Township of Union Public Schools
Administration Building

K - 5
CURRICULUM GUIDE APPROVAL REQUEST FORM

Please present the attached guide to the Board of Education for approval. The guide has been reviewed by all involved parties and is aligned with the New Jersey Core Curriculum Content Standards.

Title: Science Curriculum Guide

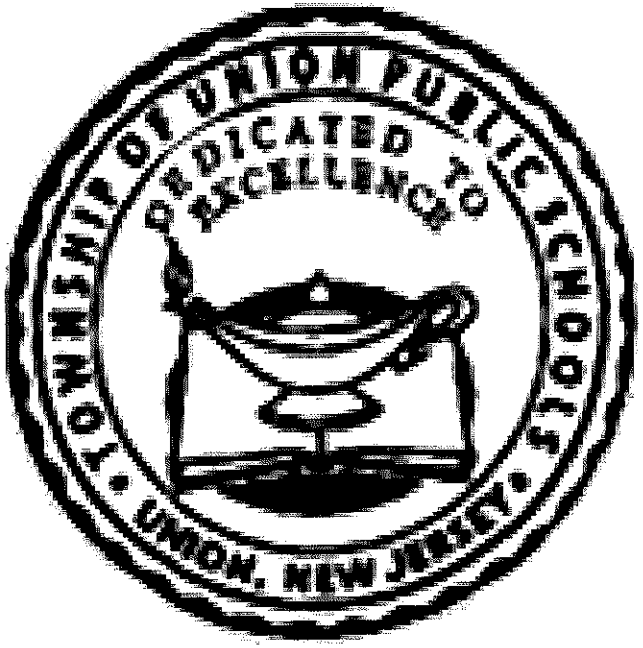
Department/Grade: Grade 3

Supervisor: Terri Matthews

Submission Date: May 6, 2015

Board Approval Date: _____

TOWNSHIP OF UNION PUBLIC SCHOOLS



Grade 3 Science

Curriculum Guide

2015

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Mission Statement

The Township of Union Board of Education believes that every child is entitled to an education designed to meet his or her individual needs in an environment that is conducive to learning. State standards, federal and state mandates, and local goals and objectives, along with community input, must be reviewed and evaluated on a regular basis to ensure that an atmosphere of learning is both encouraged and implemented. Furthermore, any disruption to or interference with a healthy and safe educational environment must be addressed, corrected, or when necessary, removed in order for the district to maintain the appropriate educational setting.

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Statement of District Goals

- Develop reading, writing, speaking, listening, and mathematical skills.
- Develop a pride in work and a feeling of self-worth, self-reliance, and self discipline.
- Acquire and use the skills and habits involved in critical and constructive thinking.
- Develop a code of behavior based on moral and ethical principals.
- Work with others cooperatively.
- Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.
- Acquire a knowledge and understanding of the physical and biological sciences.
- Participate effectively and efficiently in economic life and the development of skills to enter a specific field of work.
- Appreciate and understand literature, art, music, and other cultural activities.
- Develop an understanding of the historical and cultural heritage.
- Develop a concern for the proper use and/or preservation of natural resources.
- Develop basic skills in sports and other forms of recreation.

Course Description

The third grade science standards place increasing emphasis on conducting investigations. Students are expected to be able to develop questions, formulate simple hypotheses, make predictions, gather data, draw conclusions and communicate results. Measuring, interpreting data in the form of tables, charts and graphs, as well as using number sense during investigations is also emphasized throughout the units of study.

The curriculum is integrated to include *Life Science, Earth Science, Environmental Studies and Physical Science.* Through the use of hands-on investigations and cooperative learning structures, the third grade students will explore the following content topics that are aligned with the *New Jersey Core Curriculum Science Standards and the 2011Elementary Grades Science Practices(5.1)Clarifications.*

In **Life Science,** students explore plant and animal growth, development, and adaptations for survival.

Earth Science focuses on the materials that make up the Earth and the processes that change Earth's surface including: soils, landforms, weathering and erosion, the water cycle and Earth's Weather. In a related unit, **Environmental Studies,** emphasis is placed on the uses and importance of protecting and conserving Earth's natural resources. Recycling is also explored.

Physical Science includes the investigation of the structure and properties of matter. Students also explore some of the physical and chemical changes that matter can undergo.

All units integrate reading, writing, and math skills as well as critical thinking skills. Safe practices are equally important as are the attitudes students develop toward learning Science.

