Atlantic City Public Schools

Science

K - 8th Grade

Curriculum Guide

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Mission Statement

Mission: *Scientifically literate individuals possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.*

Vision: Our science curriculum is designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields. The learning experiences provided for students should engage them with fundamental questions about the world and with how scientists have investigated and found answers to those questions. Throughout grades K-12, students should have the opportunity to carry out scientific investigations and engineering design projects related to the disciplinary core ideas (pp. 8-9, NRC, 2012).

S.T.E.M. Philosophy

Mastery of Science, Technology, Engineering, and Mathematics (STEM) topics are important for students to be competitive in an increasingly global economy. The STEM initiative is not defined by one specific program or format. It is simply a philosophy of teaching that attempts to transform the typical teacher-centered classroom by encouraging a curriculum that is driven by problem-solving, discovery, exploratory learning and requires students to be actively engaged in finding and implementing solutions. A STEM approach maximizes achievement when students consistently experience it during hands-on learning situations that infuse the four content areas that comprise the STEM acronym.

S.T.E.M. is a method of delivery that utilizes an array of best practice research in teaching and learning with an integrated approach to teaching science, technology, engineering, and mathematics. It utilizes a research-based set of components grounded in a constructivist view of learning and teaching. The goal of S.T.E.M. education (K-12) is to ensure that students gain the mathematics, science, technology and engineering literacy necessary to succeed in life beyond high school.

S.T.E.M Skills for All

There is a critical need to go beyond the basic skills starting early in Kindergarten and continuing through grade 12. The skills required to develp S.T.E.M. literacy for all require the following elements: Critical Thinking & Problem Solving, Creativity & Inn0vation, Collaboration, Information Media & Contextual Learning.

Purposeful Design & Inquiry

At the heart of S.T.E.M. education is a philosophy of purposeful curriculum integration, at which point specifically designed heands-on investigation are carefully related to engage students in rigorous real world problem solving experiences.

Atlantic City School District S.T.E.M Goal:

All students will graduate prepared to persue a S.T.E.M. focused college and career path.

Basic Knowledge and Skills

A well-rounded individual who has strong basic skills is an important goal of education. These skills include: Science, Mathematics, reading, Writing, Speaking, Humanities/Arts. Government/Economics, Foreign Languages and History/Geogrphy.

21st Century Content

Learning occurs best when students are immersed in meaningful, useful and relevant content that invites them to engage and interact. 21st Century topics that offer this opportunity are: Global Awareness, Finance, Economic & Entrepenurial Literacy, Civic Literacy Heath & Wellness Awareness and Environmental Literacy.

S.T.E.M. education is not simply a new name for the traditional approach to teaching science and mathematics. Nor is it just the grafting of "technology" and "engineering" onto standard science and math curricula. Instead, S.T.E.M. is an approach to teaching that is greater than the sum of its parts – it is a "meta-discipline." It represents a new frontier in education by removing traditional barriers between disciplines and integrating them into a cohesive curriculum. Each of the four content areas is essential and does not stand alone; each adds a specific relevance and purpose. Real-world problems are presented as part of the curriculum, and students are challenged to apply each of the four content areas seamlessly.

S.T.E.M. education is about redesigning the infrastructure, principles and methods of instruction within conventional science and mathematics programs so that engineering and technology are presented as real-world outlets for traditional subjects. Engineering and technology put emphasis on the process and design of solutions instead of the solutions themselves – the familiar approach to math and science. The emphasis on process and design allows students to explore math and science in a more personalized context, while helping them to develop the critical thinking skills that can be applied to all facets of their academic and work futures. Engineering is the method that students use for discovery, exploration, and problem solving. The technology component allows for a deeper understanding within the other three parts of S.T.E.M., allowing students to apply what they have learned – for example, specialized and professional applications like GPS, computer assisted drafting, and computer animation. The knowledge gained from these separate but integrated subject areas is greater than the sum of its parts.

**S.T.E.M.
EDUCATION IS…**

- An interdisciplinary approach to learning that is rigorous and links student learning with real-world challenges.
- An approach that emphasizes process and design with a goal to develop problem solvers and critical thinkers.
- A teaching method to create a learning environment that promotes discovery, exploration, and problem solving.
- Across all grade levels, K-12.

**S.T.E.M.
EDUCATION IS NOT…**

- A new name for the traditional approaches to teaching science and mathematics.
- An add-on – the grafting of technology and engineering onto traditional science and math curricula.
- One specific program or lesson format

In summary, S.T.E.M. education is a process that offers all students an opportunity to make sense of the world holistically, rather than in bits and pieces. S.T.E.M. education removes traditional barriers and integrates separate subject areas into a cohesive teaching and learning paradigm. As stated by Janice Morrison (*TIES S.T.E.M.*, 2006), "S.T.E.M. education is an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise."

BOE Reference for Science Curriculum:
http://www.state.nj.us/education/aps/cccs/science/ScienceProgramRubric.pdf

Next Generation Science Standards

The Next Generation Science Standards (NGSS) is the future of Science education. Created in part by the New Jersey Education Association; the three dimensional standards are applied to all curriculum content from K-12 grades and beyond. The NGSS seeks to focus on the fluid progression of knowledge through dependent scaffolding over a child's educational career. (https://www.nextgenscience.org/)

The NGSS emphasizes three codependent dimensions: Disciplinary Core Ideas (DCI), Scientific & Engineering Practices, and Crosscutting Concepts. Each of these dimensions is applied to the curriculum content through the years in a progressive fashion. These dimensions must not be looked at as separate entities, but a unified method of moving at the speed of science.

Scientific & Engineering Practices were designed for the student to fully understand scientific and engineering ideas. At the same time, they cannot learn or demonstrate understanding in these practices without the core curriculum content. The eight essential scientific and engineering practices are governed by the scientific method and broken down in the table on page(s) 12-15.

The Disciplinary Core Ideas (DCI) are aligned with the core content curriculum standards. These current curriculum modifications put a great deal more emphasis on the integration of STEM principles. The core ideas regarding science and engineering allow for the student and teacher to explore a deeper understanding of the content.

Cross-cutting concepts are the real world connections that highlight the scientific and engineering practices, as well as disciplinary core ideas. The seven cross-cutting concepts are as follows and are further broken down on the table on page(s) 16-18.

1. Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
2. Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.
3. Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.
4. Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

5. Energy and matter: Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.
6. Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
7. Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

The NGSS provides the framework for a successful classroom by relying on scientific and engineering practices, disciplinary core ideas, and crosscutting concepts. This central idea of the next generation standards ties these dimensions together to be seamlessly infused with any curriculum. Do not think of these dimensions as separate, but a convergent scientific method. We are 21st century learners and looking to progress at the speed of science.

NGSS Science & Engineering Practices K-2

Grades K-2

Asking Questions and Defining Problems

Ask questions based on observations to find more information about the natural and/or designed world(s).
Ask and/or identify questions that can be answered by an investigation.
Define a simple problem that can be solved through the development of a new or improved object or tool.

Developing and Using Models

Distinguish between a model and the actual object, process, and/or events the model represents.
Compare models to identify common features and differences.
Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).
Develop a simple model based on evidence to represent a proposed object or tool.

Planning and Carrying Out Investigations

With guidance, plan and conduct an investigation in collaboration with peers (for K).
Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.
Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal.
Make predictions based on prior experiences.

Analyzing and Interpreting Data

Record information (observations, thoughts, and ideas).
Use and share pictures, drawings, and/or writings of observations.
Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
Compare predictions (based on prior experiences) to what occurred (observable events).
Analyze data from tests of an object or tool to determine if it works as intended.

Using Mathematics and Computational Thinking

Decide when to use qualitative vs. quantitative data.
Use counting and numbers to identify and describe patterns in the natural and designed world(s).
Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.
Use quantitative data to compare two alternative solutions to a problem.

Constructing Explanations and Designing Solutions

Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.
Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.
Generate and/or compare multiple solutions to a problem.

Engaging in Argument from Evidence

Identify arguments that are supported by evidence.
Distinguish between explanations that account for all gathered evidence and those that do not.
Analyze why some evidence is relevant to a scientific question and some is not.
Distinguish between opinions and evidence in one's own explanations.
Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.
Construct an argument with evidence to support a claim.

Make a claim about the effectiveness of an object, tool, or solution that is supported by relevant evidence.
Obtaining, Evaluating, and Communicating Information *Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).* *Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.* *Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.* *Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.*

NGSS Science & Engineering Practices 3-5

Grades 3-5
Asking Questions and Defining Problems *Ask questions about what would happen if a variable is changed.* *Identify scientific (testable) and non-scientific (non-testable) questions.* *Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.* *Use prior knowledge to describe problems that can be solved.* *Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.*
Developing and Using Models *Identify limitations of models.* *Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events.* *Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.* *Develop and/or use models to describe and/or predict phenomena.* *Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.* *Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.*
Planning and Carrying Out Investigations *Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.* *Evaluate appropriate methods and/or tools for collecting data.* *Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.* *Make predictions about what would happen if a variable changes.* *Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.*
Analyzing and Interpreting Data *Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.* *Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.* *Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.* *Analyze data to refine a problem statement or the design of a proposed object, tool, or process.* *Use data to evaluate and refine design solutions.*
Using Mathematics and Computational Thinking *Decide if qualitative or quantitative data are best to determine whether a proposed object or tool meets criteria for success.* *Organize simple data sets to reveal patterns that suggest relationships.* *Describe, measure, estimate, and/or graph quantities (e.g., area, volume, weight, time) to address scientific and engineering questions and problems.* *Create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem*
Constructing Explanations and Designing Solutions *Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.* *Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.* *Generate and/or compare multiple solutions to a problem.*

Engaging in Argument from Evidence
Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).
Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
Identify the evidence that supports particular points in an explanation.
Apply scientific ideas to solve design problems.
Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

Obtaining, Evaluating, and Communicating Information
Compare and refine arguments based on an evaluation of the evidence presented.
Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.
Respectfully provide and receive critiques from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions.
Construct and/or support an argument with evidence, data, and/or a model.
Use data to evaluate claims about cause and effect.
Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.

NGSS Science & Engineering Practices 6-8

Grades 6-8

Asking Questions and Defining Problems
Ask questions
- *o that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information.*
- *o to identify and/or clarify evidence and/or the premise(s) of an argument.*
- *o to determine relationships between independent and dependent variables and relationships in models.*
- *o to clarify and/or refine a model, an explanation, or an engineering problem.*
- *o that require sufficient and appropriate empirical evidence to answer.*
- *o that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.*
- *o that challenge the premise(s) of an argument or the interpretation of a data set.*

Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.

Developing and Using Models
Evaluate limitations of a model for a proposed object or tool.
Develop or modify a model—based on evidence – to match what happens if a variable or component of a system is changed.
Use and/or develop a model of simple systems with uncertain and less predictable factors.
Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.
Develop and/or use a model to predict and/or describe phenomena.
Develop a model to describe unobservable mechanisms.
Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.

Planning and Carrying Out Investigations
Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.
Evaluate the accuracy of various methods for collecting data.
Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.
Collect data about the performance of a proposed object, tool, process or system under a range of conditions.

Analyzing and Interpreting Data
Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships.
Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.
Distinguish between causal and correlational relationships in data.
Analyze and interpret data to provide evidence for phenomena.
Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible.
Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).
Analyze and interpret data to determine similarities and differences in findings.
Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.

Using Mathematics and Computational Thinking *Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.* *Use mathematical representations to describe and/or support scientific conclusions and design solutions.* *Create algorithms (a series of ordered steps) to solve a problem.* *Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems.* *Use digital tools, mathematical concepts and arguments to test & compare proposed solutions to an engineering design problem.*
Constructing Explanations and Designing Solutions *Construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) and/or describe(s) phenomena.* *Construct an explanation using models or representations.* *Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.* *Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.* *Apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion.* *Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.* *Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.* *Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re-testing.*
Engaging in Argument from Evidence *Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.* *Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.* *Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.* *Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.* *Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.*
Obtaining, Evaluating, and Communicating Information *Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).* *Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.* *Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.* *Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.* *Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.*

NGSS Crosscutting Concepts K-2

Grades K-2

Patterns

Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Cause and Effect: Mechanism and Prediction

Events have causes that generate observable patterns.
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Scale, Proportion, and Quantity

Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower).
Standard units are used to measure length.

Systems and System Models

Objects and organisms can be described in terms of their parts.
Systems in the natural and designed world have parts that work together.

Energy and Matter: Flows, Cycles, and Conservation

Objects may break into smaller pieces, be put together into larger pieces, or change shapes.

Structure and Function

The shape and stability of structures of natural and designed objects are related to their function(s).

Stability and Change

Some things stay the same while other things change.
Things may change slowly or rapidly.

NGSS Cross-Cutting Concepts 3-5

Grades 3-5

Patterns

Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.
Patterns of change can be used to make predictions.
Patterns can be used as evidence to support an explanation.

Cause and Effect: Mechanism and Prediction

Cause and effect relationships are routinely identified, tested, and used to explain change.
Events that occur together with regularity might or might not be a cause and effect relationship.

Scale, Proportion, and Quantity

Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.
Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

Systems and System Models

A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.
A system can be described in terms of its components and their interactions.

Energy and Matter: Flows, Cycles, and Conservation

Matter is made of particles.
Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.
Energy can be transferred in various ways and between objects.

Structure and Function

Different materials have different substructures, which can sometimes be observed.
Substructures have shapes and parts that serve functions.

Stability and Change

Change is measured in terms of differences over time and may occur at different rates.
Some systems appear stable, but over long periods of time will eventually change.

NGSS Cross-Cutting Concepts 6-8

Grades 6-8

Patterns

Macroscopic patterns are related to the nature of microscopic and atomic-level structure.
Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. Patterns can be used to identify cause and effect relationships.
Graphs, charts, and images can be used to identify patterns in data.

Cause and Effect: Mechanism and Prediction

Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.
Cause and effect relationships may be used to predict phenomena in natural or designed systems.
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

Scale, Proportion, and Quantity

Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.
The observed function of natural and designed systems may change with scale.
Proportional relationships (e.g., speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.
Scientific relationships can be represented through the use of algebraic expressions and equations.
Phenomena that can be observed at one scale may not be observable at another scale.

Systems and System Models

Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems.
Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems.
Models are limited in that they only represent certain aspects of the system under study.

Energy and Matter: Flows, Cycles, and Conservation

Matter is conserved because atoms are conserved in physical and chemical processes.
Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter.
Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion).
The transfer of energy can be tracked as energy flows through a designed or natural system.

Structure and Function

Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore, complex natural and designed structures/systems can be analyzed to determine how they function.
Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Stability and Change

Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale.
Small changes in one part of a system might cause large changes in another part.
Stability might be disturbed either by sudden events or gradual changes that accumulate over time.
Systems in dynamic equilibrium are stable due to a balance of feedback mechanisms.

Pacing Guides

K-2 Pacing Guide

3-5 Pacing Guide

Grade 6 Pacing Guide

Grade 7 Pacing Guide

Grade 8 Pacing Guide

Scope & Sequence - K

Unit 1: Force Olympics	PHYSICAL SCIENCE

During this unit of study, students 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. The crosscutting concept of cause and effect is called out as the organizing concept for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and analyzing and interpreting data. Students are also expected to use these practices to demonstrate understanding of the core ideas.

