ("Earth's Systems")**, Middle School science students are able to:

- Students make sense of how **Earth's geosystems** operate by modeling the flow of energy and cycling of matter within and among different systems.
- Students investigate the **controlling properties** of important materials and construct explanations based on the analysis of real geoscience data.
- Students model the ways that geoscience processes provide resources needed by society but also cause **natural hazards** that present risks to society; both involve technological challenges, for the identification and development of resources.
- Students develop understanding of the factors that control **weather**. A systems approach is also important here, examining the feedbacks between systems as energy from the sun is transferred between systems and circulates though the ocean and atmosphere.
- The *crosscutting concepts* of patterns, cause and effect, scale proportion and quantity, systems and system models, energy and matter, and stability and change are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, and constructing explanations; and to use these practices to demonstrate understanding of the core ideas.

Middle School science students formulate an answer to questions such as:

1. How do the materials in and on Earth's crust change over time?
2. How does the movement of tectonic plates impact the surface of Earth?
3. How does water influence weather, circulate in the oceans, and shape Earth's surface?
4. What factors interact and influence weather?
5. How have living organisms changed the Earth and how have Earth's changing conditions impacted living organisms?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Earth and Space Science ("Earth and Human Activity")**, Sixth Grade students are able to:

- Students understand the ways that **human activities** impact Earth's other systems.
- Students use many different practices to understand the significant and complex issues surrounding **human uses** of land, energy, mineral, and water **resources** and the resulting impacts of their development.
- The *crosscutting concepts* of patterns, cause and effect, and stability and change are called out as organizing concepts for these disciplinary core ideas. Students demonstrate proficiency in asking questions, developing and using models, analyzing and interpreting data, constructing explanations and designing solutions and engaging in argument; and to use these practices to demonstrate understanding of the core ideas.

Middle School Science students formulate an answer to questions such as:

1. How is the availability of needed natural resources related to naturally occurring processes?
2. How can natural hazards be predicted?
3. How do human activities affect Earth systems?
4. How do we know our global climate is changing?"

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("From Molecules to Organisms: Structures and Practices")**, Sixth Grade students are able to:

- Students gather information and use this information to support explanations of the structure and function relationship of **cells**.
- They can communicate understanding of **cell theory**.
- They have a basic understanding of the role of cells in **body systems** and how those systems work to support the life functions of the organism. The understanding of cells provides a context for the plant process of **photosynthesis** and the movement of matter and energy needed for the cell.
- Students can construct an explanation for how environmental and genetic factors affect **growth of organisms**. They can connect this to the role of animal behaviors in reproduction of animals as well as the dependence of some plants on animal behaviors for their reproduction.
- *Crosscutting concepts* of cause and effect, structure and function, and matter and energy are called out as organizing concepts for the core ideas about processes of living organisms.

Middle School science students formulate an answer to the question:

1 How can one explain the ways cells contribute to the function of living organisms?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Interactions, Energy and Dynamics: Relationships in Ecosystems")**, Middle School science students are able to:

- Students analyze and interpret data, develop models, and construct arguments and demonstrate a deeper understanding of resources and the **cycling of matter** and the flow of energy in ecosystems.
- They also study patterns of the **interactions** among organisms within an **ecosystem**.
- They consider **biotic and abiotic factors** in an ecosystem and the effects these factors have on population.
- They evaluate competing design solutions for maintaining **biodiversity** and ecosystem services.

Middle School science students formulate an answer to the question:

1. How does a system of living and non-living things operate to meet the needs of the organisms in an ecosystem?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Heredity: Inheritance and Variations of Traits")**, Middle School science students are able to:

- Students use models to describe ways gene mutations and sexual reproduction contribute to **genetic variation**.
- *Crosscutting concepts* of cause and effect and structure and function provide students with a deeper understanding of how gene structure determines differences in the functioning of organisms.

Middle School science students formulate an answer to the question:

1. How do living organisms pass traits from one generation to the next?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Biological Evolution: Unity and Diversity")**, Middle School science students are able to:

- Students construct explanations based on evidence to support fundamental understandings of **natural selection and evolution**.
- They use ideas of **genetic variation** in a population to make sense of organisms surviving and reproducing, hence passing on the **traits** of the species.
- They use **fossil records** and anatomical similarities of the relationships among organisms and species to support their understanding.
- *Crosscutting concepts* of patterns and structure and function contribute to the evidence students can use to describe biological evolution.