Recommended Textbooks

Science Fusion – Houghton Mifflin Harcourt

Curriculum Units

Unit 1: The Nature of Science and STEM

Unit 2: Life Science

Unit 3: Earth and Space Science

Unit 4: Physical Science

Pacing Guide- Course

Content

Unit 3 – Earth and Space Science – Marking Period 1

Chapter 5 – Changes to Earth's Surface
Chapter 6 – People and Resources

Unit 3 – Earth and Space Science – Marking Period 2

Chapter 7 – Water and Weather
Chapter 8 – Earth and Its Moon

Unit 2 – Life Science – Marking Period 3

Chapter 3 – Plants and Animals
Chapter 4 – Ecosystems and Interactions

Unit 4 – Physical Science – Marking Period 4

Chapter 9 – Matter
Chapter 10 – Simple and Compound Machines

**** Unit 1 – The Nature of Science and STEM (Chapter 1-2) should be incorporated into lessons throughout the year.**

Unit 1 – The Nature of Science and STEM

Essential Questions	Instructional Objectives/ Skills and Benchmarks(*CPIs*)	Activities	Assessments
Investigating Questions How do scientists investigate questions? How can you use a model? How do Scientists use tools? How can you measure length? How do Scientists use data?	**CS 5.1A** Demonstrate understanding of the interrelationships among fundamental concepts in the physical, life, and Earth systems sciences.**(5.1.4.A.1)** • Learn fundamental concepts, principles, theories, and models. • Then, build organized and meaningful understandings of the big picture (conceptual framework) that incorporate these concepts, principles and theories. • Then, use these relationships to interpret, understand and predict other natural phenomenon. Use outcomes of investigations to build and	1. Keep a Cube – explore the design process by engineering a way to keep an ice cube from melting for 30 minutes Materials: • 2 ice cubes • 1 cardboard box (less than one cubic foot; shoe boxes work well) • waxed paper • masking tape • newspaper • aluminum foil • rubber bands • paper plate or plastic bowl to hold 'control' ice cube source: http://teachers.egfi-k12.org/keep-a-cube/ 2. Catapult Challenge – explore the design process by engineering a way to design and build two catapults. Each catapult will undergo three different tests to	**Investigating Questions** -Unit 1 Investigating Questions "Sum It Up!" and "Brain Check" -Unit 1 Lesson Quizzes -Unit 1 Test -Performance Assessment: Investigate Static Electricity – Give students balloons, different types of cloth, and various materials such as plastic wrap, tissue paper, salt, and glitter. Students write a hypothesis, design an experiment to test hypothesis, perform experiment, collect data, and share results in a written report -STEM Journal – Students can gather research and record all steps taken in the process as well as reflections

	refine questions, models, and explanations. **(5.1.4.A.2)** • Develop models, from evidence obtained, to explain the relationships between fundamental concepts and principles. • Construct and refine explanations, arguments or models as new evidence becomes available. Use scientific facts, measurements, observations, and patterns in nature to build and critique scientific arguments. **(5.1.4.A.3)** • Use tools to observe, measure, and explain natural phenomena. • Evaluate the strengths of arguments based on the evidence presented. • Evaluate the quality of the evidence based on the logic and design of the experiment and the quality of the data collected. **CS 5.1B**	determine accuracy and power Materials: • Magazines/newspapers • Popsicle sticks (thick and thin) • Masking tape • Scissors • Plastic cups • Coke cans • Rubber bands (various sizes) • Soup cans • Plastic spoons • Bottle caps Source: http://www.vivifystem.com/blog/2014/12/23/catapult-challenge 3. Marble Run Challege – explore the design process by engineering a sculpture through which you can make a marble roll from start to finish Materials: various tubes, materials, and fixings Source:	

The Engineering Process How do engineers Use the Design Process? How are technology and society related? How can we improve a design?	Design and follow simple plans using systematic observations to explore questions and predictions. **(5.1.4.B.1)** • Ask questions and decide what to measure in order to answer the questions. • Develop strategies for accurately measuring and collecting data. • Organize the data logically so that it may be used to answer questions or validate predictions. Measure, gather, evaluate, and share evidence using tools and technologies. **(5.1.4.B.2)** • Use age-appropriate tools with accuracy and confidence. • Use mathematics in the collection, organization and analysis of data. • Use tools of data analysis to organize and represent	http://www.stanscafe.co.uk/manor/marble-run.html 4. Paper Bridge for Pennies – explore the design process by engineering a "bridge" that supports 100 pennies Materials: single sheet of paper (8.5 x 11 inches) and up to five paper clips Source: http://www.sciencebuddies.org/science-fair-projects/project_ideas/CE_p018.shtml?from=Blog 5. Harmless Holder – explore the design process by engineering a holder for 6 cans that is sturdy, animal safe, and convenient. Materials: • 6 full cans of soda, seltzer, or juice • cardboard (approx. 8.5 x 11 in.) • copier paper • duct tape • wax paper	**The Engineering Process** -Unit 2 The Engineering Process "Sum It Up!" and "Brain Check" -Unit 2 Lesson Quizzes -Unit 2 Test -Performance Assessment: Write a Design Improvement – Have students think about a technology they would like to improve. Have them write about how they would use the steps in the design process to change the technology. Ask them to conclude by explaining how they would test their improved technology and why they would like to improve it. -STEM Journal – Students can gather research and record all steps taken in the process as well as reflections