K-PS2-1 Motion and Stability: Forces and Interactions

- Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

K-PS2-2 Motion and Stability: Forces and Interactions

- Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

K-2-ETS1-2 Engineering Design

- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3 Engineering Design

- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Unit 2: Weather Watching	EARTH & SPACE SCIENCE

In this unit of study, students develop an understanding of patterns and variations in local weather and the use of weather forecasting to prepare for and respond to severe weather. The crosscutting concepts of patterns; cause and effect; interdependence of science, engineering, and technology; and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions, analyzing and interpreting data, and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

K-ESS2-1 Earth's Systems

- Use and share observations of local weather conditions to describe patterns over time.

K-ESS3-2 Earth and Human Activity

- Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.

K-PS3-1 Energy

- Make observations to determine the effect of sunlight on Earth's surface.

K-PS3-2 Energy

- Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

K-2-ETS1-2 Engineering Design

- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2.ETS1-3 Engineering Design

- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Unit 3/4: Plant & Animal Secrets **LIFE SCIENCE**
In this unit of study, students develop an understanding of what plants and animals need to survive and the relationship between their needs and where they live. Students compare and contrast what plants and animals need to survive and the relationship between the needs of living things and where they live. The crosscutting concepts of patterns and systems and system models are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in developing and using models, analyzing and interpreting data, and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.
K-LS1-1 From Molecules to Organisms: Structures and Processes ● Use observations to describe patterns of what plants and animals (including humans) need to survive. **K-ESS3-1 Earth and Human Activity** ● Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. **K-ESS2-2 Earth's Systems** ● Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. **K-ESS3-3 Earth and Human Activity** ● Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Special Ed Accommodations:
Follow IEP and 504 plans per individual student.
Utilize in class support based on IEP and 504 pla/ns.
http://www.washington.edu/doit/working-together-science-teachers-and-students-disabilities
ELL Accommodations:
https://www.csun.edu/science/ref/language/teaching-ell.html
Gifted and Talented Accommodations:
https://kendrik2.wordpress.com/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/
Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Scope & Sequence - Grade 1

Unit 1: Spinning Sky, Grade 1	**EARTH SYSTEMS**
Students observe, describe, and predict some patterns in the movement of objects in the sky. The crosscutting concept of patterns is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and analyzing and interpreting data. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on 1-ESS1-1 and 1-ESS1-2.	
ESS1.A: The Universe and its Stars ● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) **ESS1.B: Earth and the Solar System** ● Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) **ETS1.B: Developing Possible Solutions** ● Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)	

Unit 2: Light & Sound, Grade 1	**PHYSICAL SCIENCE**
In this unit of study, students develop an understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. The idea that light travels from place to place can be understood by students at this level by placing objects made with different materials in the path of a beam of light and determining the effect of the different materials. Students apply their knowledge of light and sound to engage in engineering design to solve a simple problem involving communication with light and sound. **The crosscutting concept of *cause and effect* is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *planning and carrying out investigations*, *constructing explanations*, *designing solutions, asking questions and defining problems,* and *developing and using models.* Students are also expected to use these practices to demonstrate understanding of the core ideas.**	
PS4.A: Wave Properties ● Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) **PS4.B: Electromagnetic Radiation** ● Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) ● Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3) **PS4.C: Information Technologies and Instrumentation** ● People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) **ETS1.B: Developing Possible Solutions** ● Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)	

Units 3/4: Plant and Animal Superpowers, Grade 1	LIFE SCIENCE
In this unit of study, students develop an understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs, as well as how the behaviors of parents and offspring help offspring survive. The understanding that young plants and animals are like, but not exactly the same as, their parents is developed. The crosscutting concept of patterns and structure and function are called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in obtaining, evaluating, and communicating information and constructing explanations. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
1-LS1.A: Structure and Function ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1) **LS1.B: Growth and Development of Organisms** ● Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2) **LS1.D: Information Processing** ● Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) **LS3.A: Inheritance of Traits** ● Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1- LS3-1) **LS3.B: Variation of Traits** ● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1) **ETS1.A: Defining and Delimiting Engineering Problems** ● A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) ● Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) ● Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) **ETS1.B: Developing Possible Solutions** ● Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2) **ETS1.C: Optimizing the Design Solution** ● Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)	

Special Ed Accommodations:
Follow IEP and 504 plans per individual student.
Utilize in class support based on IEP and 504 plans.
http://www.washington.edu/doit/working-together-science-teachers-and-students-disabilities
ELL Accommodations:
https://www.csun.edu/science/ref/language/teaching-ell.html
Gifted and Talented Accommodations:
https://kendrik2.wordpress.com/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/
Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Scope & Sequence - Grade 2

Unit 1: Plant Aventures	Mystery Science
This unit develops the idea that plants are truly alive and face challenges every bit as dramatic as those of animals. Students will learn that plants have needs, and will reason from evidence to understand how plants meet their needs. Their attention will be drawn to exciting connections they can observe in their everyday world: why forests are dark, why trees grow so tall, and more.	
2-LS2-1 LS2.A K.LS1.C K.ESS3.A 5.LS1.C 2-LS2-2 LS2.A ETS1.B K.ETS1.A 5.LS2.A 2-LS4-1 LS2.A ETS1.B 3.LS4.C 3.LS4.D 5.LS2.A	

Unit 2: Animal Adventures	Mystery Science
This unit helps students develop a sense of wonder for biodiversity: the sheer range and variety of animals found on earth. Students gain practical experience in identifying animals and sorting them into scientific groups, and apply their knowledge in an engineering design challenge. This unit introduces two critically important concepts in biology: "habitat" and "species," foundational concepts which will be revisited and refined at higher grade levels.***nterpreting data*. Students are also expected to use these practices to demonstrate understanding of the core ideas.**	
2-LS4-1 LS4.D K-2-ETS1-1 K-PS2-2 K-ESS3-2 K-2-ETS1-2 K-ESS3-8	

1-PS4-4 2-LS2-2 K-2-ETS1-3 2-ESS2-1

Unit 3: Materials Magic	Mystery Science
In this unit of study, students continue to develop an understanding of observable properties of materials through analysis and classification of different materials. The crosscutting concepts of *cause and effect* and *energy and matter* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *constructing explanations*, *designing solutions*, and *engaging in argument from evidence*. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
2-PS1-1 5.PS1.A 2-PS1-2 5.PSI.A K-2-ETS1-1 K-PS2-2 K-ESS3-2 3-5.ETS1.A 3-5.ETS1.C K-2-ETS1-2 K-ESS3-3 1-PS4-4 2-LS2-2 3-5.ETS1.A 3-5.ETS1.B 3-5.ETS1.C K-2-ETS1-3 K-2-ETS1.C 2-ESS2-1 3-5.ETS1.A 3-5.ETS1.B 3-5.ETS1.C	

Unit 4: Work of Water	Mystery Science
In this unit of study, 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. The crosscutting concept of *patterns* is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in	

developing and using models **and** ***obtaining, evaluating, and communicating information*****. Students are also expected to use these practices to demonstrate understanding of the core ideas.**
ESS1.C: The History of Planet Earth ● Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) **ESS2.A: Earth Materials and Systems** ● Wind and water can change the shape of the land. (2- ESS2-1) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** ● Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2- 2) **ESS2.C: The Roles of Water in Earth's Surface Processes** ● Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)

Special Ed Accommodations:
Follow IEP and 504 plans per individual student.
Utilize in class support based on IEP and 504 plans.
http://www.washington.edu/doit/working-together-science-teachers-and-students-disabilities
ELL Accommodations:
https://www.csun.edu/science/ref/language/teaching-ell.html
Gifted and Talented Accommodations:
https://kendrik2.wordpress.com/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/
Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Scope & Sequence - Grade 3

Implementation of the NJSLS for Science Grade 3 Unit 1 Stormy Skies October 9th - November 7th (21 days)					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English Language Development Standards**
Core Ideas: : 3-ESS2-1 3-ESS2-2 3-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3 **Cross Cutting:** RI.3.1 RI.3.9 W.3.1 W.3.7 W.3.9 MP.2 MP.4 MP.5 3.MD.B.3	**Oct. 29 -Nov. 2** Benchmark 1	-Planning and carrying out investigations -Analyzing and interpreting data -Engaging in argument from evidence -Obtaining, evaluating, and communicating information -Define problems -Develop and use a model to design solutions	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science Grade 3 Unit 2 **Invisible Forces** Forces, Motion & Magnets December 17 - January 24 (5 weeks)

NJ Science Student Learning Standards (NJSLS)	edConnect Assessments	Scientific Practices	Technology	21st Century	English Language Development Standards
Core Ideas: : 3.PS2.1 3.PS2.2 3.PS2.3 3.PS2.4 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.3.1 RI.3.3 RI.3.8 W.3.7 W.3.8 SL.3.3 MP.2 MP.5 3.MD.A.2	**Jan.15-Jan.25** Benchmark 2	-Planning and carrying out investigations -Analyzing and Interpreting Data -Asking Questions and Defining Problems -Use and develop models -Engage in argument from evidence -Design solutions	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

February 26th - March 26th (21 Days)					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English Language Development Standards**
Core Ideas: 3.LS1.1 3.LS3.1 3.LS3.2 3.LS4.2 3-5.ETS1.1 3-5.ETS1.2 3-3.ETS1.3 **Cross Cutting:** RI.3.1 RI.3.2 RI.3.3 RI.3.7 W.3.2 SL.3.4 SL.3.5 MP.2 MP.4 3.MD.B.4 3.MD.B.3 3.NBT 3.NF	**Mar.14-Mar.26** Benchmark 3	-Analyze and interpret data -Develop and use models -Construct explanations and design solutions -Carry out investigation -Engage in argument from evidence -Obtain, evaluate, and communicate information	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science
Grade 3 Unit 4
Animals Through Time *Habitats, Heredity, & Change Over Time*
March 27th - May 3rd (20 days)

NJ Science Student Learning Standards (NJSLS)	edConnect Assessments	Scientific Practices	Technology	21st Century	English Language Development Standards
Core Ideas: 3.LS1.1 3.LS4.1 3.LS4.2 3.LS4.3 3.LS4.4 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.3.1 RI.3.2 RI.3.3 RI.3.7 SL.3.4 SL.3.5 W.3.1 W.3.2 W.3.8 W.5.7 W.5.8 W.5.9 MP.2 MP.4 M.P.5 3.NBT 3.NF 3.MD.B.3 3.MD.B.4 3-5.OA	**Apr. 29-May 3** Benchmark 4	-Develop and use models -Construct explanations and designing solutions -Engage in argument from evidence -Analyze and interpret data -Ask questions and define problems -Carry out investigation -Use mathematics and computational thinking	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Grade 3 Unit 1

Stormy Skies

<u>Profound Perspective</u>: This unit develops the idea that by paying careful attention to clouds, wind, and other weather clues around us, we can predict the daily weather and make sense of why places on earth look and feel the way they do.
<u>Essential Question:</u> How do we protect people from weather related hazards that may occur near our home?

Mystery Science units are designed to be completed in the order presented

Grade 3 Earth Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Where do clouds come from?	5 days	Foundational for 3-ESS2-1	Water Cycle, Phases of Matter	Clouds may look like white, fluffy, cotton, but they are actually made of water! When liquid water is heated it turns into gas water. This process is called evaporation. Some liquid water from Earth's surface (like oceans and lakes) is heated and turns into invisible water gas. It rises up into the atmosphere and becomes trapped! These trapped water droplets make clouds. **DCIs: *Foundational* ESS2.D**	Students **carry out an investigation** by **using a model** to observe evaporation. They **engage in argument from evidence** using observations from their investigation to explain what clouds are.	Students consider the **cause and effect** relationship between heated liquid water and the evaporation of gas water that forms into clouds.
Mystery 2 How can we predict when it's going to storm?	5 days	3-ESS2-1	Local Weather Patterns, Weather Prediction	There are many different types of clouds! Knowing what types of clouds bring stormy weather can help you prepare for a rainstorm. But it isn't that simple--knowing the direction of the wind is important too! Understanding this patterns help scientists, and you, predict what kind of weather might happen next! **DCIs: ESS2.D**	Students **obtain and communicate information** about different types of clouds by creating a Storm Spotter's Guide. They **engage in argument from evidence** by using this information to analyze multiple scenarios and determine if a storm will occur and why.	Students explore **patterns** of changing clouds as a way to predict weather.
Mystery 3 Why are some places always hot?	5 days	3-ESS2-2	Climate, Geography, & Global Weather Patterns	Different places in the world have different weather conditions. These weather conditions are predictable and occur over long periods of time and are called climates. There are 5 climates--tropical, polar, temperate, mild, and desert. Each climate occurs in a specific part of the world, depending on how much sunlight and rain it gets throughout the year. **DCIs: ESS2.D**	Students **obtain and evaluate information** about multiple location's weather. They **communicate the information** by color coding a map based on climate. Students **analyze and interpret the data** to determine climate patterns across the world.	Students recognize climate across the world as an observable **pattern**.
Mystery 4 How can you keep a house from blowing away in a windstorm?	6 days	3-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3	Natural Hazards & Engineering	Strong winds can cause different types of natural hazards such as hurricanes, dust storms, and tornadoes. Strong winds can cause a lot of problems--they blow down all kinds of things! Engineers design solutions for the damage strong winds can cause. They identify problems and brainstorm a lot of different ideas until they find a solution. **DCIs**: **ESS3.B, ETS1.A, ETS1.B, ETS1.C**	Students **define problems** that strong winds cause. They **develop and use a model** of a home in order to **design a solution** that keeps the roof attached to the home and stops the home from blowing away in the wind. They test and improve their prototype.	Students identify the **cause and effect** relationship between strong winds and the problems they cause.

Grade 3 Unit 2

Invisible Forces *Forces & Motion, Magnetism*

Grade 3 Mystery Science & NGSS Alignment - Physical Sciences (PS)

Profound Perspective: This introductory forces unit will give students a new understanding of the invisible pushes and pulls that operate in the world around them. They will realize that understanding forces will let them do surprising things — from building a sturdy bridge from paper to using the pull of a rubber band to send a cardboard "hopper" flying. What students learn in this unit will connect to the world around them, leading them to think about such things as the force of friction as they slide down a playground slide or the the invisible force that makes magnets cling to the refrigerator. Hands-on activities focus on engineering, investigation, and discovery.

Essential Question: How do magnets change the way we interact and solve problems within the environment?

