Branchburg Township Public Schools

Office of Curriculum and Instruction

Grade 5 Science Curriculum

Adopted by the Board of Education September 2023

This curriculum is aligned with the 2020 New Jersey Student Learning Standards in Science

Curriculum Scope and Sequence			
Content Area	Science	**Course Title/Grade Level:**	5th

Topic/Unit Name		Suggested Pacing (Days/Weeks)
Unit #1	Launching Research / Earth's Systems and Human Activity	September-October
Unit #2	Earth's Place in the Universe	Mid October-December
Unit #3	Energy and Ecosystems	January- April
Unit #4	Matter and Its Interactions	May-June

Unit 1	Launching Research & Earth's Systems and Human Activity	Approximate Pacing	September-October

STANDARDS		
NJSLS (Science-NGSS)		
Students will be able to...	**Students will know…**	**Crosscutting Concepts**
5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.] **5-ESS2-2.** Describe and graph the amounts of saltwater and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers,groundwater, and polar ice caps, and does not include the atmosphere.] **5-ESS3-1.** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	**ESS2.A:** Earth Materials and Systems Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1) **ESS2.C:** The roles of water in Earth's Surface processes nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2) **ESS3.C:** Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	**Cause and Effect** Determine the causes of changes among systems. Develop models to show the interactions among systems. (5-ESS2-1) **Scale, Proportion, and Quantity** Standard units are used to measure and describe physical quantities such as weight and volume. (5-ESS2-2) **Systems and System Models** A system can be described in terms of its components and their interactions. (5-ESS2-1) **Science Addresses Questions About the Natural and Material World.** Science findings are limited to questions that can be answered with empirical evidence. (5- ESS3-1)

Interdisciplinary Connections:	CS & DT:
RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently (Example: Students will research locations of freshwater when learning about the chunk of ice that came off of a polar ice cap and the implications of that happening.) W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (Example: During launch, students will learn appropriate ways to research and take notes.)	8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. 8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career. 8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data. (Examples: Students will work together in groups to research the different Earth's systems using Discovery Education. Students collect data regarding the major Earth system they are researching. Students will then share, compare, and make claims based on the data of all Earth's systems.) 8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim. 8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data. (Example: Students will research locations of freshwater when learning about the chunk of ice that came off of a polar ice cap and the implications of that happening.)

CLKS:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process
Example: Students will be working collaboratively to collect data and evidence to support their claim about the patterns they notice with climate.
9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
Example: Meteorologists and geologists need to have an understanding of the different spheres and how they interact to solve problems and recognize patterns.

UNIT ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

- **Forest fires in Quebec, Canada are causing unsafe air quality in New Jersey.**
- **Glacier National Park used to have 150 glaciers, however, it now has only 25.**
- **In the past decade, there has been a significant increase in whale, shark, and dolphin carcasses washed up on the Jersey shore.**

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: climate natural phenomenon geosphere hydrosphere atmosphere biosphere ecosystems gravity argument claim evidence models structure function patterns	***Students will be able to:*** ● Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. ● Describe and graph the amounts of saltwater and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. ● Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Students will develop a model and construct and argument with evidence to explain the science behind the phenomena using the Disciplinary Core Ideas, Cross Cutting Concepts, and Science and Engineering Practices
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Models, claims, evidence, data and research, planning and carrying out investigations, classroom discussions, anecdotal notes
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Quizzes, Discovery Education Board activities, worksheets/activities, PBL (extensions), modified assessments as per IEPs

Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Grade level benchmark assessment
RESOURCES	
Core instructional materials: NGSS GRC Model Unit 1 Outline	
Supplemental materials: Discovery Education TheWonderofScience Newsela Climate Change	
Modifications for Learners	
See appendix	

Topic/Unit 2 Title	Earth's Place in the Universe	Approximate Pacing	Mid-October/December