	data. Formulate explanations from evidence.(**5.1.4.B.3)** • Make claims based on the available evidence. • Cite evidence and explain the reasoning for a claim. • Use data representations to communicate findings. Communicate and justify explanations with reasonable and logical arguments. **(5.1.4.B.4)** • Justify claims with connections to other fundamental concepts and principles. • Use evidence and data to support both a claim and the reasoning behind a scientific argument. **CS 5.1C** Monitor and reflect on one's own knowledge regarding how ideas change over time. **(5.1.4.C.1)** • Monitor and reflect on their ideas as those	• string • 4 paint stirrers • 6 rubber bands Source: http://teachers.egfi-k12.org/harmless-holder/ 6. The Egg Drop Challenge – explore the engineering design to create a container that will protect an egg from breaking from a high fall Materials: • Toilet paper rolls • Newspaper • Shoebox • Popsicle sticks • Tape • Rubberbands • Plastic bag • String • Balloons • Packing peanuts Source: http://buggyandbuddy.com/egg-drop-challenge-free-planning-printable-2014/	

	ideas change over time. • Develop an understanding that "doing science" extends beyond experiments and includes modeling, organizing observations, and historical reconstructions. • Develop an awareness that science is about searching for core explanations and connections between fundamental concepts and principles. Revise predictions or explanations on the basis of learning new information. (5.1.4.C.2) • Recognize that there may be multiple interpretations for the same phenomenon. • Recognize that explanations are increasingly valuable as they account for the	7. Marshmallow Toothpick Building Challenge – explore the engineering design to create architetual designs of buildings to see how buildings are made, kept upright, and made into certain shapes. Materials: Marshmallows and toothpicks Source: http://www.learnwithplayathome.com/2015/01/mini-marshmallow-and-toothpick-building.html 8. Pipe Cleaner Challenge – Students will use pipe cleaners to build the tallest, freestanding tower. Materials: • Pipe cleaners Source: http://www.vivifystem.com/blog/2014/12/8/pipecleaner-stem-challenge 9. Saving Freddie – explore the engineering process to work in teams to save Freddie the Gummy Worm. The students provide step-by-step instructions to share with other	

	available evidence more completely. Present evidence to interpret and/or predict cause-and-effect outcomes of investigations. **(5.1.4.C.3)** • Use evidence to uncover cause-and-effect relationships. • Create multiple representations of the results of an investigation. • Move confidently between multiple forms of representations (e.g., graph, chart, data table). **CS 5.1D** Actively participate in discussions about student data, questions, and understandings. **(5.1.4.D.1)** • Develop increasingly productive ways of representing ideas.	engineers. Materials: • One clear plastic cup • One gummy worm • One gummy life saver • Two paperclips Source: http://www.k12stemplans.com/engineering.html 10. Build a Boat Challenge – explore the engineering process to build a mini boat the floats Materials: to be determined by student Source: http://www.planetsmarty.com/2013/10/design-and-build-boat-that-floats.html#_a5y_p=1448819	

	• Develop appropriate norms for presenting scientific arguments and evidence. • Practice productive social interactions with peers in the context of science investigations Work collaboratively to pose, refine, and evaluate questions, investigations, models, and theories. **(5.1.4.D.2)** • Demonstrate understanding of the difference between scientific argument, which rests on plausibility and evidence and has the goal of shared understanding, and everyday arguments. • Learn appropriate norms and language of scientific argumentation. • Persuade peers of the validity of one's own		

	ideas and the ideas of others. Demonstrate how to safely use tools, instruments, and supplies. **(5.1.4.D.3)** • Evaluate risks and benefits of decision. • Minimize the probability of harm by taking appropriate precautions. • Develop an individual sense of responsibility and good habits for safety. Handle and treat organisms humanely, responsibly, and ethically. **(5.1.4.D.4)** • Become knowledgeable about the care of animals so that both students and the animals stay safe and healthy during all activities. • Follow local, state, and national laws, policies,		

	and regulations when live organisms are included in the classroom. • Discuss the importance of not conducting experimental procedures if such procedures are likely to cause pain, induce nutritional deficiencies, or expose animals to parasites, hazardous and or toxic chemicals, or radiation.		

Unit 2 Life Science

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
• What are some plant life cycles? • What are some animal life cycles? • How do living things • What are structural adaptations? • What are behavioral adaptations? • What are ecosystems? • What is a food	**5.5.4.A.1**. Matter, Energy and Organization in Living Systems: Identify the roles that organisms may serve in a food chain. **5.5.4.A.2.** Matter, Energy and Organization in Living Systems: Differentiate between the needs of plants and those of animals. • Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. **5.5.4.A.3.** Matter, Energy and Organization in Living Systems: Recognize that plants and animals are	• Students will complete a life cycle wheel for an observed insect (ant, grasshopper, ladybug, butterfly, etc.) from the schoolyard and students will conduct research to identify observed insect. • At the beginning of the school year each student will choose one tree on the school grounds to "adopt." Each month students will make observations of "their trees." • Wrap 3 kinds of seeds in a damp paper towel. Put in a zipper bag. Tape bags to the window and observe and record changes for 10 days. • Plant bean seeds in 3 different kinds of environments (on the windowsill, in the closet, in	Unit Assessment in science book- Plants and Animals "Sum It Up!" and "Brain Check" -Unit Lesson Quizzes -Unit Test -Performance Assessment: 1. Student will describe to class: a. how a seed becomes a full plant b. how different parts of a plant help it grow 2. Endangered Animal Project – Students can research an endangered animal and explain why the animal is endangered and what is being done to help it.