Grade 3 Physical Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 How could you win a tug-of-war against a bunch of adults?	4 days	3-PS2-1	Forces	Every action is either a push or a pull, or what we call a 'force'. Forces each have a strength and a direction. When objects are in contact, they exert a force on each other. When a force is greater than the opposite force, it causes the object to move in its direction. **DCIs: PS2.A, PS2.B**	Students build a Hopper Popper to **carry out an investigation** about force and motion. They **construct an explanation** for which direction the forces act on the object, causing it to hop.	Students recognize the **cause and effect** relationship between the forces acting on an object and the direction of its motion.
Mystery 2 What makes bridges so strong?	4 days	3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3 Foundational for 3-PS2-1	Balance of Forces, Engineering	Engineers build bridges to join two pieces of land that are split by a body of water. Building a bridge is no easy task! Engineers had to try lots of different solutions, most that didn't work, and learn from them. Possible solutions to a problem can be limited by available resources and materials--we call these constraints. All engineers communicate with their peers, test their prototypes, learn from their failures, and improve their designs. Being an engineer is exciting and full of learning! **DCIs: ETS1.A, ETS1.B, ETS1.C, Foundational PS2.A**	Students **define a problem - designing a bridge that will hold the most weight -** and its constraints, it can only be made of paper. They collaborate with peers to **design multiple solutions**. They **carry out investigations** to test each of their prototypes, determine how to improve their design.	Students explore the relationship between the **structure and function** of different bridge designs.
Mystery 3 How can you	4 days	3-PS2-1 3-PS2-2	Balance of Forces,	A special type of 'push' force is called friction. This force occurs when two objects	Students **use a model** of a slide to **carry out an investigation.** They **ask**	Students consider the **cause and effect** relationship between a

go faster down a slide?			Friction	are in contact and push against each other. When an object has less friction, it moves easier. If an object has more friction, it is moves slower. Objects with smooth surfaces have less friction, and objects with rougher surfaces have more friction. **DCIs: PS2.A, PS2.B**	**questions** about different materials and weights and test their ideas to explore which combinations move the fastest down the slide. Students then complete a fair test to determine which material has the least friction. They **engage in argument from evidence** to share their findings.	material's surface and the amount of friction it has.
Mystery 4 What can magnets do?	4 days	3-PS2-3 3-PS2-4	Magnets, Forces	Magnetism is another special kind of force. Magnets can pull on things without actually touching them--the force can even go right through a solid object. But not all objects are affected by magnetism, only objects that contain iron. Magnets have a lot of interesting properties. The closer a magnet is to a magnetic object, the stronger its force will be.. Also, magnets have two sides. When two magnets line up at the same side, they will push away from each other. When they are lined up at different sides, they will pull toward each other. **DCIs: PS2.B**	Students **ask questions** about magnets and **develop and carry out investigations** to observe the different properties of them.	Students consider the **cause and effect** relationship between this distance of a magnet and the strength of the force. Students consider the **cause and effect** relationship between which direction two magnets are facing and if they will push or pull on one another.
Mystery 5 How could you unlock a door using a magnet?	5 days	3-PS2-3 3-PS2-4 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3	Magnets & Engineering	We've learned that magnets have a lot of interesting properties! One of them, is that magnets can push and pull on each other. In fact, they can do this even with space or another object between them! Since magnets have many useful properties, they can be used to design solutions to a variety of problems. **DCIs: PS2.B, ETS1.A, ETS1.B, ETS1.C**	Students **design a solution** for a magnetic lock by **developing a model**.	Students consider the **cause and effect** relationship between two magnets as a way to so design solutions using the engineering process.

Grade 3 Unit 3

Power of Flower Life Cycle, Traits, & Heredity

Profound Perspective: This unit develops the idea that by studying how plants reproduce and pass on their traits, we human beings have figured out how to make food plants even more useful to us. Students first discover how plants reproduce by exploring the process of pollination and fruiting. Then students are introduced to the process of plant domestication (selection of traits based on inheritance and variation).

Essential Question: How do plants reproduce? Why are roses different colors?

Grade 3 Life Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Why do plants grow flowers?	5 days	3-LS1-1	Flowering & Reproduction	All plants grow from a seed, which is a baby plant. Just like animals, *some* plants--all flowering plants--need two parent plants to create a seed. Flowering plants make seeds through a process called pollination. Pollination happens when pollen from one flower gets transferred to a special part of another flower - the stigma. Flowers make seeds! These plants have a unique life cycle that start with pollination. **DCIs: *Foundational LS1.B***	Students **develop a model** of a flower and bee to simulate pollination. With a partner, they **carry out an investigation** to determine how bees fly between flowers and cause pollination. Students an**alyze their data** and **construct an explanation** for if their flower will produce seeds or not.	Students explore the **pattern** of similarities in life cycles among organisms. Students observe that a plant's stigma (**structure**) is stick to 'catch' pollen (**function**).
Mystery 2 Why do plants give us fruit?	5 days	3-LS1-1	Reproduction	We learned in the last Mystery that pollen travels to the stigma of a flower to make a seed. But it isn't that simple - the pollen travels down the stigma, and into the flower's ovary. Then a seed is made! Some plants grow fruit next. Fruit, a yummy 'container' for seeds, is eaten by animals! They swallow the seeds and excrete them away from the parent plant. This helps the seeds spread to new places and grow new plants. A lot of vegetables have seeds, but to plant scientists they are actually fruits! **DCIs: LS1.B**	Students **carry out an investigation** to determine if a food is a science fruit or vegetable. They cut open each food to determine if there are seeds. Students **analyze this data** to determine if the food is a fruit or vegetable.	Students use **patterns** to sort food as a science fruit or a science vegetable. Students learn that fruit (**structure**) contains seeds and helps them spread (**function**).
Mystery 3 Why are some apples red and some green?	5 days	3-LS3-1	Inheritance, Traits, & Selection	Apples, like all living things, inherit their characteristics from their parents. Sweet apples grow from the seeds of sweet apples, and sour apples grow from the seeds of sour apples. While offspring have similar traits as their parents and siblings, they are not *exactly* the same. There are over 2,000 varieties of apples, each with unique traits. Farmers choose people's favorites, plant that type of seed over and over, and grow more of them. This is called selection. **DCIs: LS3.A, LS3.B**	Students **carry out an investigation** to determine the sweetness of different apple varieties.	Students identify the similarities and differences shared between offspring and their parents, or among siblings as a **pattern**.
Mystery 4 How could you make the biggest fruit in the world?	5 days	3-LS3-1	Fruiting & Reproduction	No two individual offspring are exactly alike! Organisms inherit their traits from their parents which is why they are similar but not identical. Selection is when a desired trait is chosen to reproduce. It is used to change any trait of a plant. Plant-growers watch closely for changes in traits so that they can create new varieties of plants.	Students **engage in argument from evidence** about which plants and fruits are related to one another. Students **obtain, evaluate, and communicate information** by sorting plant cards into groups	Students recognize similarities and differences among the traits of different plants as a **pattern**.

				Many fruits and vegetables we eat today were created through selection. **DCIs: LS3.A, LS3.B**	based on similar traits. They determine which plants share wild parents and are varieties of each other.	

Grade 3 Unit 4

Animals Through Time *Habitats, Heredity, & Change Over Time*

Profound Perspective: In this unit students will develop an appreciation for how animals and the places they live (their habitats) are not constant—they have changed over time. Fossils give us a window to the animals and habitats of the past. Selective breeding shows us not only how some animals of the past became domesticated, but allows us to imagine how they might look in the future.

Essential Question: What do fossils tell us about the organisms and the environment in which they lived?

Grade 3 Life Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Where can you find whales in the desert?	3 days	3-LS4-1 3-LS4-3	Habitats & Environmental Change	Fossils provide evidence of the types of organisms that lived long ago and also about the characteristics of their habitats. They help tell the story of how the environment, and the things that live in it, have changed over time. As the environment changes, some organisms survive, some adapt, and some die out. **DCIs: LS2.C, LS4.A, LS4.C, LS4**	Students **analyze and interpret data** from fossil records to determine how the environment they were found in has changed over time. They use this evidence to **engage in an argument** for which environment an organism survived in based on its characteristics.	Students reason about the **cause and effect** relationship between environment and the type of organism that can survive there. They observe that organisms have body parts (**structure**) that helps them survive in their habitat **(function).** Students also consider the rate of **stability and change** of an environment.

Mystery 2 How do we know what dinosaurs looks like?	4 days	3-LS4-1	Structure & Adaptations, Fossil Evidence, Classification	Fossils are clues to the past! They can tell us what an organism looked like on the outside, the habitat it lived in, and even the food it ate. Dinosaur skeletons helped us learn that dinosaurs looked a lot like lizards do today. Fossils of their teeth helped us determine if they were meat or plant-eaters. **DCIs: LS4.A**	Students **analyze and interpret data** from fossil records to determine what type of food an organism ate/eats. They use the fossil evidence to **engage in an argument** for why they chose each food source.	Students consider that fossilized evidence of organism's teeth (**structure**) can determine which type of food they ate (**function**) and the type of environment they inhabited.
Mystery 3 Can you outrun a dinosaur?	5 days	3-LS4-1	Fossil Evidence, Behavior	Dinosaur footprints are a type of fossil, meaning they can help us learn about the past. When footprints are farther apart, an organism is moving faster. When footprints are closer together, the organism is moving slower. Some dinosaurs are faster than others and we can use their footprints to figure out how their speed's were different. **DCIs: LS4.A**	Students **carry out an investigation** by comparing the stride length of student runners to the stride length of a comparable sized dinosaur, CeeLo. They use **mathematics and computational thinking** to record stride length, graph the value and determine the speed at which the student was running.	Students explore **quantity** by measuring stride length. They observe the relationship between stride length and speed.
Mystery 4 What kinds of animals might there be in the future?	5 days	3-LS3-1	Heredity, Variation, & Selection	People want their pets to look a certain way--they want them to have desirable traits. Since many characteristics of organisms are inherited from their parents, people can change organisms to have the traits they want! This is called selection. If people want an animal to have a specific trait -like, a dog to be small - they will breed two of the smallest dogs they can over and over again! **DCIs: LS3.A, LS3.B**	Students **analyze** the traits of parent dogs to determine which puppy they could have. They **construct explanations** about which traits the puppy gets from each parent.	Students recognize **patterns** in traits between parents and offspring.
Mystery 5 Can selection happen without people?	5 days	3-LS2-1* 3-LS3-1 3-LS4-2 3-LS4-3 *3-LS4-4*	Heredity, Variation, & Selection	It isn't just people that can change the traits of animals over time--nature can too! When the environment changes, like the introduction of a new predator, some organisms survive well and reproduce, some have traits that help them survive less well, and some cannot survive at all. Over time, most offspring will be born with the trait that helps them survive well. This is because offspring inherit their traits from their parents--and the ones that survive well and reproducing! *Bonus Mystery in Optional Extras **DCIs: LS2.C, LS3.A, LS3.B, LS4.B, LS4.C, LS4.C**	Students c**arry out an investigation** by using a **model** to simulate the introduction of a predator species on Lizard Island. Students simulate multiple generations of lizards, **analyzing and interpreting the data** after each one. They use this data to **engage in argument from evidence** to support their claim about how the offspring change from the original lizards.	Students recognize the **cause and effect** relationship between a change in the environment and the survival of organisms that inhabit it. They recognize environments as a **system**, made up of interdependent parts that function as a whole. They can be **stable and change** over time at different rates of speed.

Scope & Sequence - Grade 4

Implementation of the NJSLS for Science Grade 4 Unit 1 **Birth of Rocks** *Rock Cycle, Erosion, & Natural Hazards* October 9th - November 7th (21 days)					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English Language Development Standards**
Core Ideas: : 4.ESS1.1 4.ESS2.1 4.ESS2.2 4.ESS3.2 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.4.1 RI.4.7 RI.4.9 RI.5.1 RI.5.9 W.4.7 W.4.8 W.4.9 W.5.7 W.5.8 W.5.9 MP.2 MP.4 MP.5 4.MD.A.1 4.MD.A.2 4.OA.A.1	**Oct. 29 -Nov. 2** Benchmark 1	-Analyzing and interpreting data -Planning and carrying out investigations -Constructing explanations and designing solutions -Use findings as evidence for an argument -Conduct investigation -Use models -Design solutions	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science Grade 4 Unit 2 **Human Machine** Body, Senses, & the Brain December 17 - January 24 (21 days)

NJ Science Student Learning Standards (NJSLS)	edConnect Assessments	Scientific Practices	Technology		21st Century	English Language Development Standards
Core Ideas: 4-LS1-1 4-LS1-2 4.LS4.2 4-PS4-2 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3 **Cross Cutting:** SL.4.5 W.4.1 MP.4 4.G.A.1 4.G.A.3	**Jan.15-Jan.25** Benchmark 2	-Developing and using models -Engaging in argument from evidence -Construct an explanation -Conduct an investigation -Analyze and interpret data	8.1.2.A.1 8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.1.2.A.5 8.1.2.A.6 8.1.2.A.7 8.1.2.B.1 8.1.2.C.1 8.1.2.D.1 8.1.2.E.1 8.1.2.F.1 8.2.2.A.1 8.2.2.A.2 8.2.2.A.3 8.2.2.A.4 8.2.2.A.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	8.2.2.C.1 8.2.2.C.2 8.2.2.C.3 8.2.2.C.4 8.2.2.C.5 8.2.2.C.6 8.2.2.D.1 8.2.2.D.2 8.2.2.D.3 8.2.2.D.4 8.2.2.D.5 8.2.2.E.1 8.2.2.E.2 8.2.2.E.3 8.2.2.E.4 8.2.2.E.4 8.2.2.E.5	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science
Grade 4 Unit 3
Energizing Everything Energy & Motion
February 26th - March 26th (20 days)

NJ Science Student Learning Standards (NJSLS)	edConnect Assessments	Scientific Practices	Technology	21st Century	English Language Development Standards
Core Ideas: 4.PS3.1 4.PS3.2 4.PS3.3 4-PS3-4 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.4.1 RI.4.3 RI.4.9 W.4.2 W.4.7 W.4.8 W.4.9 MP.2 MP.4 4.OA.A.1 4.OA.A.3	**Mar.14-Mar.26** Benchmark 3	-Planning and carrying out investigations -Obtaining, evaluating, and communicating Information -Asking questions and defining problems -Constructing Explanations and designing solutions -Analyze and interpret data	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science **Grade 4 Unit 4** **Waves and Sound** Sound, Waves, & Communication **March 27th - May 3rd (22 days)**					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English Language Development Standards**

Core Ideas: 4.PS3.4 4.PS.4.1 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** W.4.7 W.4.8 RI.4.9 SL.4.5 MP.2 MP.4 MP.5 4.OA.A.3 4.G.A.1	**Apr. 29-May 3** Benchmark 4	-Constructing explanations and designing solution -Asking questions and defining Problems -Planning and carrying out Investigations -Developing and using models -Design own series of investigations -Argue from evidence	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Assessments				
	Benchmark	**Formative**	**Summative**	**Alternate/Diagnostic**
Science	**edConnect Unit Benchmark**	Interactive Science Notebook Essential Question Responses Mystery Activity Journal Entries	End of lesson assessments on www.mysteryscience.com End of Unit assessments on www.mysteryscience.com	Essential Question Pretest Alternative Assessments Guide

Grade 4 Unit 1

Birth of Rocks *Rock Cycle, Erosion, & Natural Hazards*

Grade 4 Mystery Science & NGSS Alignment - Earth & Space Sciences (ESS)

Profound Perspective: Every rock has a story that it tells, if you know how to "read" it, i.e. by identifying *patterns* and knowing the *causes* of how the various rocks are formed. Take any place that seems mundane to people now--like a parking lot--and a rock will tell you something extraordinary about what that place *used* to be like: it may well have been the site of a volcano. You will soon discover that nowhere on earth has been mundane forever. One of the most seemingly dull things you can imagine--a simple rock--is actually the relic of something astounding.