Middle School science students formulate an answer to the question:

1. How do organisms change over time in response to changes in the environment?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Matter and its Interactions")**, Middle School science students are able to:

- Matter and its Interactions is broken down into two sub-ideas: the structure and **properties of matter**, **and chemical reactions**.
- will be able to apply understanding that pure substances have characteristic **physical and chemical properties** and are made from a single type of atom or molecule.
- They will be able to provide molecular level accounts to explain **states of matters** and changes between states that chemical reactions involve regrouping of atoms to form new substances, and that atoms rearrange during chemical reactions.
- Students are also able to apply an understanding of the design and the process of optimization in **engineering to chemical reaction systems**.
- The *crosscutting concepts* of patterns; cause and effect; scale, proportion and quantity; energy and matter; structure and function; interdependence of science, engineering, and technology; and influence of science, engineering and technology on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, analyzing and interpreting data, designing solutions, and obtaining, evaluating, and communicating information. Students use these scientific and engineering practices to demonstrate understandings.

Middle School science students formulate an answer to the question:

1. How do atomic and molecular interactions explain the properties of matter that we see and feel? (By building understanding of what occurs at the atomic and molecular scale.)

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Motion and Stability: Forces and Interactions")**, Middle School science students are able to:

- By the end of middle school, students will be able to apply **Newton's Third Law** of Motion to relate forces to explain the motion of objects.
- Students also apply ideas about gravitational, electrical, and magnetic **forces** to explain a variety of phenomena including beginning ideas about why some materials attract each other while others repel. In particular, students will develop understanding that **gravitational interactions** are always attractive but that electrical and magnetic forces can be both attractive and negative.
- Students develop ideas that objects can exert **forces** on each other even though the objects are not in contact, through **fields**.
- Students apply an engineering practice and concept to **solve a problem** caused when **objects collide**.
- The *crosscutting concepts* of cause and effect; system and system models; stability and change; and the influence of science, engineering, and technology on society and the natural world serve as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in asking questions, planning and carrying out investigations, and designing solutions, and engaging in argument; and to use these practices to demonstrate understandings.

Middle School science students formulate an answer to the questions:

1. How can one describe physical interactions between objects and within systems of objects? (The focus is on helping students understand ideas related to why some objects will keep moving, why objects fall to the ground and why some materials are attracted to each other while others are not. Motion and Stability: Forces and Interactions is broken down into two sub-ideas: Forces and Motion and Types of interactions.)

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Energy")**, Middle School science students are able to:

- Students develop their understanding of important qualitative ideas about **energy** including that the **interactions** of objects can be explained and predicted using the concept of transfer of energy from one object or system of objects to another, and the total change of energy in any system is always equal to the total energy transferred into or out of the system.
- Students understand that objects that are moving have **kinetic energy** and that objects may also contain stored **(potential) energy**, depending on their relative positions.
- Students will also come to know the difference between **energy and temperature**, and begin to develop an understanding of the relationship between force and energy.
- Students are also able to apply an understanding of design to the process of **energy transfer.**
- The *crosscutting concepts* of scale, proportion, and quantity; systems and system models; and energy are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, planning investigations, analyzing and interpreting data, and designing solutions, and engaging in argument from evidence; and to use these practices to demonstrate understandings.

Middle School Science students formulate an answer to the question:

1. How can energy be transferred from one object or system to another? (Energy is broken down into four sub-core ideas: Definitions of Energy, Conservation of Energy and Energy Transfer, the Relationship between Energy and Forces, and Energy in Chemical Process and Everyday Life.)

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Waves and Their Applications in Technologies for Information Transfer")**, Middle School Science students are able to:

- Students are able to describe and predict characteristic properties and behaviors of **waves** when the waves **interact with matter**.
- Students can apply an understanding of waves as a means to send **digital information**.
- The *crosscutting concepts* of patterns and structure and function are used as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, using mathematical thinking, and obtaining, evaluating and communicating information; and to use these practices to demonstrate understandings.

Middle School Science students formulate an answer to the question:

1. What are the characteristic properties of waves and how can they be used? (Waves and Their Applications in Technologies for Information Transfer is broken down into Wave Properties, Electromagnetic Radiation, and Information Technologies and Instrumentation.)