chain? • How do environmental changes affect living things?	composed of different parts performing different functions and working together for the well being of the organism. • Use evidence to support the explanation that traits can be influenced by the environment. • Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. **5.5.4.A.4.** Matter, Energy and Organization in Living Systems: Describe the basic functions of the major systems of the human body including, but not limited to: digestive system; circulatory system; respiratory system; nervous system; skeletal	the freezer) and observe the plants daily for 3 weeks. Record observations and analyze how the plants are influenced by the environment. • Food Chain game out of styrofoam cups- glue images of animals on to cups and write the name of the organism on the rim. Mix them up, have students put them in order, and stack them in order of the food chain. • Use six small plants. Do not give 2 plants light. Do not give 2 plants water. Give the last 2 plants water AND light. Observe changes in plants and compare observations to find out some of the things that plants need to grow. • Observe and identify parts of a simple moss plant. Analyze how rootlike,	

	system; muscular system; reproductive system **5.5.4.B.1**. Diversity and Biological Evolution: Develop a simple classification scheme for grouping organisms. • Construct an argument that some animals form groups that help members survive. **5.5.4.B.2.** Diversity and Biological Evolution: Recognize that individuals vary within every species, including humans **5.5.4.C.1.** Reproduction and Heredity: Identify different stages in the lives of various organisms • Develop models to describe that organisms have unique and diverse	stemlike, and leaflike parts help simple plants meets their needs. • Students can observe pictures of different animals' habitats and use the homes to classify and compare the animals and their homes. • Students will take two aluminum cans. Glue a thick layer of cotton to one can. Fill both cans with hot water. Place a thermometer in both cans and record the temperature of the water. Wait ten minutes and record the temperature again. Repeat the last step two more times. Students will discuss how an animal's fur helps keep it warm • Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.	

	life cycles but all have in common birth, growth, reproduction, and death. • Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.		

Unit 3: Earth and Space Science

Essential Questions	Instructional Objectives/ Skills and Benchmarks*(CPIs)*	Activities	Assessments
Changes to Earth's Surface 1. What are some landforms? 2. How does Earth's surface change slowly? 3. How can we model erosion? 4. How does Earth's surface change quickly?	**Changes to Earth's Surface** **CS 5.4.6.D:** Earth's landforms are created through constructive (deposition) and destructive (erosion) processes. The theory of plate tectonics provides a framework for understanding the dynamic processes within and on Earth. The student will be able to: • Describe how wind, water, and ice shape the Earth's surface. (Slow changes: weathering and erosion)	**Changes to Earth's Surface** **1.** Have students pick a landform and then build a diorama out of the following materials: modeling clay, cardboard or shoe box, small toy houses, people trees, etc. 2. Books: -What is a Landform by Rebecca Rissman -Introducing Landforms by Bobbie Kalman -U.S Landforms by Dana Meachen Rau 3. Video- Study Jams "Weathering and Erosion" http://www.watchknowlearn.org/Video.aspx?VideoID=13256 4. Scholastics: Study Jams- Landforms, Rocks, and Minerals. http://studyjams.scholastic.com/studyjams/jams/science/rocks-minerals-	**Changes to Earth's Surface** -Unit 5 in science book- Changes to Earth's Surface "Sum It Up!" and "Brain Check" -Unit 5 Lesson Quizzes -Unit 5 Test -Performance Assessment: "Make Landforms." Have students use modeling clay to make a mountain, valley, plain, and plateau. Have them think about the features of each landform. Then have students label each landform with its name and a sentence describing it.

	• Describe how rapid changes such as earthquakes, volcanoes, and floods change the surface of the Earth. • Differentiate between weathering and erosion. • Use a model to investigate: -how sand wears away rocks -how volcanoes change the land around them -some of the effects of earthquakes -how chemicals in water wear away rock	landforms/landforms.htm	
People and Resources 1. What are some natural resources? 2. How can we conserve energy? 3. What is soil?	**People and Resources** **CS 5.4.4.C**: Rocks can be broken down to make soil. Earth's composition is unique, is related to the origin of our solar system, and provides us with the raw resources needed to sustain life.	**People and Resources** 1. Scholastics: Study Jams- Natural Resources http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/natural-resources.htm 2. Read Natural Resources (Investigate Geography) by	**People and Resources** -Unit 6 People and Resources "Sum It Up! " And "Brain Check" -Unit 6 Quizzes - Unit 6 Test -Performance Assessment: "Create a List." Think of five objects in your classroom. List the natural resources that were used to create these objects,