STANDARDS		
NJSLS (Science-NGSS)		
Students will be able to…	**Students will know…**	**Crosscutting Concepts**
5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth. [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).] **5-ESS1-2**. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.] 5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]	**5-PS2B.1:** The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1) **5-ESS1A.1:** The sun is a star that appears larger and brighter than others because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1) **5-ESS1B.1:** The orbits of Earth around the sun and of the moon around the Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)	**Patterns** Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2) **Scale, Proportion, and Quantity** Natural objects exist from the very small to the immensely large. (5-ESS1- 1) **Energy and Matter** Trace the movement of matter among systems. (5-PS2-1) **Cause and Effect** Analyze the relative impacts of various causes contributing to the specific phenomena. (5-PS2-1)

Interdisciplinary Connections:	CS & DT:
5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (Example- In math, students will determine their weight on various planets by multiplying the planet's surface gravity by the student's body weight. In Science students explore the gravitational pull on various objects). W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (Example: When students learn about the patterns of the sun they research information about other stars in order to make claims.)	8.1.2.DA.3: Identify and describe patterns in data visualizations. 8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data. (Examples: When students collect data for the length of shadows throughout the day they will use Google docs and tables. Students will share and compare the data with other students and will make claims based on the data)

CLKS:
9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process *Example: Students will be working collaboratively to collect data and evidence to support their claim about the patterns they notice with shadows.* 9.4.2.TL.3: Enter information into a spreadsheet and sort the information. The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills. (Example-Students are recording the effects and impacts the objects have on other objects when falling. Effects include time, impact width, capacity lost.)

UNIT ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS
• **When I let go of a paper clip, it always falls to the ground OR When I dropped a heavy pumpkin it smashed, but when I dropped small pumpkins they only bounced.** • **The sun is larger and brighter than the North Star.**

- **In the morning my shadow is taller than me.**
- **The sun sets in the west and rises in the east.**

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Students will know: gravity gravitational force axis mass distance compass natural phenomenon argument claim evidence models structure function patterns	***Students will be able to:*** ● Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth. ● Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. ● Support an argument that the gravitational force exerted by Earth on objects is directed down.

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Students will develop a model and construct and argument with evidence to explain the science behind the phenomena using the Disciplinary Core Ideas, Cross Cutting Concepts, and Science and Engineering Practices
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Models, claims, evidence, data and research, planning and carrying out investigations, classroom discussions, anecdotal notes
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Quizzes, Discovery Education Board activities, worksheets/activities, PBL (extensions), modified assessments as per IEPs

Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Grade level benchmark assessment
RESOURCES	
Core instructional materials: NGSS GRC Model Unit 2 Outline	
Supplemental materials: Discovery Education TheWonderofScience Newsela Climate Change	
Modifications for Learners	
See appendix	

Topic/Unit 3 Title	Energy and Ecosystems	Approximate Pacing	January-April

STANDARDS		
NJSLS (Science-NGSS)		
Students will be able to...	**Students will know…**	**Crosscutting Concepts**
5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.] **5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.] **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]	**PS3.D: Energy in Chemical Processes and Everyday Life** -The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) **LS1.C: Organization for Matter and Energy Flow in Organisms** -Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) **LS1.C: Organization for Matter and Energy Flow in Organisms** -Plants acquire their material for growth chiefly from air and water. (5-LS1-1) **LS2.A: Interdependent Relationships in Ecosystems** -The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants	**Energy and Matter:** Energy can be transferred in various ways and between objects. (5-PS3-1) **Energy and Matter:** Matter is transported into, out of, and within systems. (5-LS1-1) **Systems and System Models:** A system can be described in terms of its components and their interactions. (5-LS2- 1)

	parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1) **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**-Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)	
Interdisciplinary Connections:	**CS & DT:**	
RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area. (Example: Students must know the meaning of the science vocabulary words they use in their explanations.) 2.1.4.A.1 Explain the physical, social, emotional, and mental dimensions of personal wellness and how they interact.	8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved. (Example: During the PBL, students monitor the SBS courtyard to ensure it does not become overgrown. Rain barrels, raised garden beds, and gardening tools were purchased through the climate change grant to help take care of the garden.	