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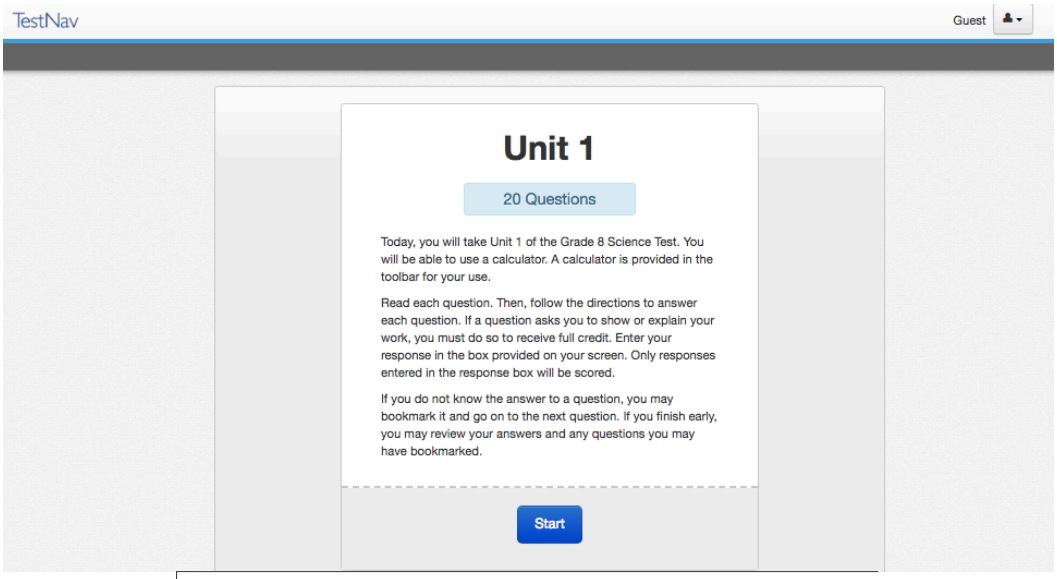

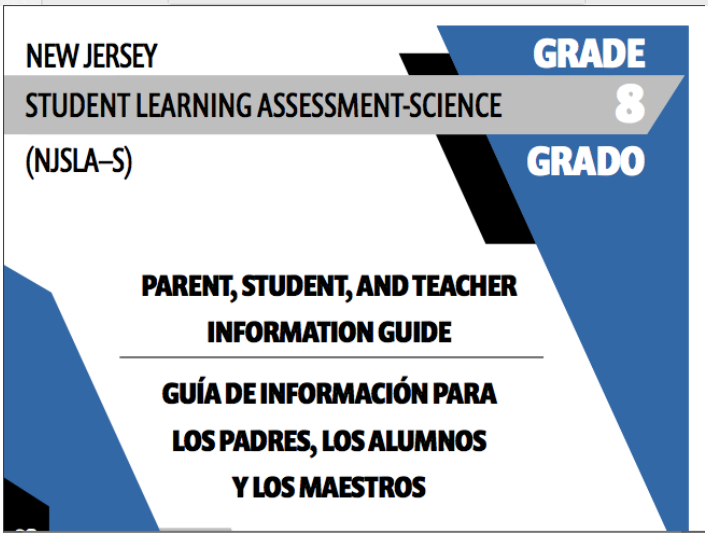

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Grade 9-11 Information and Resources

With respect to **Earth and Space Science ("Earth's Place in the Universe")**, High School science students are able to:

- examine the processes governing the formation, evolution, and workings of the **solar system and universe**. Some concepts studied are fundamental to science, such as understanding how the matter of our world formed during the Big Bang and within the cores of stars.
- Other concepts are practical, such as understanding how short-term changes in the behavior of our **sun** directly affect humans. Engineering and technology play a large role here in obtaining and analyzing the data that support the theories of the **formation of the solar system and universe.**
- The *crosscutting concepts* of patterns, scale, proportion, and quantity, energy and matter, and stability and change are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, using mathematical and computational thinking, constructing explanations and designing solutions, engaging in argument, and obtaining, evaluating and communicating information; and to use these practices to demonstrate understanding of the core ideas.