	5.4.4. C.1: Create a model to represent how soil is formed. **CS 5.4.4.C:** Earth materials in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Attributes of rocks and minerals assist in their identification. Earth's composition is unique, is related to the origin of our solar system, and provides us with the raw resources needed to sustain life. The students will be able to: • Compare and contrast earth materials such as soils and sand, through simple observation and investigation • Determine the kinds of materials found in soil and explain how soil is formed over	Louise Spilsbury and Rebecca Rissman 3. Read Life in a Bucket of Soil. By Alvin Silverstein and Virginia Silverstein. 4. Scholastics: Study Jams- Soil http://studyjams.scholastic.com/studyjams/jams/science/rocks-minerals-landforms/soil.htm	Label each resource as renewable or nonrenewable.

	time. • Evaluate the importance of soil to people. (related to unit on plants) • Describe how people change Earth's surface and how negative changes can be controlled. (i.e.: soil conservation) • Identify natural resources such as plants and animals, water, air, land, minerals, forests, and soil. • Recognize that many natural resources are limited. • Compare and contrast natural and man-made resources. • Distinguish between renewable and non-renewable resources. • Compare and contrast ways of		

	conserving resources. This includes recycling, reusing, and reducing consumption of natural resources. • Predict what would happen if natural resources were used up, and explain ways to prevent this from happening.		
Water and Weather 1. What is the water cycle? 2. What is weather? 3. How can we measure weather?	**Water and Weather** **CS 5.4.4.F:** Weather changes that occur from day to day and across the seasons can be measured and documented using basic instruments such as a thermometer, wind vane, anemometer, and rain gauge. Earth's weather and climate systems are the result of complex interactions between land, ocean, ice, and	**Water and Weather** 1. Scholastics Study Jams- Weather and Climate- The Water Cycle. http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/water-cycle.htm 2. Water Cycle Project **Materials**: Jar, small plants, bottle cap or shell of water, soil, sand and small rocks.	**Water and Weather** -Unit 7 Water and Weather "Sum It Up!" and "Brain Check" - Unit 7 Lesson Quizzes -Unit 7 Test -Performance Assessment: Write a Weather Report. Have students think about how the water cycle influences weather patterns. Tell them to write a brief news report explaining how evaporation, condensation, and precipitation influence the weather.

	atmosphere. **5.4.4.F.1** Identify patterns in data collected from basic weather instruments. **CS 5.4.4.G:** Most of Earth's surface is covered by water. Water circulates through the crust, oceans, and atmosphere in what is known as the water cycle. The biogeochemical cycles in the Earth systems include the flow of microscopic and macroscopic resources from one reservoir in the hydrosphere, geosphere, atmosphere, or biosphere to another, are driven by Earth's internal and external sources of energy, and are impacted by human activity. **5.4.4.G.3:** Trace a path a drop of water might follow through the water cycle. **5.4.4.G.4:** Model how the	**Procedures**: 1.Layer jar with small rocks, sand, and soil. 2. Place the small plant into the soil. 3. Add the cap or shell of water to the top of the soil. 4. Place the cap onto the jar. 5. Place the jar in a sunny place and have the student's monitor how the water cycle works over 3-5 days. 3. Play Water Cycle Video- http://www.havefunteaching.com/videos/science-videos/water-cycle-video 4. Read The Water Cycle by Helene Frost and A Drop Around the World by Barbara McKinney.	

	properties of water can change as water moves through the water cycle. The students will be able to: • Identify the sun as the origin of energy that drives the water cycle. • Describes the processes of evaporation, condensation, and precipitation as they relate to the water cycle. • Construct and interpret a model of the water cycle. • Identify major water sources for a community including rivers reservoirs, and wells. • Explain methods of water conservation in the home and school. • Analyze possible sources of water pollution in their neighborhoods, at school, and in the local		

	community. This includes runoff from over-fertilized lawns and fields, oil from parking lots, eroding soil, and animal waste. • Use a thermometer to compare air temperatures over a period of time. • Analyze the changes in air pressure occurring over time, using a barometer, and predict what the changes mean in terms of changing weather patterns. • Differentiate between cloud types (cirrus, status, cumulous, and cumulo-nimbus clouds) and the associated weather. • Compare and contrast the formation of different types of precipitation (rain, snow, sleet, and hail.)	**Earth and Moon** * Teach students the moon phase story to learn the cycle: **New Moon** — A girl earns a new job . . .	