Essential Question: How is the surface of the Earth changed by weathering and erosion? How does it affect people?

Grade 4 Earth Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Could a volcano erupt in your backyard?	5 days	4-ESS1-1 4-ESS2-2	Volcanoes, Rock Cycle & Earth's Surface	Rocks begin as lava--volcanic rocks are lava that has been frozen in time. Volcanoes don't just exist--they *form*, or 'pop up'. There is a pattern to where most volcanoes exist today on the earth. And yet dead volcanoes--and volcanic rock they erupted--can be found in *lots* of places. (So the pattern today isn't necessarily what it used to be.) You can look for volcanic rocks near you. **DCIs: ESS1.C, ESS2.B**	Students **analyze and interpret data** from recent volcanic eruptions. They use their findings as **evidence for an argument** that volcanoes are (or are not) likely to erupt in their backyard. .	Students identify **patterns** about the location of the world's volcanoes and use these patterns as evidence to support an argument about why a volcano may or may not erupt in their backyard.
Mystery 2 Why do volcanoes explode?	5 days	4-ESS1-1	Volcanoes, Lava & Rock Cycle	Volcanic rocks are lava frozen in time. There are two primary types of lava, each of whose thickness explains two major differences in a volcano's shape & style of eruption. These two lavas also account for two commonly observed volcanic rocks that you might find. **DCIs: *Foundational for* ESS2.B; *Extends* ESS2.B**	Student **conduct an investigation** to **construct an explanation** for why some volcanoes explode and why some do not. Students **model** thick and thin lava to conduct their investigations.	Students reason about the **cause and effect** of the type of lava (cause) and the nature of the eruption (effect) as well as the shape of the volcano (effect).
Mystery 3 Will a mountain last forever?	5 days	4-ESS1-1 4-ESS2-1	Weathering & Destructive Forces	Rock does not stay as massive monoliths of volcanoes--it tends to get broken into smaller pieces ("sediments") over time due to natural forces ("weathering"), and tumble downhill. You can look for evidence of this where you live. **DCIs: ESS2.A**	Students **conduct an investigation** by **modeling** how rocks erode over time. Students **construct an explanation** for why rocks erode.	Students consider the **cause and effect** of ice and root wedging on rock as it is broken down into small pieces.
Mystery 4 How could you survive a landslide?	6 days	4-ESS2-1 4-ESS3-2	Erosion, Natural Hazards & Engineering	The weathering process is not benign; it creates some of the worst natural hazards, including rock falls, landslides, and debris flows. If we are to be safe from these hazards, we have to design solutions to protect us. **DCIs: ESS3.B**	Students **design solutions** to protect their "homes" from rock slides. Students **argue** for the merits of their design.	**Engineering** a solution to landslide hazards **depends on scientific knowledge** about the causes of landslides.

Grade 4 Unit 2

Human Machine *Body, Senses, & the Brain*

Grade 4 Mystery Science & NGSS Alignment - Life Science (LS)

Profound Perspective: Your body is like a machine or robot. It has parts for moving around, sensors, a built-in computer (and it all even runs on power--but that's a topic for a later time).

Essential Question: How is a robot and the human body similar?

Grade 4 Life Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Why do your biceps bulge?	5 days	4-LS1-1	Muscles & Skeleton	Like a machine or robot, the body has parts, or structures, for moving around (e.g. the limbs). In order to move (one of the body's functions), the body needs at least two things: muscles and bones. The contraction of your muscles pulls on tendons, which in turn pull on the bones, causing you to move. Your external parts (such as appendages) are controlled by your brain like a marionette puppet (a topic we explore in Mystery 4). **DCIs: LS1.A**	Students **build a model** of a finger that they then use to **construct an explanation** for how fingers move.	Students consider how human motion is made possible by a **system** of muscles, tendons and bones. Students consider the **cause and effect** relationship between tendons and the muscles and bones that they move.
Mystery 2 What do people who are blind see?	5 days	4-LS1-1 4-LS1-2 4-PS4-2	Eyes & Vision	Continuing the analogy of the body as a machine or robot, we now consider its "sensors"--the sensory organs, in this lesson focusing specifically on the eyes. Students discover the basics of how their eyes work, and figure out some of the causes of vision problems. **DCIs: LS1.A; *Foundational for* LS1.D, PS4.B**	Students **build a model** of a eyeball that they then use to **construct an explanation** of why some people have blurry vision.	Students think about how the eye works as a **system** of different parts that interact to facilitate vision. Students consider how light interacts with the system to determine what images we see (**cause and effect**.)
Mystery 3 How can some animals see in the dark?	5 days	4-LS1-1 4-LS1-2 4-PS4-2	How Eyes Work	Students delve further into the workings of the eye, exploring the function of their iris and pupil. **DCIs: LS1.A; *Extends* LS1.D, PS4.B**	Students **conduct an investigation** to see how pupils change in response to light. Students **build a model** of an eye (extending the model they built in Mystery 3) to **explain** how changes in pupil size changes the image that appears on the retina.	Students continue to think about how the eye works as a **system** and how changes to each part impact the system as a whole. Students also reason about the effect of changes in pupil size (**cause and effect).**
Mystery 4 How does your brain control your body?	6 days	4-LS1-1 4-LS1-2	Brain & Nerves	Continuing the analogy of the body as a machine or robot, we finally consider the body's 'build-in computer' or central processor: the brain, and its accompanying nerves. Students explore the brain's role in receiving information from the senses, processing that information, and controlling the muscles to enable movement. **DCIs: LS1.A, LS1.D**	Students **conduct investigations** to explore how the brain processes information and responds to that information. Students **analyze and interpret data** from the investigations to determine how fast their reflexes are.	Students identify **patterns** based on how their brains process information.

Grade 4 Unit 3

Energizing Everything Energy & Motion
Grade 4 Mystery Science & NGSS Alignment - Physical Science (PS)

Profound Perspective: "Energy" is a real thing--not just some vague term--almost like a power or substance that causes objects to move, speed up, or slow down. This power or substance can be transferred between objects when they collide. Thinking about the world in terms of energy helps us to make sense of how and why things speed up and slow down.

Essential Question: What is energy? Where does it come from? How does it change?

Grade 4 Physical Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 How can a car run without gas?	4 days	4-PS3-1 4-PS3-4	Stored Energy, Motion	When something is moving, it has energy. Moving things get their energy from stored energy, and energy can be *stored* in different ways (such as gasoline, batteries, or even food). DCIs: PS3.B, Foundational for PS3.A	Students build rubber-band racers and use them to **carry out an investigation** to examine the relationship between stored energy and motion. Students **analyze and interpret data** from their races. As engineers, students modify their racers to improve how well they move.	Students explore how **energy** can be stored and released using a rubber band. The amount of **energy** that is put into the **system** is related to the amount of energy that is released.
Mystery 2 What makes roller coasters go so fast?	4 days	4-PS3-1 4-PS3-3	Stored Energy, Speed, Collisions	Giving something "height" (putting it up high) is another way to store energy in something. When the object falls or drops, that stored energy is released: this explains why roller coasters work, but also bicycling downhill, skiing, skydiving, even meteors. The higher up you place an object, the more energy you store in it, and the faster it goes when released or dropped. DCIs: PS3.A	Students **build a model** of a roller coaster and carry out an investigation using marbles. Students **analyze and interpret data** from the model to **explain** the connection between height, energy and motion.	Students consider how **energy** is stored and released in a system as they experiment with their marble roller coasters.
Mystery 3 Why is the first hill of a roller coaster always the highest?	4 days	4-PS3-3	Energy & Collisions	Something that's falling only has as much energy as was stored in it in the first place. This is why the first hill of a rollercoaster is always the highest. When an object collides with another object, some of its energy is transferred.	Students **conduct an investigation** using a model roller coaster to determine how energy can be stored in the hills of the coaster and how that energy is released to make the marbles go	Students consider how **energy** is stored and released in a system as they experiment with their marble roller coasters.

				DCIs: PS3.B	different distances. Students **analyze and interpret data** from the model to explain how the heights of different hills give marbles the energy to roll.	

Mystery 4 Could you knock down a building using only dominoes?	4 days	4-PS3-4 3-5-ETS1-1	Energy & Engineering	We can invent devices that convert stored energy into movement, and transfer that energy to various other objects along a pathway. DCIs: PS3.A, PS3.C, ETS1.A	Students begin to **design** a chain reaction machine. They start by figuring out how to connect two components of the chain reaction: the lever and the slide. This is the basis of the machine they will further develop in Mystery 5.	Students consider the ways in which energy can be stored and released as they trace the path of energy through a chain reaction.
Mystery 5 Can you build a chain reaction machine? (continuation of Mystery 4)	4 days	4-PS3-4 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3	Energy & Engineering	Engineers are people who design or invent solutions to problems by using knowledge of science. All engineers think about what their goal is, come up with multiple ideas, test those ideas out, and repeatedly fail until they figure out what works. DCIs: PS3.A, PS3.C, ETS1.A	Students **design** a chain reaction machine that displays a message at the end. The chain reaction machines use multiple components that transfer energy from one part to the next.	Students consider the ways in which energy can be stored and released as they trace the path of energy through a chain reaction.
***Done in 4th MP Mystery 6 What if there were no electricity?	5 Days	4-PS3-2 4-PS3-4	Electrical Energy	Electricity--the stuff from our outlets and batteries--is a form of energy that we use to produce *movement*, but also light, heat, and more. Just like the energy in a chain reaction machine, electricity moves along a path and so can be transferred from one place to another. We can use such knowledge about electrical energy to design solutions to problems (such as flashlights for seeing in the dark). DCIs: PS3.B, ETS1.A	Students **design** a flashlights using batteries, flights and tin foil. Students experiment with different ways of constructing their flashlights so that they turn on and off.	Electricity is a form of **energy** that can be stored (such as in batteries) and transferred via wires, where it is used to produce not only movement, but also light, heat, and more.

Grade 4 Unit 4

Waves of Sound *Sound, Waves, & Communication*

Profound Perspective: Even though "sound" might seem like a short-lived phenomenon without any real form, it is very much a physical thing, a wave of vibrations traveling through the air. Sound has properties: it takes time to travel, it can be transmitted over a string, manipulated to become high or low, turned into music, even captured and frozen in time. Equipped with this understanding, students can begin to make sense of how sound and music work.

Essential Question: What is sound and how does it travel through objects?

Grade 4 Physical Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 How far can a whisper travel?	5 days	4-PS4-1 4-PS4-3	Sound & Vibrations	Sounds aren't something we can see or touch, and so it's easy to dismiss them as not fully real. But if you've experienced an echo before, then clearly there is something interesting and very real about sound--we can even feel and see that sound has something to do with vibrations. Students observe a relationship between sound and vibration, and through the activity, discover evidence that sound isn't merely related to vibrations, but perhaps, *is* a vibration. **DCIs: *Foundational for* PS4.A**	Students document their understanding of how vibrations travel using a **model** of their paper cup telephones. Students then **design their own series of investigations** to figure out how to make their telephone work better in different circumstances. Students **construct an explanation** of how the telephone works. Students extend the lesson by developing a way to send a message using a pattern of sounds.	Students identify **patterns** about the relationship between the tension of the string and the quality of the sound it produces. Students also investigate **patterns** in the how different materials affect the quality of the sound that is transmitted.
Mystery 2 What would happen if you scream in outer space?	6 days	4-PS4-1	Sound & Vibrations	Sound can travel through lots of different materials: through water, through string… it's possible to even *feel* the vibrations in the string, pinch the string, and stop the vibrations from reaching the other side. It would seem that sound is a vibration that must travel from one place to another. So does that mean sound is vibrating the air? (It is.) And what happens if there is no air? (There is no sound!) **DCIs: PS4.A**	Students **conduct investigations** with balloons to experience the vibrations caused by sound of their voices. Students **construct an explanation** that sound is a vibration. Students then **develop a model** to explain how sound travels through a medium and how it can cause distant objects to move.	Students consider the **effect** of vibrations on the movement of distant objects.
Mystery 3 Why are some sounds high and some sounds low?	6 days	4-PS4-1	Sound, Vibrations & Waves	Some sounds are very high-pitched, while others are low-pitched. For example, young people can even hear certain high-pitched sounds that adults can no longer hear. What makes one sound high and another low? By examining some musical instruments played in slow motion, we can begin to detect some differences in the vibrations. Special instruments enable us to visualize the resulting air vibrations, and reveal that sound vibrations travel as waves in the air. Students discover that the difference between high and low-pitched sounds has to do with the length of these waves ("wavelength").	Students **analyze and interpret data** from oscilloscopes to determine how wavelengths differ between high and low pitch sounds. Students make claims and **argue from evidence** about which wavelength patterns were generated from different pitches. Students then use a rope to **model** waves created by different pitches and begin to explore the relationship between wavelength and frequency.	Students identify and analyze the oscilloscope **patterns** made by sounds with low and high pitches.

				DCIs: PS4.A		

Possible Modifications and Accommodations			
Special Education/504	**At-Risk**	**Gifted and Talented**	**English Language Learners**
All teachers of students with special needs must review each student's IEP. Teachers must then select the appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.* **All teachers of students with a 504 must review each student's 504. Teachers must then follow the document for appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.* **Possible Modifications/Accommodations ● Extra time on timed assessments ● Use of a graphic organizer to plan ways to solve problems ● Use of concrete materials and objects (manipulatives) ● Opportunities for cooperative partner work ● Basic computation – use counters	The possible list of modifications/accommodations identified for Special Education students can be utilized for At- Risk students. Teachers should utilize ongoing methods to provide instruction, assess student needs, and utilize modifications specific to the needs of individual students.	● Enrichment projects ● Higher-level cooperative learning activities ● Provide higher-order questioning and discussion opportunities ● Tiered centers ● Tiered assignments	● Continue practicing vocabulary ● Demonstrate that vocabulary can have multiple meanings ● Encourage bilingual supports among students ● Provide visual cues, graphic representations, gestures, and pictures ● Rephrase science questions when appropriate ● Build knowledge from real-world examples ● Provide manipulatives and symbols ● Encourage peer discussions regarding how students are thinking about science

• Differentiated center-based small group instruction • Provide a copy of math class notes, and examples for science notebook • Highlight or underline key words in science notebook • If a manipulative is used during instruction, allow its use on a tests • Provide visual aids and anchor charts • Tiered lessons and assignments			