High School Science students formulate an answer to the question:

1. What is the universe, and what is Earth's place in it?

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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Earth and Space Science ("Earth's Systems")**, High School science students are able to:

- Students develop models and explanations for the ways that **feedbacks** between **different Earth systems** control the appearance of Earth's surface. Central to this is the tension between internal systems, which are largely responsible for creating land at Earth's surface, and the sun-driven surface systems that tear down the land through weathering and erosion.
- Students begin to examine the ways that **human activities** cause feedbacks that create changes to other systems.
- Students understand the system interactions that control **weather and climate**, with a major emphasis on the mechanisms and implications of climate change.
- Students model the flow of energy between different components of the weather system and how this affects **chemical cycles** such as the carbon cycle.
- The *crosscutting concepts* of cause and effect, energy and matter, structure and function and stability and change are called out as organizing concepts for these disciplinary core ideas. In the ESS2 performance expectations, students are expected to demonstrate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, and engaging in argument; and to use these practices to demonstrate understanding of the core ideas.

High School Science students formulate an answer to the question:

1. How and why is Earth constantly changing?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Earth and Space Science ("Earth and Human Activity")**, High School science students are able to:

- Students understand the complex and significant **interdependencies** between humans and the rest of **Earth's systems** through the impacts of natural hazards, our dependencies on natural resources, and the significant environmental impacts of human activities. Engineering and technology figure prominently here, as students use mathematical thinking and the analysis of geoscience data to examine and construct solutions to the many challenges facing long-term human sustainability on Earth.
- The *crosscutting concepts* of cause and effect, systems and system models, and stability and change are called out as organizing concepts for these disciplinary core ideas. In the ESS3 performance expectations, students are expected to demonstrate proficiency in developing and using analyzing and interpreting data, mathematical and computational thinking, constructing explanations and designing solutions and engaging in argument; and to use these practices to demonstrate understanding of the core ideas.

High School Science students formulate an answer to the question:

1. How do Earth's surface processes and human activities affect each other?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Molecules to Organism: Structures and Processes")**, High School science students are able to:

- demonstrate that they can use investigations and gather evidence to support explanations of **cell function and reproduction**.
- They understand the role of proteins as essential to the work of the cell and **living systems.**
- Students can use models to explain **photosynthesis**, **respiration**, and the **cycling** of matter and flow of energy in living organisms. The cellular processes can be used as a model for understanding of the hierarchical organization of organism.
- *Crosscutting concepts* of matter and energy, structure and function, and systems and system models provide students with insights to the structures and processes of organisms.

High School Science students formulate an answer to the question:

1. How do organisms live and grow?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Ecosystems: Interactions, Energy and Dynamics")**, High School science students are able to:

- students demonstrate that they can use investigations and gather evidence to support explanations of **cell function and reproduction**.
- They understand the role of **proteins** as essential to the work of the cell and living systems.
- Students can use models to explain **photosynthesis**, **respiration**, and the **cycling of matter and flow of energy** in living organisms. The cellular processes can be used as a model for understanding of the hierarchical organization of organism.
- *Crosscutting concepts* of matter and energy, structure and function, and systems and system models provide students with insights to the structures and processes of organisms.

High School Science students formulate an answer to the question:

1. How do organisms live and grow?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Heredity: Inheritance and Variation of Traits")**, High School Science students are able to:

- Students are able to ask questions, make and defend a claim, and use concepts of probability to explain the **genetic variation** in a population.
- Students demonstrate understanding of why individuals of the same **species** vary in how they look, function, and behave.
- Students can explain the mechanisms of **genetic inheritance** and describe the environmental and genetic causes of gene mutation and the alteration of gene expression.
- *Crosscutting concepts* of patterns and cause and effect are called out as organizing concepts for these core ideas.

High School Science students formulate answers to the questions:

1. How are characteristics of one generation passed to the next?
2. How can individuals of the same species and even siblings have different characteristics?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Life Science ("Biological Evolution: Unity and Diversity")**, High School Science students are able to:

- Students can construct explanations for the processes of **natural selection** and evolution and communicate how multiple lines of evidence support these explanations.
- Students can evaluate evidence of the conditions that may result in **new species** and understand the role **of genetic variation in natural selection**. Additionally, students can apply concepts of probability to explain trends in populations as those trends relate to advantageous heritable traits in a specific environment.
- The *crosscutting concepts* of cause and effect and systems and system models play an important role in students' understanding of the evolution of life on Earth.