Earth and Moon 1. How do Earth and Moon move? 2. How can we model the moon's phases?	• Recognize a variety of storm types, describe the weather conditions associated with each and explain when they occur (thunderstorms, hurricanes, and tornadoes). • Analyze and report information about temperature and precipitation on weather maps. • Measure precipitation with a rain gauge. • Design an investigation where weather data are gathered using meteorological tools and charted to make predications. **Earth and Moon** **5.4.4.A.2** Identify patterns of the Moon's appearance and make predictions about its future appearance based observational data.	**Waxing Crescent** — where she is asked to wax the crescent. **First Quarter** — Her boss is pleased so she earns her first quarter. **Waxing Gibbous** — Her next job is to wax the gibbous. **Full Moon** — Again, the boss is pleased, so she earns her first full paycheck. **Waning Gibbous** — Then she gets lazy. She begins to wane the gibbous. **Last Quarter** — So the boss says, "You're fired. This is your last quarter. Finish the job and leave." **Waning Crescent** — She wanes the crescent before leaving . . . **New Moon** — to find a new job. * Scholastic's Smartboard compatible "Study Jam" lesson of the Moon http://studyjams.scholastic.com/stud	**Earth and Moon** -Unit 8 Earth and Moon "Sum It Up!" and "Brain Check" - Unit 8 Lesson Quizzes -Unit 8 Test -Performance Assessment: Write a Science Report. Have students write a brief science report explaining how Earth's rotation on its axis and revolution around the sun affect Earth. Have them explain how the moon also affects Earth.

		yjams/jams/science/solar-system/moon.htm * Read The Moon Book By Gail Gibbons * Make the Moon Phases out of Oreo Cookies: You will need: - 4 Oreo cookie for each student -A piece of paper with a moon phase written on it for each student -A popsicle stick or other tool for scraping the frosting Directions: -Break the oreos open and remove parts of the cream as shown in the phases. -Next place then in a line to represent the phases of the moon. -Name each phase.	

Unit 4: Physical Science

Essential Questions	Instructional Objectives/ Skills and Benchmarks (*CPIs*)	Activities	Assessments
Investigating Matter • What are some physical properties? • What are the states of matter? • What physical properties can we observe? • What are some changes to matter? • What can we observe?	**5.6.4.A.1**. Structure and Properties of Matter: Sort materials based on physical characteristics that can be seen by using magnification. **5.6.4.A.2**. Structure and Properties of Matter: Observe that water can be a liquid or a solid and can change from one form to the other and the mass remains the same. **5.6.4.A.3**. Structure and Properties of Matter: Recognize that water, as an example of matter, can exist as a solid, liquid or gas and can be transformed from one state to another by heating or cooling. **5.6.4.A.4**. Structure and	• Magnet Activity 1. Give magnetic marbles to students, so they can experience the forces of magnetism on their own. 2. Walk around the classroom, giving suggestions on experiments to try, or pointing out how the magnets are attracted to each other. 3. After a few minutes of exploration, have students get into small groups of three or four. Have students show each other the tricks they found to do with their magnets. 4. Encourage them to talk about why they think that happened. Come back as a class and have one or two students from each group share what they learned about magnets.	Unit Assessment in science book- Matter "Sum It Up!" and "Brain Check" -Unit Lesson Quizzes -Unit Test -Performance Assessment: " Comparing Matter: Students will compare two objects made of different kinds of matter such as an uncooked piece of macaroni and a cotton ball. Students will use their sense of sight and touch to observe the cotton ball and macaroni, The student will record three words that describe the physical properties of each object.

Simple and Compound Machines • What are simple machines? • How do simple machines affect work?	Properties of Matter: Show that not all materials respond the same way to what is done to them. **5.6.4.B.1**. Chemical Reactions: Combine two or more materials and show that the new material may have properties that are different from the original material. The students will be able to: • Infer that objects are made of one or more materials based on observations of the physical properties that are common to each individual object. • Compare the physical properties of smaller pieces of material to those properties of the entire material. (i.e.,	• Butter Activity: 1. Gently melt some butter in a small pan. Warm the butter only enough to melt it. 2. Put the melted butter into a narrow jar. Be sure to fill the jar completely to the top Mark the height of the melted butter. Cool in a refrigerator. 3. When the butter has again solidified, have the students observe the butter and compare what they see to the butter before it solidified. Students should note a deep hole in the solid butter. This shows that some solids take up less space than their corresponding liquids. Extend this activity by repeating with water. Students will find that water expands when it solidifies. • Internet field trip: http://spaceplace.nasa.gov/beat-the-heat/en/	

	cookie crumbs-cookie) • Conclude that materials have their own set of physical properties that are observable. • Classify materials as to whether they are solids, liquids, or gasses. • Measure the mass of solids and the volumes of liquids in metric and standard English units. • Examine and describe the transformation matter form one state to another, i.e., solid water (ice) to liquid (water) to gas (steam). • Construct and interpret a sequence of models (diagrams) showing the activity of molecules in all 3 states of matter.	• Customary and SI Units for Volume 1. Provide measuring cups and spoons with both SI and customary units marked on them. Have students practice measuring liquid volumes using both sets of units. Challenge students NOT to convert milliliter to tablespoons, cups, and so on. Instead, direct them to make enough measurements using SI units that they get a feel for how much a milliliter or a liter is. • Forces and Interactions 1. Students move a bowling ball using only a rubber mallet. Tapping the ball with the mallet can only move the ball, and the mallet cannot be kept in constant contact with the ball this forces the students to observe the direction of the taps that are necessary to start the ball	