/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/

Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Scope & Sequence - Grade 5

Implementation of the NJSLS for Science Grade 5 Unit 1 **Chemical Magic** Chemical Reactions and Properties of Matter October 9th - November 7th (21 days)					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English & Spanish Language Development Standards**
Core Ideas: : 5.PS1.1 5.PS1.2 5.PS1.3 5-PS1.4 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.5.7 W.5.7 W.5.8 W.5.9 MP.2 MP.4 MP.5 5.MD.A.1 5.NBT.A.1 5.NF.B.7 5.MD.C.3 5.MD.C.4	**Oct. 29 -Nov. 2** Benchmark 1	-Planning and carrying out investigations -Develop and use models -Use mathematics and computational thinking -Construct an explanation -Develop conceptual models -Analyze data -Develop a particle model	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science Grade 5 Unit 2 Web of Life Ecosystems and the Food Chain **December 17 - January 24 (21 days)**					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English & Spanish Language Development Standards**
Core Ideas: 5.LS1.1 5.LS2.1 5.PS3.1 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.5.1 RI.5.7 RI.5.9 W.5.1 SL.5.5 MP.2 MP.4 MP.5 5.MD.A.1	**Jan.15-Jan.25** Benchmark 2	-Engage in argument from evidence -Develop and use models -	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science Grade 5 Unit 3 Watery Planet February 26th - March 26th (20 days)					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English & Spanish Language Development Standards**
Core Ideas: 5.ESS2.1 5.ESS2.2 5.ESS3.1 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.5.1 RI.5.7 W.5.8 RI.5.9 W.5.9 SL.5.5 MP.2 MP.4 5.G.A.2	**Mar.14-Mar.26** Benchmark 3	-Develop and use models -Obtain, evaluate, and communicate Information -Use mathematics and computational thinking	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Implementation of the NJSLS for Science Grade 5 Unit 4 **Spaceship Earth** Sun, Moon, Stars & Planets March 27th - May 3rd (22 days)					
NJ Science Student Learning Standards (NJSLS)	**edConnect Assessments**	**Scientific Practices**	**Technology**	**21st Century**	**English & Spanish Language Development Standards**

Core Ideas: 5.ESS1.2 3-5.ETS1.1 3-5.ETS1.2 3-5.ETS1.3 **Cross Cutting:** RI.5.1 RI.5.7 RI.5.8 RI.5.9 W.5.1 SL.5.5 MP.4 5.NBT.A.2 5.G.A.2	**Apr. 29-May 3** Benchmark 4	-Develop and use models -Engage in arguments from evidence -Analyze and interpret data -Construct an argument -Obtain and communicate information	8.1.2.A.1 8.2.2.C.1 8.1.2.A.2 8.2.2.C.2 8.1.2.A.3 8.2.2.C.3 8.1.2.A.4 8.2.2.C.4 8.1.2.A.5 8.2.2.C.5 8.1.2.A.6 8.2.2.C.6 8.1.2.A.7 8.2.2.D.1 8.1.2.B.1 8.2.2.D.2 8.1.2.C.1 8.2.2.D.3 8.1.2.D.1 8.2.2.D.4 8.1.2.E.1 8.2.2.D.5 8.1.2.F.1 8.2.2.E.1 8.2.2.A.1 8.2.2.E.2 8.2.2.A.2 8.2.2.E.3 8.2.2.A.3 8.2.2.E.4 8.2.2.A.4 8.2.2.E.4 8.2.2.A.5 8.2.2.E.5 8.2.2.B.1 8.2.2.B.2 8.2.2.B.3 8.2.2.B.4	CRP1 CRP2 CRP3 CRP4 CRP5 CRP5 CRP6 CRP7 CRP8 CRP9 CRP10 CRP11 CRP12 9.2.4.A.1 9.2.4.A.2 9.2.4.A.3 9.2.4.A.4	ELDS.1 ELDS.2 ELDS.3 ELDS.4 ELDS.5

Assessments				
	Benchmark	**Formative**	**Summative**	**Alternate/ Diagnostic**
Science	**edConnect Unit Benchmark**	Interactive Science Notebook Essential Question Responses Mystery Activity Journal Entries	End of lesson assessments on www.mysteryscience.com End of Unit assessments on www.mysteryscience.com	Essential Question Pretest Alternative Assessments Guide

Grade 5 Unit 1

Chemical Magic *Chemical Reactions and Properties of Matter*
Grade 5 Mystery Science & NGSS Alignment - Physical Sciences (PS)

Profound Perspective: This unit helps students develop the concepts of “substances” and “chemical reactions.” Students see that chemical reactions enable us to make new materials by transforming the ones we have. The results of these reactions are interesting and sometimes profoundly useful.

Essential Question: What is matter and how can it be changed?

Grade 5 Physical Science		Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Are magic potions real?	4 days	5-PS1-1 5-PS1-2	Introduction to Chemistry	The alchemists were a historic group of people who experimented with mixing different substances together to make a potion. They wondered if their potions could transform materials. **DCIs: *Foundational PS1.A and PS1.B***	Students **plan and carry out an investigation** to see which solution will turn a dull penny into a shiny penny. Students **develop a conceptual model** in order to **construct an explanation** for their test results. They revise their conceptual **model** as they develop a more sophisticated understanding of particles.	Students observe the **effect** of solutions on a dull penny. Students explore that substances undergo **change**.
Mystery 2 Could you transform something worthless into gold?	4 days	5-PS1-1 5-PS1-2	Particulate Nature of Matter	The alchemists were on a quest to transform ordinary metal into gold, so that they could become rich. To do this, the alchemists observed and investigated the many materials around them--the substances which things are made of. They discovered that substances are able to change form, and that some substances may even *appear* to vanish, almost like magic. **DCIs: *Foundational PS1.A and PS1.B***	Students **carry out an investigation** to determine what happens when they place a steel object in the same solution that turned their pennies shiny in Mystery 1. Students **construct an explanation** by **developing a conceptual model** to show how the solution affects the steel nail.	This Mystery lays the foundation for an understanding of **conservation of matter** by considering that the copper from the penny did not disappear, but only dissolved into the solution. Students consider the variety of **scale** within natural objects. They understand that there are extremely small, to small to see, copper particles dissolved in their solution.

Mystery 3 What would happen if you drank a glass of acid?	4 days	5-PS1-3	Acids, Reactions & Properties of Matter	The alchemists discovered acids--a set of substances that is extremely *reactive* (undergoes chemical changes easily). A chemical *reaction* happens when different substances are mixed and it causes some kind of change. We can tell a chemical change is happening by observing indications such as fizzing, a color change, or dissolving. **DCIs: PS1.A**	Students **conduct an investigation** to discover if a reaction occurs when mixing two substances. **Analyzing the data**, students determine which substances react with acid. Next, students decide how to test unknown liquids to see if they are acids.	Students consider the **cause and effect** relationship when combining chemicals to produce reactions. Students consider that combining two chemicals may result in a **change** in the substance.

Mystery 4 What do fireworks, rubber, and silly putty have in common?	4 days	5-PS1-4	Chemical Reactions	The alchemists were not successful in finding an easy way to make gold, but all of their observations and experimenting with substances turned out to be hugely important. For example, when acids react with other substances, they form entirely new substances. The new substance will have different properties from the original substances. Some of these properties are useful. Chemical reactions are how we get new substances and discover new properties! **DCIs: PS1.B**	Students **conduct an investigation** to see which chemicals, when combined, result in a chemical reaction. They **construct an explanation** to share which chemicals reacted and formed a new substance with a good consistency. In Part 2 of the activity, students make their own goo by mixing the two chemicals which formed a goo-like substance in Part 1.	Students consider the **cause and effect** relationship between chemicals that are combined to form new substances. Students consider that combining two chemicals may result in a **change** when a substance with unique properties is created.
Mystery 5 Why do some things explode?	5 days	5-PS1-1	Gases & Particulate Nature of Matter	Not all explosions are big and fiery, they can be small too! The alchemists were the first to discover these small explosions. They noticed small bubbles forming when some substances and objects were placed in an acid. The substance, gas, was hard to capture--it would escape the container, or make it burst. Gases can be visible or invisible and are made up of many tiny particles that you can't see. All explosions are caused by a buildup of gas moving outward that bursts the container they are in. **DCIs: PS1.A**	Students **conduct an investigation** to see what happens when baking soda and vinegar react inside a closed ziplock bag. They **develop a particle model** to explain their results--that gas particles are created and move outward, causing the ziplock bag to expand or even burst.	Students consider that combining two chemicals may result in a **change** when a substance with unique properties is created. Students understand that particles are very small, to small to see, compared to other natural objects.

Grade 5 Unit 2

Web of Life *Ecosystems and the Food Chain*

Grade 5 Mystery Science & NGSS Alignment - Life Science (LS)

Profound Perspective: The food materials and energy that our bodies use for growth ultimately come from plants. Plants in turn derive their materials from air, water, and soil and their energy from the sun. Thus in a very real way, our bodies come from the earth and the sun. And when we die, decomposers return our materials and energy to the earth, to be used again by future organisms. The whole of nature forms a great system--the ecosystem.

Essential Question: How is energy cycled through living things? Who eats who?

Grade 5 Life Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Why would a hawk move to New York City?	3 days	5-LS2-1	Food Chains, Predators, Herbivores & Carnivores	Animals are all around us--even in cities. We can learn to spot them by bearing in mind of one of the most basic relationships that all animals have with each other: some of them are predators and others are prey. (Where there are prey, there are predators, and vice versa.) **DCIs: LS2.A, Foundational for LS1.C**	Students **construct models** of different food chains by linking cards representing different organisms. The chains are used to explain the relationship between predators and prey. Students **argue using evidence and reasoning** about which organisms can be linked together and in what order.	This Mystery begins to lay the foundation for thinking about **systems and energy/matter flow.** By constructing chains of relationships between organisms, students are exposed to an example of a system. Food chains set students up for considering energy & matter flow in future Mysteries in this unit.
Mystery 2 What do plants eat?	4 days	5-LS1-1 5-LS2-1	Matter Cycle, Food Chain	Because predators depend on prey, all animals ultimately depend on plants--even carnivores that do not eat plants. Plants in turn derive their growth material primarily from water and air. **DCIs: LS1.C, Foundational for LS2.B**	Students **plan an investigation** to determine whether or not air has weight. As a whole class, students **conduct an investigation** to compare the weights of balloons with and without air. Students **analyze and interpret data** from the investigation to **explain** what happened and how the evidence may **explain** how plants gain weight.	Students observe that deflating a balloon **causes** the balloon to weigh less, leading to the conclusion that air has weight. This Mystery also lays the foundation for an understanding of **conservation of matter** by considering how plants gain weight as they grow due to the air they absorb.
Mystery 3 Where do fallen leaves go?	4 days	5-LS2-1	Decomposers & Matter Cycle	Decomposers are yet another category of living thing, which consume dead plant and animal material and produce soil. Fungi--of which mushrooms and mold are types--is a conspicuous decomposer found everywhere, even in your home. **DCIs: LS2.A, Foundational for LS2.B**	Students **ask questions** about what conditions they think will induce and prevent the growth of mold. Students **plan and conduct an investigation** to test different conditions. Students **analyze and interpret data** that they record from their experiments to **explain** how different conditions impact mold growth.	Students observe **patterns i**n the rates of **change** in the mold terrariums. They note similarities and differences to analyze how mold grows on different foods under different conditions.

Grade 5 Life Science		Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 4 Do worms really eat dirt?	3 days	5-LS2-1 5-LS1-1	Decomposers, Nutrients, & Matter Cycle	Earthworms aren't pests, they are decomposers! They eat dead and decaying matter, bacteria, and animal waste that is in soil. Worm castings (their excretions) release the nutrients from their food back into the soil. In addition to water and carbon dioxide from the air, plants need these nutrients to grow. Worms help gardens, not hurt them. **DCIs: LS2.A, LS2.B, *Supplementary* LS1.C**	Students observe worm behavior to help them determine a worm's role in a garden. Then, they **conduct an investigation** to test if worms prefer damp or dry places. They **create an argument** using the investigations results as **evidence** to support a claim about the worm's preferences. Lastly, students **plan and carry out an investigation** to answer a question they have about worms.	Students recognize that earthworms are part of a **system,** a food chain, with other organisms. Earthworms help **matter** flow back into the food chain.
Mystery 5 Why do you have to clean a fish tank but not a pond?	3 days	5-LS2-1	Ecosystems & Matter Cycle	All living things in an ecosystem depend on one another. In a pond, fish depend on plants as food and as a source of oxygen. Decomposers break down dead plant and animal matter, releasing micronutrients into the water. They also give off carbon dioxide. Plants take in carbon dioxide and give off oxygen. If one part is removed, the ecosystem would not function. **DCIs: LS2.A, LS2.B**	Students **develop a model** to show the flow of energy and matter within an ecosystem. Then, students **develop a model** of a pond ecosystem. They add different living things to the pond, considering what each organism needs to eat and how much carbon dioxide each organism adds or removes from the ecosystem.	Students recognize the living organisms in a habitat as a **system**, an ecosystem. If one organism were to disappear, the whole ecosystem would break down.
Mystery 6 Why did the dinosaurs go extinct?	4 days	5-PS3-1	Flow of Energy	It is believed that an asteroid impact *could* have caused the dinosaurs to go extinct. When the asteroid hit the earth it filled the sky with dust, ash and debris which blocked sunlight. Plants all over the world couldn't get the sun's energy they needed to grow. When plants died out, the herbivores would eventually die as well, followed by the carnivores. Ultimately, the asteroid collapsed the dinosaur's food web causing a mass extinction. **DCIs: PS3.D, LS1.C**	Students **develop a model** of a dinosaur food web to show how all animals get their energy. They use the model to help **construct an explanation** about how an asteroid killed all of the dinosaurs.	Students identify the sun as the ultimate source of **energy** in an ecosystem. The sun's energy is used by plants to grow and transferred through an ecosystem in the form of food.

Grade 5 Unit 3

Watery Planet

Profound Perspective: This unit helps students develop the idea that water is a profoundly important natural resource, but one which requires surprising ingenuity to find and maintain.

Essential Question: Where does earth's water come from? How is water recycled through the environment?

Grade 5 Earth Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 How much water is in the world?	5 days	5-ESS2-2	Water on Earth's Surface	Water is our most basic human need. Despite the fact that Earth is a watery planet, Earth's water is mostly salt water--a form not fit to drink. Easily accessible fresh water is a surprisingly small amount by comparison. Of that fresh water, much of it is frozen in glaciers and ice caps. **DCIs: ESS2.C**	Students **analyze and interpret dat**a from world maps to determine the relative amounts of fresh, salt and frozen water. Students **use mathematics and computational thinking** to calculate areas on a map and graph values to compare and graph quantities of fresh, salt and frozen water on Earth.	Students use standardized units of area to compare the **quantity** of fresh, salt and frozen water on Earth. Students use **proportional reasoning** to represent **quantities** in their graph comparing different types of water.
Mystery 2 When you turn on the faucet, where does the water come from?	5 days	5-ESS2-2 5-ESS3-1	Water as a Natural Resource	Most people get their drinking water from water that's located underground, where there turns out to be a surprisingly large amount within structures called "aquifers." People use science ideas	Students are asked to determine where is the best place to settle a new town by considering features of the landscape and what they know about where to find water. Students **obtain, evaluate and communicate** information from different sources about topography, plants and soil to inform their decision. Students **argue using evidence** to justify where their town should be built.	Students reason about information they get about natural patterns to determine where underground water is most likely to be found. These **patterns** involve correlations between elevation and water depth as well as how plant

				about the location of aquifers to make decisions about where to build communities. **DCIs: ESS2.C, Foundational for ESS3.C & ESS2.A**		and soil **patterns** can give clues about where drinkable water may be found.
Mystery 3 Can we make it rain?	5 days	5-ESS2-1	Water Cycle	Evaporation of ocean water is the ultimate source of rain, and thus all our easily accessible fresh water. (All water on Earth's surface is part of an interconnected system, the hydrosphere.) **DCIs: Foundational for ESS2.A**	Students create a **model** of the ocean and sky (hydrosphere and atmosphere). Students use the model to **plan and carry out an investigation** to determine how temperature influences evaporation and condensation.	Students reason about how the hydrosphere and atmosphere **systems** interact to produce rain. Students model the systems to explain how rain is created.
Mystery 4 How can you save a town from a hurricane?	5 days	5-ESS2-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3	Natural Disasters & Engineering	Hurricanes start out as small storms over the ocean. As they move across the ocean, warm water evaporates into the storm cloud, making the hurricane grow bigger and bigger. Hurricanes bring tons of rain, flooding entire cities. Engineers design solutions to protect towns	Students **define the problem** that a town needs protection from flooding. They **obtain and communicate information** about different types of engineers and work as a team to design solutions using their different types of flood protection. Students use **mathematics and computational thinking** design a solution under budget.	Students reason about how the hydrosphere and atmosphere **systems** interact to produce hurricanes and extreme flooding. They also consider the impact of hurricanes on the biosphere and geosphere system.

				from extreme flooding. **DCIs: ESS2.A, ETS1.A, ETS1.B, ETS1.C**		

Grade 5 Unit 4

Spaceship Earth Sun, Moon, Stars & Planets

Profound Perspective: This astronomy unit helps students develop a new perspective on the world they're standing on. They will be given evidence that the Earth beneath our feet is actually moving through space, both spinning on its axis, and traveling in a great orbit around the Sun. They will see how these movements account for the patterns we see in our sky (the paths of our Sun across the sky, the changing seasons, and the changing constellations). Accompanying us on this journey are the Moon and planets, which the students will observe have their own patterns of movement in the sky.