High School Science students formulate an answer to the question:

1. What evidence shows that different species are related?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Matter and its Interactions")**, High School Science students are able to:

- to develop understanding of the substructure of **atoms** and to provide more mechanistic explanations of the properties of substances. **Chemical reactions**, including rates of reactions and energy changes, can be understood by students at this level in terms of the collisions of molecules and the rearrangements of atoms.
- Students are able to use the **periodic table** as a tool to explain and predict the properties of elements. Using this expanded knowledge of chemical reactions, students are able to explain important biological and geophysical phenomena. Phenomena involving nuclei are also important to understand, as they explain the formation and abundance of the elements, radioactivity, the release of energy from the sun and other stars, and the generation of nuclear power.
- Students are also able to apply an understanding of the process of optimization in engineering design to **chemical reaction systems**.
- The *crosscutting concepts* of patterns, energy and matter, and stability and change are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, planning and conducting investigations, using mathematical thinking, and constructing explanations and designing solutions; and to use these practices to demonstrate understanding of the core ideas.

High School Science students formulate an answer to the question:

1. How can one explain the structure, properties, and interactions of matter?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Motion and Stability: Forces and Interactions")**, High School Science students are able to:

- Build and understanding of **forces** and interactions and **Newton's Second Law**.
- Students also develop understanding that the total **momentum** of a system of objects is conserved when there is no net force on the system.
- Students are able to use **Newton's Law of Gravitation and Coulomb's Law** to describe and predict the gravitational and electrostatic forces between objects.
- Students are able to apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a **collision**.
- The *crosscutting concepts* of patterns, cause and effect, systems and system models, and structure and function are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in planning and conducting investigations, analyzing data and using math to support claims, applying scientific ideas to solve design problems, and communicating scientific and technical information; and to use these practices to demonstrate understanding of the core ideas.

High School Science students should be able to answer the question:

1. How can one explain and predict interactions between objects and within systems of objects?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Energy")**, High School Science students are able to:

- Students develop an understanding that energy at both the macroscopic and the atomic scale can be accounted for as either **motions of particles or energy** associated with the configuration (relative positions) of particles. In some cases, the energy associated with the configuration of particles can be thought of as stored in fields.
- Students also demonstrate their understanding of engineering principles when they design, build, and refine devices associated with the **conversion of energy.**
- The *crosscutting concepts* of cause and effect; systems and system models; energy and matter; and the influence of science, engineering, and technology on society and the natural world. Students are expected to demonstrate proficiency in developing and using models, planning and carry out investigations, using computational thinking and designing solutions; and to use these practices to demonstrate understanding of the core ideas.

High School Science students formulate an answer to the question:

1. How is energy transferred and conserved?

Full NJDOE "Storylines" with associated NJCCS/NGSS are found at:
http://www.state.nj.us/education/aps/cccs/science/mc.htm

Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

With respect to **Physical Science ("Waves and Their Application to Technologies for Information Transfer")**, High School Science students are able to:

- Students are able to apply understanding of how **wave properties** and the interactions of electromagnetic radiation with matter can transfer information across long distances, store information, and investigate nature on many scales. Models of electromagnetic radiation as either a wave of changing electric and magnetic fields or as particles are developed and used.
- Students understand that combining waves of different **frequencies** can make a wide variety of patterns and thereby encode and transmit information.
- Students also demonstrate their understanding of engineering ideas by presenting information about how technological devices use the principles of **wave behavior** and wave interactions with matter to transmit and capture information and energy.
- The *crosscutting concepts* of cause and effect; systems and system models; stability and change; interdependence of science, engineering, and technology; and the influence of engineering, technology, and science on society and the natural world are highlighted as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in asking questions, using mathematical thinking, engaging in argument from evidence and obtaining, evaluating and communicating information; and to use these practices to demonstrate understanding of the core ideas.