	(Solids- molecules are close together and only vibrate; Liquids- molecules are further apart and slide; Gases- molecules are far apart and move freely.) **5.7.4.A.1**. Motion and Forces: Recognize that changes in the speed or direction of a moving object are caused by force and that the greater the force, the greater the change in motion will be. **5.7.4.A.2**. Motion and Forces: Recognize that some forces can act at a distance: gravity, magnetism, static electricity. **5.7.4.B.1**. Energy Transformations: Identify sources of heat and demonstrate that heat can be transferred from one object to another.	moving, keep the ball moving in a given direction, and to stop the ball and bring it to rest. The students identify the use of the mallet as a contact force and compare it to the use of magnetism, gravity, or electrical forces to move objects. 2. Students discuss the effect of the force of the fan or fans on the cars. • Students will work in small teams of 2-3 and make a paper bridge. They will test their bridge strength and stability and modify as needed using the NGSS engineering process guidelines. • A cloud is created in a bottle using hot water, and ice. Pour hot tap water into the jar until it is half full. Quickly insert the deli container (or a plastic bag) into the mouth of the jar and fill it with ice. • **Objective:** To show how the steepness of an inclined plane	

	5.7.4.B.2. Energy Transformations: Identify sources of light and demonstrate that light can be reflected from some surfaces and pass through others. **5.7.4.B.3.** Energy Transformations: Use devices that show electricity producing heat, light, sound, and magnetic effects. **5.7.4.B.4.** Energy Transformations: Show that differences in sound (loud or soft, high or low) can be produced by varying the way objects vibrate	can affect the amount of force necessary to do work. **Procedure:** 1. Make a stack of books about six inches high. Form two ramps of different lengths by leaning a ruler and a yardstick up against the top of the stack. 2. Loop a rubber band through the eye screw in the end of a wooden block. Place the block at the end of one ramp with the rubber band end toward the ramp. 3. Pull the block up one ramp. Try again using the other ramp. 4. Notice how much the rubber band stretches. How does the steepness of the ramp affect the rubber band? If you had to move a heavy piano into a moving van, would you rather have a short, steep ramp or a long, less steep ramp? The work to be done is the same in each case. Since work = force x distance, moving the piano into the van over a longer distance means less force is required.	

New Jersey Core Curriculum Content Standards
Grade 3 Science

New Jersey Core Curriculum Content Standards for Science

INTRODUCTION

Science Education in the 21st Century

"Today more than ever before, science holds the key to our survival as a planet and our security and prosperity as a nation" (Obama, 2008).

Scientific literacy assumes an increasingly important role in the context of globalization. The rapid pace of technological advances, access to an unprecedented wealth of information, and the pervasive impact of science and technology on day-to-day living require a depth of understanding that can be enhanced through quality science education. In the 21st century, science education focuses on the practices of science that lead to a greater understanding of the growing body of scientific knowledge that is required of citizens in an ever-changing world.

Mission: *Scientifically literate students 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: A quality science education fosters a population that:

- Experiences the richness and excitement of knowing about the natural world and understanding how it functions.
- Uses appropriate scientific processes and principles in making personal decisions.
- Engages intelligently in public discourse and debate about matters of scientific and technological concern.
- Applies scientific knowledge and skills to increase economic productivity.

Intent and Spirit of the Science Standards

"Scientific proficiency encompasses understanding key concepts and their connections to other fundamental concepts and principles of science; familiarity with the natural and designed world for both its diversity and unity; and use of scientific knowledge and scientific ways of thinking for individual and social purposes" (American Association for the Advancement of Science, 1990).

All students engage in science experiences that promote the ability to ask, find, or determine answers to questions derived from natural curiosity about everyday things and occurrences. The underpinning of the revised standards lies in the premise that science is experienced as an *active* process in which inquiry is central to learning and in which students engage in observation, inference, and experimentation on an ongoing basis, rather than as an isolated a *process*. When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others in their community and around the world. They actively develop their understanding of science by identifying their assumptions, using critical and logical thinking, and considering alternative explanations.

Revised Standards

The revision of the science standards was driven by two key questions:

- *What are the core scientific concepts and principles that all students need to understand in the 21st century?*

- *What should students be able to do in order to demonstrate understanding of the concepts and principles?*

In an attempt to address these questions, science taskforce members examined the scientific concepts and principles common to the National Science Education Standards, Benchmarks and Atlases for Science Literacy , and the National Assessment of Educational Progress (NAEP) Framework .This resulted in narrowing the breadth of content from 10 standards to four standards that include 17 clearly-defined key concepts and principles.

- **Science Practices** (standard 5.1) embody the idea of "knowledge in use" and include understanding scientific explanations, generating scientific evidence, reflecting on scientific knowledge, and participating productively in science. Science practices are integrated into the Cumulative Progress Indicators within each science domain in recognition that science content and processes are inextricably linked; science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge.
- Science content is presented in **Physical Science** (standard 5.2), **Life Science** (standard 5.3), and **Earth Systems** (standard 5.4). The most current research on how science is learned informed the development of learning progressions for each strand, which increase in depth of understanding as students progress through the grades.