Essential Question: Why are there 24 hours in a day?

Grade 5 Life Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 1 Why does the sun rise and set?	3 days	5-ESS1-2	Sun, Daily Patterns, Earth's Rotation	The sun appears to move across the sky each day, creating an observable pattern. It rises in the morning, and sets in the evening. It is natural for us to assume that the sun is moving--this is what we believed for most of human history. But to much surprise, scientists eventually figured out that this is not the case; it's actually the Earth that is spinning. There is no simple way to demonstrate this from the ground without using advanced knowledge of physics and math. But now that we've been to space and can film it, we have direct proof. **DCIs: ESS1.B**	Students **carry out an investigation** to explore the phenomena of the sun appearing to move across the sky. They investigate **using two models,** one of the sun rotating around the Earth and another of the Earth rotating around the sun. Students create an **argument using the evidence** they gathered in the investigation to explain why the sun rises and sets.	Students observe the **pattern** of the rising and setting sun. In this Mystery, they notice the similar **patterns** between two different models. They recognize that the sun moving across the sky is a **pattern** that can be explained by either model. With additional data, students come to understand which model is accurate.
Mystery 2 Who set the first	4 days	5-ESS1-2	Sun, Daily Patterns, Earth's Rotation	A long time ago, our ancestors divided the day into 24 hours. Clocks measure the Sun's apparent movement. But before clocks existed, the change in shadows helped us	Students create a shadow clock, to observe how shadows change throughout the day. Students **carry out**	Students observe **patterns** in the **change** of

clock?				measure the Sun's movement. The sun's position causes the length and direction of an object's shadow. Since the Sun moves across the sky each day in a pattern, shadow clocks (sundials) can be used to tell the time of day. **DCIs: ESS1.B**	**an investigation** to determine how the position of the sun changes the direction of the shadow at different times of day. Then, they go outside and **interpret data** from their shadow clock to determine what time of day it is.	shadow length and position throughout the day. They use shadow **patterns** to determine what time of day it is, without the use of a clock.
Mystery 3 Why do the stars change with the seasons?	4 days	5-ESS1-2	Stars & Constellations, Earth's Orbit, Annual Patterns	The night sky is full of stars that are grouped into constellations. The stars are seasonal, which means we only see certain stars depending on the season. As the Earth orbits around the sun, its position in the universe changes and we see different parts of the night sky. The seasonal patterns of the constellations repeat each year. **DCIs: ESS1.B**	Students **develop a model** of the universe, in order to **construct an explanation** for why we see different stars during different seasons. Using **evidence** from their **model**, students make an **argument** that supports the claim that the Earth orbits around the sun.	Students observe the seasonal **pattern** of stars. They note the **change** of constellations that are visible in the night sky, based on the season. This pattern is used as evidence to argue that Earth is orbiting the Sun, and we only see a part of the night sky at a time.

Grade 5 Physical Science	Pacing Guide	Performance Expectations	Topics	Disciplinary Core Ideas (DCIs) (Mystery Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Mystery 4 How can the sun tell you the season?	4days	5-ESS1-2	Sun, Earth's Orbit, Annual Patterns	The sun's path changes with the seasons. Summer days are longer and warmer, because the Sun follows a higher path across the sky. Winter days are shorter and colder, because the Sun follows a low path across the sky. In the summer, shadows are shorter because the Sun is high. In the winter, they are longer because the Sun is low. **DCIs: ESS1.B**	Students **analyze and interpret data** from photographs taken during different seasons and times of day, to determine how the sun's path affects Earth's surface. Students use **evidence** from the photos-- such as weather, shadow length, and sunrise/sunset time-- to **construct an argument** as to which season it is.	Students observe the **pattern** of seasons **caused** by the sun's path. The unique characteristics of each season are **caused** by the sun's position in the sky. Each season repeats each year.
Mystery 5 How does the moon change	4 days	5-ESS1-2	Moon, Moon's Orbit, Lunar Cycle	If you look up at the night sky and see the moon, then do it again a week later- it will be a different shape! But the Moon isn't actually changing shape, it's always a sphere. The Moon orbits Earth, and when it is farther away from the sun, more of it is lit up; when it is closer to the sun, less of it is lit up. The	Students **develop a model** of the sun and moon to **carry out an investigation** of the Moon's orbit and the different moon phases. Through this investigation, they **obtain information** about how the	Students consider the phases of the moon as a **pattern**. They learn that the orbit of the Moon

shape?				Moon's phases are a pattern that go in a very certain order. Just like other sky patterns we've learned about, the cycle of the Moon is used to measure time. A full cycle takes about 28 days, or about a month, to repeat! **DCIs: ESS1.B**	Moon goes through each phase. Then, they **communicate this information** by constructing an explanation about what causes the Moon's phases for someone who doesn't already know.	around Earth **causes** each different phase. The phases repeat in the same order every 14 days, and then reverse in the same order for another 14 days. The total orbit of the Moon around the Earth takes 28 days, and then the **pattern** repeats.
Mystery 6 What are the wandering stars?	3 days	5-ESS1-2	Plants & Solar System	We've already learned that the sky is full of stars. If you look closely, some of those stars appear to be wandering-or moving-across the night sky! The ancient Greeks gave these wandering stars a special name, "planetes." Look familiar? That's right-these wandering stars are actually planets. We'll take a tour through the solar system and learn about some interesting discoveries of each planet.	Students **use a model** of the solar system to learn the order of the planets and their relative distance from the sun, and each other. Using sidewalk chalk, they draw the sun and the planets at their relative distances from one another. Then, they play "Running to Neptune," where they run to different planets in the model in order to help them learn their order in the solar system.	Students use a **system model** of the solar system to understand the parts (the planets and sun) that make up the whole (the solar system). By creating a **scaled model**, they are able to observe an immensely large system of natural objects. They learn that by creating **scaled models**, people can interact with **systems** they wouldn't otherwise be able to.

Possible Modifications and Accommodations			
Special Education/504	**At-Risk**	**[Gifted and Talented]**	**English Language Learners**
All teachers of students with special needs must review each student's IEP. Teachers must then select the appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.* **All teachers of students with a 504 must review each student's 504. Teachers must then follow the document for appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.* **Possible Modifications/Accommodations ● Extra time on timed assessments ● Use of a graphic organizer to plan ways to solve problems ● Use of concrete materials and objects (manipulatives) ● Opportunities for cooperative partner work ● Basic computation – use counters ● Differentiated center-based small group instruction ● Provide a copy of math class notes, and examples for science notebook ● Highlight or underline key words in science notebook ● If a manipulative is used during instruction, allow its use on a tests ● Provide visual aids and anchor charts ● Tiered lessons and assignments	The possible list of modifications/accommodations identified for Special Education students can be utilized for At- Risk students. Teachers should utilize ongoing methods to provide instruction, assess student needs, and utilize modifications specific to the needs of individual students.	● Enrichment projects ● Higher-level cooperative learning activities ● Provide higher-order questioning and discussion opportunities ● Tiered centers ● Tiered assignments	● Continue practicing vocabulary ● Demonstrate that vocabulary can have multiple meanings ● Encourage bilingual supports among students ● Provide visual cues, graphic representations, gestures, and pictures ● Rephrase science questions when appropriate ● Build knowledge from real-world examples ● Provide manipulatives and symbols ● Encourage peer discussions regarding how students are thinking about science

Scope & Sequence - Grade 6

Sixth Grade

Unit	**Unit Name**	Days	PreTest	Posttest
Unit 1	**Growth, Development, and Reproduction of Organisms**	23	9/11/18-9/14/18	12/17/18-12/20/18
Unit 2	**Matter and Energy in Organisms and Ecosystems**	23	9/11/18-9/14/18	12/17/18-12/20/18
Unit 3	**Interdependent Relationships in Ecosystems**	22	9/11/18-9/14/18	12/17/18-12/20/18
Unit 4	**Forces and Motion**	25	1/2/19-1/8/19	3/15/19-3/20/19
Unit 5	**Types of Interactions**	25	1/2/19-1/8/19	3/15/19-3/20/19
Unit 6	**Astronomy**	23	3/18/19-3/22/19	4/18/19-5/3/19
Unit 7	**Weather and Climate**	23	4/29/19-5/3/19	5/30/19-6/5/19

Instruction Days

Sixth Grade			Units	
BM1	September 11,2018	December 21, 2018	1-3	
BM 2	January 2, 2019	March 15, 2019	4-5	
BM 3	March 18, 2019	April 18, 2019	6	
BM 4	**April 29,2019**	**May 30 , 2019**	7	

Science Sixth Grade Benchmark 1 Map

Unit 1: Growth, Development, and Reproduction of Organisms, Grade 6 LIFE SCIENCE

Students use data and conceptual models to understand how the environment and genetic factors determine the growth of an individual organism. They connect this idea to the role of animal behaviors in animal reproduction and to the dependence of some plants on animal behaviors for their reproduction. Students provide evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. The crosscutting concepts of *cause and effect* and *structure and function* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade-appropriate proficiency in *analyzing and interpreting data*, *using models*, *conducting investigations*, and *communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas.

LS1.A: Structure and Function

- All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)
- Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)
- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)

Unit 2: Matter and Energy in Organisms and Ecosystems, Grade 6 LIFE SCIENCE

Students analyze and interpret data, develop models, construct arguments, and demonstrate a deeper understanding of the cycling of matter, the flow of energy, and resources in ecosystems. They are able to study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on populations. They also understand that the limits of resources influence the growth of organisms and populations, which may result in competition for those limited resources. The crosscutting concepts of *matter and energy*, *systems and system models*, *patterns*, and *cause and effect* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade-appropriate proficiency in analyzing and interpret data, developing models, and constructing arguments. Students are also expected to use these practices to demonstrate understanding of the core ideas.

LS2.A: Interdependent Relationships in Ecosystems

- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5)

LS4.D: Biodiversity and Humans

- Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)

Unit 3: Interdependent Relationships in Ecosystems, Grade 6 LIFE SCIENCE

Students build on their understandings of the transfer of matter and energy as they study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on a population. They construct explanations for the interactions in ecosystems and the scientific, economic, political, and social justifications used in making decisions about maintaining biodiversity in ecosystems. The crosscutting concept of *stability and change* provide a framework for understanding the disciplinary core ideas. **This unit includes a two-stage engineering design process. Students first evaluate different engineering ideas that have been proposed using a systematic method, such as a tradeoff matrix, to determine which solutions are most promising. They then test different solutions, and combine the best ideas into a new solution that may be better than any of the preliminary ideas. Students demonstrate grade appropriate proficiency in *asking questions*, *designing solutions, engaging in argument from evidence, developing and using models*, and *designing solutions*. Students are also expected to use these practices to demonstrate understanding of the core ideas.**
LS2.A: Interdependent Relationships in Ecosystems ● Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5) **LS4.D: Biodiversity and Humans** ● Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)

Science Sixth Grade Benchmark 2

Unit 4: Forces and Motion, Grade 6	**PHYSICAL SCIENCE**
Students use *system and system models* and *stability and change* to understanding ideas related to why some objects will keep moving and why objects fall to the ground. Students apply Newton's third law of motion to related forces to explain the motion of objects. Students also apply an engineering practice and concept to solve a problem caused when objects collide. The crosscutting concepts of *system and system models* and *stability and change* provide a framework for understanding the disciplinary core ideas. Students demonstrate proficiency in *asking questions*, *planning and carrying out investigations, designing solutions, engaging in argument from evidence*, *developing and using models,* and *constructing explanations and designing solutions*. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
PS2.A: Forces and Motion ● For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS-PS2-1) ● The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2) ● All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MS-PS2-2) **PS2.B: Types of Interactions** ● Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. (MS-PS2-3) ● Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4)	

- Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). (MS-PS2-5)

Unit 5: Types of Interactions, Grade 6	**PHYSICAL SCIENCE**
Students use *cause and effect*; *system and system models*; and *stability and change* to understand ideas that explain why some materials are attracted to each other while others are not. Students 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 develop understandings that gravitational interactions are always attractive but that electrical and magnetic forces can be both attractive and negative. Students also develop ideas that objects can exert forces on each other even though the objects are not in contact, through fields. Students are expected to consider the influence of science, engineering, and technology on society and the natural world. Students are expected to demonstrate proficiency in *asking questions*, *planning and carrying out investigations*, *designing solutions*, and *engaging in argument*. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
PS2.A: Forces and Motion ● For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS-PS2-1) ● The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2) ● All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MS-PS2-2) **PS2.B: Types of Interactions** ● Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. (MS-PS2-3) ● Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4) ● Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). (MS-PS2-5)	

Science Sixth Grade Benchmark 3

Unit 6: Astronomy, Grade 6	**EARTH SCIENCE**
This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way galaxy, and the universe. There is a strong emphasis on a systems approach and using models of the solar system to explain the cyclical patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories explaining the formation and evolution of the universe. Students examine geosciences 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 models* provide a framework for understanding the disciplinary	

core ideas. Students are expected to demonstrate proficiency in *developing and using models* and *analyzing and interpreting data*. Students are also expected to use these practices to demonstrate understanding of the core ideas.
ESS1.A: The Universe and Its Stars ● Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) ● Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2) **ESS1.B: Earth and the Solar System** ● The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2),(MS-ESS1-3) ● This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1) ● The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)