High School Science students answer the question:

1. How are waves used to transfer energy and send and store information?

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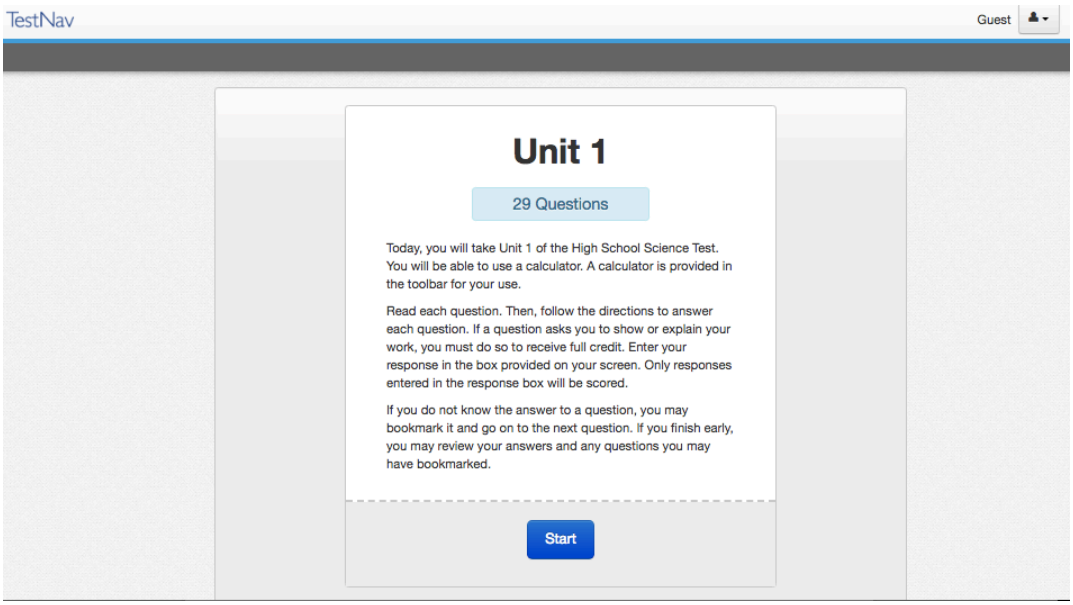
http://www.state.nj.us/education/aps/cccs/science/mc.htm

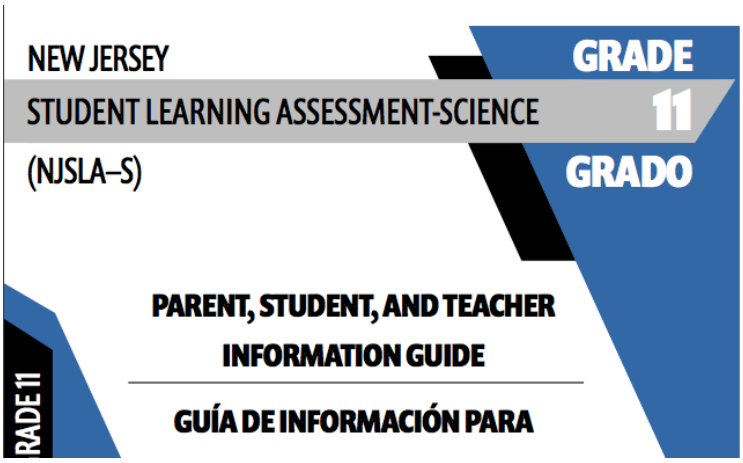
Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

Practice Tests and Parent, Student and Teacher informational guides:

http://measinc-nj-science.com/

Students should be afforded the opportunity to complete the practice test, as the NJSLA-Science is computerized, using the Pearson testing platform (TestNav 8, as seen in PARCC testing).





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Resources for Students and Staff in preparation for the NJSLA-Science (Grades 5, 8, 11)

***Along with using your district-approved resources*, here are some additional resources that you can use to help prepare for the NGSS-based state assessment:**

Comprehensive video resources on NGSS (Physical Science, Life Science, Earth and Space Science, Engineering):

http://www.bozemanscience.com/next-generation-science-standards

Varying PhET simulations for physics, chemistry, biology:

https://phet.colorado.edu/

"Brain Pop" resources (videos, quizzes, mapping, readings and more):

https://www.brainpop.com/

University at Buffalo case studies (most components of the case study are free):

http://sciencecases.lib.buffalo.edu/cs/collection/

Kahoot! interactive games (search by content topic and grade level):

https://create.kahoot.it/

Quizizz interactive games (search by content and grade level):

https://quizizz.com/

Science Spot resources (activities, puzzles, reviews and more):

www.sciencespot.net

Science Net Links (activities, puzzles, reviews and more):

http://sciencenetlinks.com/

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