(Example: Students create a healthy recipe to share with peers. Students share how healthy ingredients produce the body's energy.)	

CLKS:

9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements
(Example- Students learn about the various jobs that include benefits on healthy food. Chefs and bakers must utilize the correct portions of ingredients to accurately make food)

CRP5 Consider the environmental, social, and economic impacts of decisions.
(Example: The E.P.A. has to make decisions about the animals in the environment and how they impact the world around them).
CRP6. Demonstrate creativity and innovation
(Example: Students develop solutions to the deer problem. Engineers in all facets develop solutions to new or existing problems)

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

- **On my way to school this morning, I saw a dead deer on the side of the road. After a few days, the way the deer looks changes.**
- **There was nothing for me to eat before school except leftover pizza. So, I had pizza for breakfast.**
- **I went to the garden center and saw a plant growing in an empty bowl.**
- **I was walking in my backyard and I found an owl pellet. There was a bone sticking out.**
- ***The Stony Brook Courtyard is overgrown and not being used (PBL) **OPTIONAL***

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge

Students will know:	***Students will be able to:***
energy life cycle natural phenomenon invasive species decline variable argument claim evidence models structure function system patterns	● Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. ● Support an argument that plants get the materials they need for growth chiefly from air and water. ● Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Students will develop a model and construct and argument with evidence to explain the science behind the phenomena using the Disciplinary Core Ideas, Cross Cutting Concepts, and Science and Engineering Practices
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Models, claims, evidence, data and research, planning and carrying out investigations, classroom discussions, anecdotal notes
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Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Grade level benchmark assessment
RESOURCES	
Core instructional materials: NGSS GRC Model Unit 3 Outline	
Supplemental materials: Discovery Education TheWonderofScience Newsela Climate Change	
Modifications for Learners	
See appendix	

Topic/Unit 4 Title	Matter and Its Interactions	Approximate Pacing	May - June

STANDARDS		
NJSLS (Science-NGSS)		
Students will be able to…	**Students will know…**	**Crosscutting Concepts**
5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.] **5-PS1-2.** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.] **5-PS1-3.** Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness,	**PS1.A: Structure and Properties of Matter** Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3) **PS1.B: Chemical Reactions**	**Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4) **Scale, Proportion, and Quantity** Natural objects exist from the very small to the immensely large. (5-PS1-1) Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1- 2),(5-PS1-3)

reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.] **5-PS1-4.** Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)	

Interdisciplinary Connections:	**CS & DT:**
5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (Example: Students measure out different materials in order to make different types of solutions and/or mixtures.) W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (Example: During the sneeze simulation experiment, students will construct an explanation using the evidence from their investigation.	8.2.5.NT.2: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies. 8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved. (Example: Students will plan out an investigation to determine the effects that lemon juice has on milk. Students will also plan out an additional investigation in which they can pick another substance that they want to see how it impacts milk.)

CLKS:
9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6). (Example: During a mixing experiment, students must brainstorm measurements of the different types of solutions.)

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

- Now you see me, now you don't!
- When my mother was baking cookies, she accidentally used salt instead of sugar. We all knew something was off.
- My mom didn't have buttermilk, so she made it by mixing lemon juice and milk. It became clumpy.

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: chemical reaction mixture solution change matter particles properties solid liquid gas substance natural phenomenon argument claim evidence models structure function system patterns	***Students will be able to:*** ● Develop a model to describe that matter is made of particles too small to be seen. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. ● Make observations and measurements to identify materials based on their properties. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

ASSESSMENT OF LEARNING

Summative Assessment (Assessment at the end of the learning period)	

	Students will develop a model and construct and argument with evidence to explain the science behind the phenomena using the Disciplinary Core Ideas, Cross Cutting Concepts, and Science and Engineering Practices
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See appendix	