Science Sixth Grade Benchmark 4

Unit 7: Weather and Climate, Grade 6	**EARTH SYSTEMS**
This unit is broken down into three sub-ideas: Earth's large-scale systems interactions, the roles of water in Earth's surface processes, and weather and climate. Students make sense of how Earth's geo systems operate by modeling the flow of energy and cycling of matter within and among different systems. A systems approach is also important here, examining the feedbacks between systems as energy from the Sun is transferred between systems and circulates through the ocean and atmosphere. The crosscutting concepts of *cause and effect*, *systems and system models*, and *energy and matter* are called out as frameworks for understanding the disciplinary core ideas. In this unit, students are expected to demonstrate proficiency in *developing and using models* and *planning and carrying out investigations* as they make sense of the disciplinary core ideas. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
ESS2.C: The Roles of Water in Earth's Surface Processes ● The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) ● Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2- 6) **ESS2.D: Weather and Climate** ● Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) ● Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) ● The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6) **ESS3.D: Global Climate Change** ● Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)	

Special Ed Accommodations:

Follow IEP and 504 plans per individual student.
Utilize in class support based on IEP and 504 plans.
http://www.washington.edu/doit/working-together-science-teachers-and-students-disabilities

ELL Accommodations:
https://www.csun.edu/science/ref/language/teaching-ell.html

Gifted and Talented Accommodations:
https://kendrik2.wordpress.com/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/

Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Pacing Guide

NGSS: 7^{th} & 8^{th} Grade

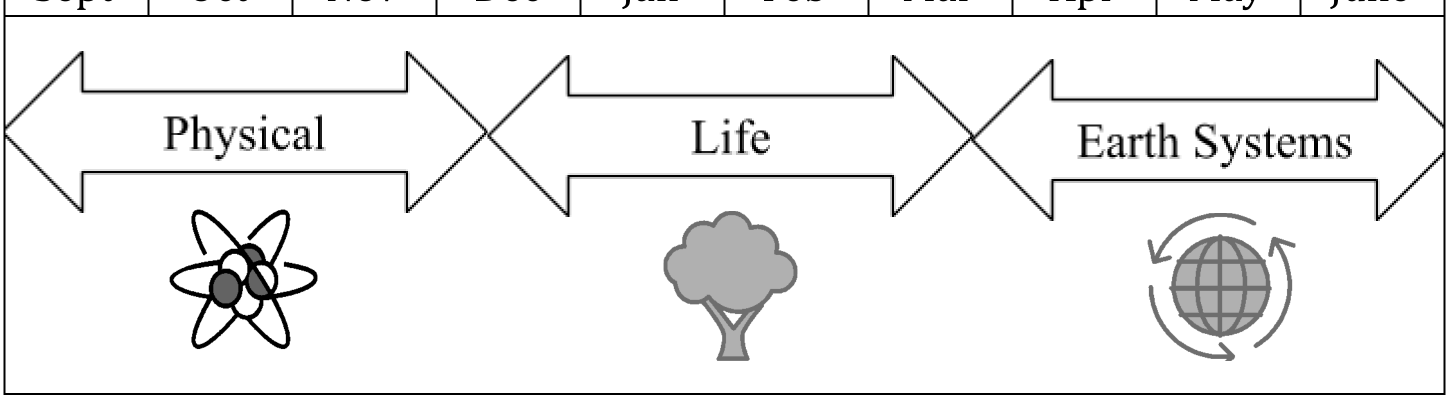
Next Generation Science Standards (NGSS) will be presented in three seasonal trimesters each concentrating on one of the primary core content ideas. Each trimester will last approximately three to four months depending on the grade level and the amount of material within each unit. The engineering and scientific practices include the tools and skills that are used in science throughout the year and should naturally weave throughout each of the major content areas.

1^{st} Trimester (Fall): Physical Science

2^{nd} Trimester (Winter): Life Science

3^{rd} Trimester (Spring): Earth Systems

Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June



Scope & Sequence - Grade 7

Seventh Grade

Unit	Unit Name	Days	Pretest	Post Test
Unit 1	**Structure and Properties of Matter**	20	9/11/18-9/14/18	11/05/18-11/16/18
Unit 2	**Interactions of Matter**	20	9/11/18-9/14/18	11/05/18-11/16/18
Unit 3	**Chemical Reactions**	25	11/13/18-11/19/18	12/17/18-12/20/18
Unit 4	**Structure and Function**	15	1/2/19-1/8/19	4/5/19-4/10/19
Unit 5	**Body Systems**	15	1/2/19-1/8/19	4/5/19-4/10/19
Unit 6	**Inheritance and Variation of Traits**	20	1/2/19-1/8/19	4/5/19-4/10/19
Unit 7	**Organization for Matter and Energy Flow in Organisms**	15	1/2/19-1/8/19	4/5/19-4/10/19
Unit 8	**Earth Systems**	30	4/8/19-4/12/19	5/28/19-6/6/19

Instruction Days

			Units
BM 1	September 11, 2018	November 5, 2018	1-2
BM 2	**November 13, 2018**	**December 17, 2018**	3
BM 3	January 2, 2019	April 5, 2019	4-7
BM 4	April 8, 2019	May 29, 2019	8

Science Seventh Grade Benchmark 1

Unit 1: Structure and Properties of Matter, Grade 7	**PHYSICAL SCIENCE**
Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or	

molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect*, *scale, proportion and quantity*, *structure and function*,*interdependence of science, engineering, and technology*, and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models*, and *obtaining, evaluating, and communicating information*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

PS1.A: Structure and Properties of Matter

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-2.)
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4)
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)

PS1.B: Chemical Reactions

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-3) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-2 and MS-PS1-5.)

Unit 2: Organization for Matter and Energy Flow in Organisms, Grade 7 — LIFE SCIENCE

Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of *matter and energy* and *structure and function* provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in developing *and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

LS1.A: Structure and Function

- All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)
- Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)
- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1- 8)

Science Seventh Grade Benchmark 2

Unit 3: Chemical Reactions, Grade 7	**PHYSICAL SCIENCE**
Students provide molecular-level accounts of states of matters and changes between states, of how chemical reactions involve regrouping of atoms to form new substances, and of how atoms rearrange during chemical reactions. Students also apply their understanding of optimization design and process in engineering to chemical reaction systems. The crosscutting concept of *energy and matter* provides a framework for understanding the 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 are also expected to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.	
PS1.A: Structure and Properties of Matter ● Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.) **PS1.B: Chemical Reactions** ● Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2),(MS-PS1-5) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.) ● The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5) ● Some chemical reactions release energy, others store energy. (MS-PS1-6)	

Science Seventh Grade Benchmark 3

Unit 4: Structure and Function, Grade 7	**LIFE SCIENCE**
Students demonstrate age appropriate abilities to plan and carry out investigations to develop *evidence* that living organisms are made of cells. Students gather information to support explanations of the relationship between structure and function in cells. They are able to communicate an understanding of cell theory and understand that all organisms are made of cells. Students understand that special structures are responsible for particular functions in organisms. They then are able to use their understanding of cell theory to develop and use physical and conceptual models of cells. The crosscutting concepts of *scale, proportion, and quantity* and *structure and function* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *planning and carrying out investigations*, *analyzing and interpreting data*, and *developing and using models*, Students are also expected to use these to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.	
LS1.A: Structure and Function ● All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) ● Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) ● In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of	

cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1- 8)

Unit 5: Body Systems, Grade 7 — LIFE SCIENCE

Students develop a basic understanding of the role of cells in body systems and how those systems work to support the life functions of the organism. Students will construct explanations for the interactions of systems in cells and organisms. Students understand that special structures are responsible for particular functions in organisms, and that for many organisms, the body is a system of multiple-interacting subsystems that form a hierarchy, from cells to the body. Students construct explanations for the interactions of systems in cells and organisms and for how organisms gather and use information from the environment. The crosscutting concepts of *systems and system models* and *cause and effect* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in *engaging in argument from evidence* and *obtaining, evaluating, and communicating information*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

LS1.B: Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MS-LS3-2)
- Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)
- Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)

LS3.A: Inheritance of Traits

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)
- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)

LS3.B: Variation of Traits

- In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)
- In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)

LS4.B: Natural Selection

- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring. (MS-LS4-5)

Unit 6: Inheritance and Variation of Traits, Grade 7 LIFE SCIENCE
Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation. Students understand how genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction. The crosscutting concepts of *cause and effect* and *structure and function* provide a framework for understanding how gene structure determines differences in the functioning of organisms. Students are expected to demonstrate proficiency in *developing and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.
LS4.A: Evidence of Common Ancestry and Diversity ● The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1) ● Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2) Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3) **LS4.B: Natural Selection** ● Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) **LS4.C: Adaptation** ● Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)

Unit 7: Organization for Matter and Energy Flow in Organisms, Grade 7 LIFE SCIENCE
Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of *matter and energy* and *structure and function* provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in developing *and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.
LS1.A: Structure and Function ● All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) ● Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary

that controls what enters and leaves the cell. (MS-LS1-2) ● In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3) **LS1.D: Information Processing** ● Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1- 8)

[Science Seventh Grade Benchmark 4]

Unit 8: Earth Systems, Grade 7	**EARTH SYSTEMS**
Students examine geoscience data in order to understand processes and events in Earth's history. Important crosscutting concepts in this unit are *scale, proportion, and quantity*, *stability and change*, and *patterns* in relation to the different ways geologic processes operate over geologic time. An important aspect of the history of Earth is that geologic events and conditions have affected the evolution of life, but different life forms have also played important roles in altering Earth's systems. Students understand how Earth's geo systems 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 are expected to demonstrate proficiency in *analyzing and interpreting* data and *constructing explanations*. They are also expected to use these practices to demonstrate understanding of the core ideas.	
ESS1.C: The History of Planet Earth ● The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1- 4) ● Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. (HS.ESS1.C GBE) (secondary to MS-ESS2-3) **ESS2.A: Earth's Materials and Systems** ● The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** ● Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3) **ESS2.C: The Roles of Water in Earth's Surface Processes** ● Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)	

Special Ed Accommodations:
Follow IEP and 504 plans per individual student.
Utilize in class support based on IEP and 504 plans.
http://www.washington.edu/doit/working-together-science-teachers-and-students-disabilities

ELL Accommodations:
https://www.csun.edu/science/ref/language/teaching-ell.html

Gifted and Talented Accommodations:

https://kendrik2.wordpress.com/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/

Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Scope & Sequence - Grade 8

Eighth Grade

Unit	Unit Title	Days	Benchmark Pre	Benchmark Post
Unit 1	**Evidence of a Common Ancestry**	15	9/11/18-9/14/18	10/30/18-11/7/18
Unit 2	**Selection and Adaptation**	20	9/11/18-9/14/18	10/30/18-11/7/18
Unit 3	**Stability and Change on Earth**	30	10/31/18-11/7/18	2/4/19
Unit 4	**Human Impacts**	25	10/31/18-11/7/18	2/4/19
Unit 5	**Relationships among Forms of Energy**	20	2/5/19-2/11/19	4/16/19-4/30/19
Unit 6	**Thermal Energy**	30	2/5/19-2/11/19	4/16/19-4/30/19
Unit 7	**The Electromagnetic Spectrum**	20	4/17/19-5/2/19	5/31/19-6/6

Instruction Days

			Units
BM 1	September 11, 2018	October 30, 2018	Unit 1-2
BM 2	**October 31, 2018**	February 4, 2019	Unit 3-4
BM 3	February 5, 2019	April 16, 2019	Unit 5-6
BM 4	April 8, 2019	May 31, 2019	Unit 7

Science Eighth Grade Benchmark 1

Unit 1: Evidence of a Common Ancestry, Grade 8	**LIFE SCIENCE**
In this unit of study, students analyze graphical displays and gather evidence from multiple sources in order to develop an understanding of how fossil records and anatomical similarities of the relationships among organisms and species describe biological evolution. Students search for patterns in the evidence to support their understanding of the fossil record and how those patterns show relationships between modern organisms and their common ancestors. The crosscutting concepts of *cause and effect, patterns*, and *structure and function* are called out as organizing concepts for these disciplinary core ideas. Students use the practices of *analyzing graphical displays* and *gathering, reading, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas.	

LS4.A: Evidence of Common Ancestry and Diversity ● The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1) ● Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and lines of evolutionary descent. (MS-LS4-2) ● Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3) **LS4.B: Natural Selection** ● Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) **LS4.C: Adaptation** ● Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)

Unit 2: Selection and Adaptation, Grade 8	**LIFE SCIENCE**
Students construct explanations based on evidence to support fundamental understandings of natural selection and evolution. They will use ideas of genetic variation in a population to make sense of how organisms survive and reproduce, thus passing on the traits of the species. The crosscutting concepts of *patterns* and *structure and function* are called out as organizing concepts that students use to describe biological evolution. Students use the practices of *constructing explanations*, *obtaining, evaluating, and communicating information*, and *using mathematical and computational thinking*. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
LS4.A: Evidence of Common Ancestry and Diversity ● The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1) ● Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2) ● Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3) **LS4.B: Natural Selection** ● Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) **LS4.C: Adaptation** ● Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)	

Science Eighth Grade Benchmark 2

Unit 3: Stability and Change on Earth, Grade 8 **EARTH SYSTEMS**
Students construct an understanding of the ways that human activities affect Earth's systems. Students use practices to understand the significant and complex issues surrounding human uses of land, energy, mineral, and water resources and the resulting impacts on the development of these resources. Students also understand that the distribution of these resources is uneven due to past and current geosciences processes or removal by humans. The crosscutting concepts of *patterns, cause and effect*, and *stability and change* are called out as organizing concepts for these disciplinary core ideas. In this unit of study students are expected to demonstrate proficiency in *asking questions, analyzing and interpreting data, constructing explanations, and designing solutions.*Students are also expected to use these practices to demonstrate understanding of the core ideas.
ESS2.A: Earth's Materials and Systems ● All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1) **ESS2.C: The Roles of Water in Earth's Surface Processes** ● Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) ● Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) **ESS3.A: Natural Resources** ● Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)

Unit 4: Human Impacts, Grade 8 **EARTH SYSTEMS**
In this unit of study, students analyze and interpret data and design solutions to build on their understanding of the ways that human activities affect Earth's systems. The emphasis of this unit is the significant and complex issues surrounding human uses of land, energy, mineral, and water resources and the resulting impacts of these uses. The crosscutting concepts of *cause and effect* and *the influence of science, engineering, and technology on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. **Building on Unit 3, students define a problem by precisely specifying criteria and constraints for solutions as well as potential impacts on society and the natural environment; systematically evaluate alternative solutions; analyze data from tests of different solutions; combining the best ideas into an improved solution; and develop and iteratively test and improve their model to reach an optimal solution. In this unit of study students are expected to demonstrate proficiency in *analyzing and interpreting data* and *designing solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas.**
ESS3.B: Natural Hazards ● Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2) **ESS3.C: Human Impacts on Earth Systems** ● Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) ● Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MSESS3-3),(MS-ESS3-4)

Science Eighth Grade Benchmark 3

Unit 5: Relationships Among Forms of Energy, Grade 8	PHYSICAL SCIENCE
In this unit, students use the practices of *analyzing and interpreting data*, *developing and using models*, and *engaging in argument from evidence* to make sense of relationship between energy and forces. Students develop their understanding of important qualitative ideas about the conservation of energy. 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 also understand the difference between energy and temperature, and the relationship between forces and energy. The crosscutting concepts of *scale, proportion, and quantity*, *systems and system models*, and *energy and matter* are called out as organizing concepts for these disciplinary core ideas. Students use the practices of *analyzing and interpreting data*, *developing and using models*, and *engaging in argument from evidence*. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
PS3.A: Definitions of Energy ● Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1) ● A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2) ● Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3),(MS-PS3-4) **PS3.B: Conservation of Energy and Energy Transfer** ● When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5) ● The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4) ● Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3) **PS3.C: Relationship Between Energy and Forces** ● When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)	

Unit 6: Thermal Energy, Grade 8	PHYSICAL SCIENCE
In this unit, students *ask questions*, *plan and carry out investigations*, *engage in argument from evidence*, *analyze and interpret data, construct explanations*, *define problems and design solutions* as they make sense of the difference between energy and temperature. They use the practices to make sense of how the total change of energy in any system is always equal to the total energy transferred into or out of the system. The crosscutting concepts of *energy and matter, scale, proportion, and quantity*, and *influence of science, engineering, and technology on society and the natural world* are the organizing concepts for these disciplinary core ideas. Students ask *questions*, *plan and carry out investigations*, *engage in argument from evidence*, *analyze and interpret data,construct explanations*, *define problems and design solutions.* Students are also expected to use these practices to demonstrate understanding of the core ideas.	