Laboratory Science in the 21st Century

Laboratory science is a *practice* not a *place.* It is important to emphasize that standards-driven lab science courses do *not* include student manipulation or analysis of data created by a teacher as a replacement or substitute for direct interaction with the natural or designed world.

The revised standards and course descriptions emphasize the importance of students independently creating scientific arguments and explanations for observations made during investigations. Science education thereby becomes a sense-making enterprise for students in which they are systematically provided with ongoing opportunities to:

- Interact directly with the natural and designed world using tools, data-collection techniques, models, and theories of science.
- Actively participate in scientific investigations and use cognitive and manipulative skills associated with the formulation of scientific explanations.
- Use evidence, apply logic, and construct arguments for their proposed explanations.

The 2009 Science Standards implicitly and explicitly point to a more student-centered approach to instructional design that engages learners in inquiry. Inquiry, as defined in the revised standards, envisions learners who:

- Are engaged by scientifically-oriented questions.
- Prioritize evidence that addresses scientifically-oriented questions.
- Formulate explanations from that evidence to address those scientifically-oriented questions.
- Evaluate their explanations in light of alternative explanations, particularly those reflecting scientific understanding.
- Communicate and justify their proposed explanations.

Fundamental principles of instructional design assist students in achieving their intended learning goals through lab-science experiences that:

- Are designed with clear learning outcomes in mind.
- Are sequenced thoughtfully into the flow of classroom science instruction.
- Integrate learning of science content with learning about science practices.
- Incorporate ongoing student reflection and discussion (National Research Council, 2007).

Students K-12 lab-science experiences should include the following:

- **Physical manipulation of authentic substances or systems:** This may include such activities as chemistry experiments, plant and animal observations, and investigations of force and motion.
- **Interaction with simulations:** In 21st-century laboratory science courses, students can work with computerized models, or simulations, that represent aspects of natural phenomena that cannot be observed directly because they are very large, very small, very slow, very fast, or very complex. Students may also model the interaction of molecules in chemistry or manipulate models of cells, animal or plant systems, wave motion, weather patterns, or geological formations using simulations.
- **Interaction with authentic data:** Students may interact with authentic data that are obtained and represented in a variety of forms. For example, they may study photographs to examine characteristics of the Moon or other heavenly bodies or analyze emission and absorption spectra in the light from stars. Data may be incorporated in films, DVDs, computer programs, or other formats.
- **Access to large databases:** In many fields of science, researchers have arranged for empirical data to be normalized and aggregated - for example, genome databases, astronomy image collections, databases of climatic events over long time periods, biological field observations. Some students may be able to access authentic and timely scientific data using the Internet and can also manipulate and analyze authentic data in new forms of laboratory experiences (Bell, 2005).
- **Remote access to scientific instruments and observations:** When available, laboratory experiences enabled by the Internet can link students to remote instruments, such as the environmental scanning electron microscope (Thakkar et al., 2000), or allow them to control automated telescopes (Gould, 2004).

New Jersey Scoring Rubric

SCIENCE RUBRIC

Exceeds – must receive no more than one 3 and the rest 4s in the other areas of the rubric.
Meets – may receive no more than one 2 and a combination of 3s and 4s in the other areas of the rubric.
Approaches – may receive no more than one 1 and a combination of 2s, 3s, or 4s, in the other areas of the rubric.
Begins – must receive at least a 1 in all 3 areas of the rubric.

	KNOWLEDGE Knows and understands scientific terms, facts, concepts, principles, theories and methods	APPLICATION Applies scientific knowledge , skills and methods to manipulate, analyze, synthesize, create and evaluate	COMMUNICATION Communicates scientific knowledge and applications through writing, speech, and visual displays.
4	• Descriptions of scientific terms, facts, concepts, principles, theories and methods are complete and correct.	• Applications are thorough, appropriate, and accurate.	• Written, oral and/or visual communication is well-organized and effective.
3	• Descriptions of scientific terms, facts, concepts, principles, theories and methods are mostly complete and correct.	• Applications are mostly thorough, appropriate, and accurate.	• Most of the written, oral and/or visual communication is well-organized and effective.
2	• Descriptions of scientific terms, facts, concepts, principles, theories and methods are somewhat complete and correct.	• Applications are somewhat appropriate and accurate.	• Some of the written, oral and/or visual communication is organized and effective.
1	• Descriptions of scientific terms, facts, concepts, principles, theories and methods are minimally present or correct.	• Applications are minimally, appropriate and accurate.	• Little of the written, oral and/or visual communication is organized and effective.
0	• All descriptions of scientific terms, facts, concepts, principles, theories and methods are missing and/or incorrect.	• All applications are missing and/or incorrect.	• All of the written, oral or visual communication is missing and/or lacks organization.
Score			