PS3.A: Definitions of Energy
- Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)
- A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)
- Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3),(MS-PS3-4)

PS3.B: Conservation of Energy and Energy Transfer
- When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)
- The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4)
- Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)

PS3.C: Relationship Between Energy and Forces
- When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)

Science Eighth Grade Benchmark 4

Unit 7: The Electromagnetic Spectrum, Grade 8 **PHYSICAL SCIENCE**

In this unit of study, students *develop and use models, use mathematical thinking,* and *obtain, evaluate, and communicate information* in order to describe and predict characteristic properties and behaviors of waves. Students also apply their understanding of waves as a means of sending digital information. The crosscutting concepts of *patterns* and *structure and function* are used as organizing concepts for these disciplinary core ideas. Students *develop and use models, use mathematical thinking,* and *obtain, evaluate, and communicate information.*Students are also expected to use these practices to demonstrate understanding of the core ideas.

PS4.A: Wave Properties
- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)
- A sound wave needs a medium through which it is transmitted. (MS-PS4-2)

PS4.B: Electromagnetic Radiation
- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2)
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)
- A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)

PS4.C: Information Technologies and Instrumentation
- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)

Special Ed Accommodations:
Follow IEP and 504 plans per individual student.
Utilize in class support based on IEP and 504 plans.
http://www.washington.edu/doit/working-together-science-teachers-and-students-disabilities

ELL Accommodations:
https://www.csun.edu/science/ref/language/teaching-ell.html

Gifted and Talented Accommodations:
https://kendrik2.wordpress.com/2007/09/13/modifying-regular-classroom-curriculum-for-gifted-and-talented-students/

Technology in the Science Classroom:
http://www.resa.net/curriculum/curriculum/science/technology/classroom/

Lab Safety

Science: Pre-K to 8th Grade

Laboratory investigations are essential for the effective teaching and learning of science. A school laboratory investigation is an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models.

Inherent in laboratory-based activities is the potential for injury. As professionals, teachers of science have a duty of care to ensure the safety of students, teachers, and staff. Science educators must act as a reasonably prudent person would in providing and maintaining a safe learning environment for their students.

Some of the key lab safety precautions are listed in the following section. Before performing ANY lab activity, make sure students are aware of the specific safety procedures that are unique to each individual experiment

Lab Safety Guidelines

To ensure a safe and effective learning environment for students, teachers of science should:

1. Report all accidents regardless of how minor to your teacher.
2. Work in the lab only when the teacher is present or when you have permission to do so.
3. Never indulge in horseplay or behavior that could lead to injury of others.
4. Before beginning work in lab, clean the lab bench top and your glassware.
5. Use goggles and lab aprons when instructed to do so.
6. Due to the dangers of broken glass and corrosive liquid spills in the lab, open sandals or bare feet are not permitted in the lab.
7. Learn the location and proper usage of the eyewash fountain, fire extinguisher, safety shower, fire alarm box, office intercom button, evacuation routes, clean-up brush and dust pan, glass/chemical disposal can.
8. For minor skin burns, immediately plunge the burned area into cold water and notify the teacher.
9. If you get any chemical in your eye, immediately wash the eye with the eye-wash fountain and notify the teacher.
10. Never look directly into a test tube. View the contents from the side.
11. Never smell a material in a test tube or flask directly. Instead, with your hand, "fan" some of the fumes to your nose carefully.
12. Immediately notify the teacher of any chemical spill and clean up the spill as directed.
13. Never take chemical stock bottles to the lab benches.
14. Never taste any material in the lab
15. Food, drink and gum are prohibited in lab.
16. Never add water to concentrated acid solutions. The heat generated may cause spattering. Instead, as you stir, add the acid slowly to water.
17. Read the label on chemical bottles at least twice before using the chemical. Many chemicals have names that are easily confused.
18. Return all lab materials and equipment to their proper places after use.
19. Upon completion of work, wash and dry all equipment, your lab bench and your clean-up area.
20. Use equipment only as directed:
    a. never place chemicals directly on the pan balances.
    b. use glycerin when inserting glass tubing into rubber stoppers.
    c. be cautious of glassware that has been heated.

d. add boiling chips to liquid that is to be heated before heating.
e. point test tubes that are being heated away from you and others.

Science Fairs

Science: Pre-K to 8th Grade

Although schools can hold science fairs at any time during the school year, the 1st and 2nd marking periods have been designated for district wide science fairs. Science fairs are a fun and interesting way for students to demonstrate an understanding of scientific concepts learned throughout the year.

In order to encourage uniformity, individual schools should adhere to the included guidelines.

Science Fairs

Why have a Science Fair?

Student Learning

The most important reason for having a science fair is the student learning that takes place. Students reap many benefits from their participation in the fair. In preparing their projects, students must use a wide range of research and organizational skills that are needed not only in science, but in all areas of learning. They learn how to use the scientific method to set up and follow an experiment to completion. They learn how to be organized in their work. They learn how to present a visually pleasing display and how to present their results orally to a judge. They use critical thinking skills to develop and interpret the data they collect, Observing, predicting, recording and drawing conclusions are skills they use to conduct their investigations and these skills are applicable to many areas of the curriculum. Those students who need to be challenged have an opportunity to explore beyond the prescribed curriculum. Students who rarely participate in class activities will suddenly become involved. If you allow students to work on projects in groups, cooperative learning skills are enhanced. A science fair present many opportunities for learning new skills and meeting new challenges.

Public Relations

Science fairs are also a great way to build enthusiasm for the science program in your school and your community. By enlisting the aid of people in the community as a sponsor or contributor, you make them part of the fair and give them a sense of belonging. When they see what the students have produced, the usual effect is to increase their support for science and our school.

Parental Involvement

Teachers sometimes complain that parents are not as involved in their children's education as they should be. A science fair gives parents the opportunity to become more involved. They should be encouraged to give support, advice and encouragement to their children. This is the most valuable assistance a parent can offer. However, they should not take over the project for the students. It is important that the child feels that the work is his or her own.

Your Personal Satisfaction

A science fair is a wonderful experience. You will be surprised by what students are capable of doing, and students will be proud of what they have accomplished. It will be a lot of hard work. There will be frustrations along the way. But when the fair happens, you can step back, look at the projects and know that what they have accomplished with your help was worth all the effort.

Stockton Science Fair Requirements

A. Quick Instructions for entering JSSF:

Step 1: Complete the Required Hardcopy Forms from ISEF. (Usually Form 1, Form 1A and Form 1B)

Step 2: Fill in and submit the online student application.

Step 3: Watch for your name and assigned project number to appear on the
Student List page [see link at top]
Write your assigned project number from that page on your hardcopy
forms and six (6) copies of your abstract.

Step 4: Mail the hardcopy forms and abstracts to the JSSF Director at:

Richard Stockton College of NJ
101 Vera King Farris
Galloway, NJ 08205
Attn: NAMS - JSSF Science Fair

Eligibility/Limitations

1. Each ISEF-affiliated fair may send the number of projects provided by their affiliation agreement

2. A student must be selected by an Intel ISEF-affiliated fair, and:

   a. be in grades 9-12 or equivalent;

   b. not have reached age 20 on or before May 1 preceding the Intel ISEF.

3. English is the official language of the Intel ISEF. Student project boards and abstracts must be in English.

4. Each student is only allowed to enter one project. That project may include no more than 12 months of continuous research and may not include research performed before January 2016.

5.Team projects must have no more than three members. Teams competing at Intel ISEF must be composed of members who all meet Intel ISEF eligibility.

6. Students may compete in only one Intel ISEF affiliated fair, except when proceeding to a state/national fair affiliated with the Intel ISEF from an affiliated regional fair.

7. Projects that are demonstrations, 'library' research or informational projects, 'explanation' models or kit building are not appropriate for the Intel ISEF.

8. All sciences (physical, life, social) are represented at the Intel ISEF. Review a complete list of categories and sub-categories with definitions.

9. A research project may be a part of a larger study performed by professional scientists, but the project presented by the student must be only their own portion of the complete study.

Requirements

General

1. All domestic and international students competing in an Intel ISEF-affiliated fair must adhere to all of the rules as set forth in this document.

2. All projects must adhere to the Ethics Statement above.

3. It is the responsibility of the student and the Adult Sponsor to evaluate the study to determine if the research will require forms and/or review and approval prior to experimentation, especially projects that include human participants, vertebrate animals, or potentially hazardous biological agents.

4. Projects must adhere to local, state and U.S. Federal laws, regulations and permitting conditions. In addition, projects conducted outside the U.S. must also adhere to the laws of the country and jurisdiction in which the project was performed.

5. The use of non-animal research methods and the use of alternatives to animal research are strongly encouraged and must be explored before conducting a vertebrate animal project.

6. Introduction or disposal of non-native and/or invasive species (e.g. insects, plants, invertebrates, vertebrates), pathogens, toxic chemicals or foreign substances into the environment is prohibited. It is recommended that students reference their local, state or national regulations and quarantine lists.

7. Intel ISEF exhibits must adhere to Intel ISEF display and safety requirements.

8. All projects must adhere to the requirements of the affiliated fair(s) in which it competes to qualify for participation in the Intel ISEF. Affiliated fairs may have additional restrictions or requirements. Knowledge of these requirements is the responsibility of the student and Adult Sponsor.

Approval and Documentation

9. Before experimentation begins, a local or regional Institutional Review Board (IRB) or Scientific Review Committee (SRC) associated with the Intel ISEF-affiliated fair must review and approve most projects involving human participants, vertebrate animals, and potentially hazardous biological agents. Note: If a project involves the testing of a student designed invention, prototype or concept by a human, an IRB review and approval may be required prior to experimentation. See Human Participants Rules for details.

10. Every student must complete the **Student Checklist (1A), a Research Plan** and **Approval Form (1B)** and review the project with the Adult Sponsor in coordination with completion by the Adult Sponsor of the **Checklist for Adult Sponsor (1)**.

11. A Qualified Scientist is required for all studies involving Biosafety Lab-2 (BSL-2) potentially hazardous biological agents and DEA-controlled substances and is also required for many human participant studies and many vertebrate animal studies.

12. After initial IRB/SRC approval (if required), any proposed changes in the **Student Checklist (1A)** and **Research Plan** must be re-approved before laboratory experimentation/data collection resumes.

13. Projects which are continuations of a previous year's work and which require IRB/SRC approval must undergo the review process with the current year proposal prior to experimentation/data collection for the current year.

14. Any continuing project must document that the additional research is new and different. (**Continuation Projects Form (7)**)

15. If work was conducted in a regulated research institution, industrial setting or any work site other than home, school or field at any time during the current Intel ISEF project year, the **Regulated Research Institutional/Industrial Setting Form (1C)** must be completed and displayed at the project booth.

16. After experimentation, each student or team must submit a (maximum) 250-word, one-page abstract which summarizes the current year's work. The abstract must describe research conducted by the student, not by the supervising adult(s).

17. A project data book and research paper are not required, but are strongly recommended for judging purposes. Regional or local fairs may require a project data book and/or a research paper.

18. All signed forms, certifications, and permits must be available for review by all regional, state, national and international affiliated fair SRCs in which the student(s) participate. This review must occur after experimentation and before competition.

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Project Categories

I. INVENTIONS:

An original, student created tool or device that is used to complete a specific task.

Includes:
-A statement describing the function of your invention.
-A pictorial representation of your design that labels each specific part.
-An actual working model of your project.

II. EXPERIMENTS:

A student created design that performs a test to answer a specific question or problem. Students must utilize the scientific method in an organized format including the following details;

Includes:
-A clear statement of the problem that the student is testing.
-Hypothesis, Procedures, Materials, Controls, Variables, Collection of Data and a Conclusion.
-A pictorial representation of your experimental design that labels the steps/parts.
-A physical display of the actual experiment.

III. DEMONSTRATIONS/COLLECTION or DISPLAYS:

A model or display of a scientific concept or a student's collection of scientific materials

Includes:
-A clear statement of the concept the student is modeling.
-A pictorial representation of the model that labels and describes the parts. .
-A physical display of the actual experiment.

Note: Be creative. Volcanoes and Solar System Models tend to be overdone.

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Science Fair Rules & Safety Guidelines

1. Projects from grades Pre-K to 6th may be a class wide, small groups (2 to 4 students) or individual student projects depending on what the teacher decides. Projects from the 7th and 8th grades should only be small groups or individual projects.

2. Project Requirements;

   -Make sure each project has the student's name(s), teacher's name and grade level clearly labeled.

   -All projects must be durable and safe. Moveable parts must be firmly attached.

   -Project backgrounds should attractive and colorful. (Watch for spelling and grammatical errors.)

   -Dangerous chemicals, illegal substances, open flames and explosives may not be exhibited.

   -Live animals may be part of your exhibit but may <u>not</u> be harmed in any way.

   -Any use of live animals must be approved by the teacher.

   -Any project deemed to be unsafe or inhumane in any way will not be entered in the fair.

   - Experimentally based Projects must follow the scientific method:

     - **Title –** This can be the name of your product.
     - **Problem –** State a problem you are dealing with.
     - **Question –** Restate your problem as a question.
     - **Hypothesis** – State a possible solution to your problem.
     - **Procedure or Experiment –** List the detailed steps taken to solve your problem
     - **Data –** Present your data in the form o
     - **Conclusion(s) –** Relate your results with your original hypothesis.
     - **Next Time –** After looking at your results an experiment you would like to do?

3. Students (or a representative team of students) must present during judging and may be asked questions about their project from one to several judges.

4. Students will be judged in three categories:

   - **Scientific Knowledge,**
   - **Display/Project quality**

- **Overall creativity**

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Score Sheet

Judge ______________________________

Project # & Category	**Scientific Knowledge**	**Display Quality**	**Creativity**	Total
	/ 10	/ 10	/ 10	/ 30

Project # & Category	**Scientific Knowledge**	**Display Quality**	**Creativity**	Total
	/ 10	/ 10	/ 10	/ 30

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