NEPTUNE CITY SCHOOL DISTRICT

Elementary Science
Curriculum
Grade 5

NEPTUNE CITY SCHOOL DISTRICT
Office of the Chief School Administrator, Principal
210 West Sylvania Avenue
Neptune City, NJ 07753

The Neptune City School District is appreciative and proud to accept and align the curriculum of the NEPTUNE CITY School District to properly prepare the Neptune City students for successful integration into the NEPTUNE CITY High School Educational Program.

April 1, 2025 Document C1#1

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SCHOOL DISTRICT MISSION STATEMENT

The Neptune City School District, in partnership with the parents and the community, will support and sustain an excellent system of learning, promote pride in diversity, and expect all students to achieve the New Jersey Student Learning Standards at all grade levels to become responsible and productive citizens.

NEPTUNE CITY SCHOOL DISTRICT

ELEMENTARY SCIENCE
GRADE 5
CURRICULUM

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Acknowledgements

The Science Grade 5 Curriculum was developed for the NEPTUNE CITY Elementary Schools through the efforts of Kory Gross, elementary teacher, in cooperation with Stacie Ferrara, Ed.D., Supervisor of STEM, and with guidance of Sally A. Millaway, Ed.D., Director for Curriculum, Instruction and Assessment. Mrs. Gross is to be commended for their dedication in creating detailed learning plans that are aligned with the 2020 New Jersey Student Learning Standards in Science. These learning plans contain student-centered and inquiry-based activities. It is our hope that this guide will serve as a valuable resource for the staff members who teach Grade 5 and that they will feel free to make recommendations for its continued improvement.

NEPTUNE CITY SCHOOL DISTRICT

DISTRICT MISSION STATEMENT

The primary mission of the NEPTUNE CITY School District is to prepare all of our students for a life-long learning process and to become confident, competent, socially- and culturally-conscious citizens in a complex and diverse world. It is with high expectations that our schools foster:

- A strong foundation in academic and modern technologies
- A positive, equitable, and varied approach to teaching and learning
- An emphasis on critical thinking skills and problem-solving techniques
- A respect for and an appreciation for our world, its resources, and its diverse people
- A sense of responsibility, good citizenship, and accountability
- An involvement by the parents and the community in the learning process

NEPTUNE CITY School District

Educational Outcome Goals

The students in the NEPTUNE CITY schools will become life-long learners and will:

- Become fluent readers, writers, speakers, listeners, and viewers with comprehension and critical thinking skills.
- Acquire the mathematical skills, understandings, and attitudes that are needed to be successful in their careers and everyday life.
- Understand fundamental scientific principles, develop critical thinking skills, and demonstrate safe practices, skepticism, and open-mindedness when collecting, analyzing, and interpreting information.
- Become technologically literate.
- Demonstrate proficiency in all New Jersey Student Learning Standards (NJSLS).
- Develop the ability to understand their world and to have an appreciation for the heritage of America with a high degree of literacy in civics, history, economics and geography.
- Develop a respect for different cultures and demonstrate trustworthiness, responsibility, fairness, caring, and citizenship.
- Become culturally literate by being aware of the historical, societal, and multicultural aspects and implications of the arts.
- Demonstrate skills in decision-making, goal setting, and effective communication, with a focus on character development.
- Understand and practice the skills of family living, health, wellness and safety for their physical, mental, emotional, and social development.
- Develop consumer, family, and life skills necessary to be a functioning member of society.
- Develop the ability to be creative, inventive decision-makers with skills in communicating ideas, thoughts and feelings.
- Develop career awareness and essential technical and workplace readiness skills, which are significant to many aspects of life and work.

INTEGRATED SOCIAL AND EMOTIONAL LEARNING COMPETENCIES

The following social and emotional competencies are integrated in this curriculum document:

Self-Awareness	
x	Recognize one's own feelings and thoughts
	Recognize the impact of one's feelings and thoughts on one's own behavior
	Recognize one's personal traits, strengths and limitations
x	Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	
x	Understand and practice strategies for managing one's own emotions, thoughts and behaviors
x	Recognize the skills needed to establish and achieve personal and educational goals
x	Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals
Social Awareness	
	Recognize and identify the thoughts, feelings, and perspectives of others
	Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds
x	Demonstrate an understanding of the need for mutual respect when viewpoints differ
x	Demonstrate an awareness of the expectations for social interactions in a variety of setting
Responsible Decision Making	
x	Develop, implement and model effective problem solving and critical thinking skill
x	Identify the consequences associated with one's action in order to make constructive choices
x	Evaluate personal, ethical, safety and civic impact of decisions.
Relationship Skills	
x	Establish and maintain healthy relationships
x	Utilize positive communication and social skills to interact effectively with others
	Identify ways to resist inappropriate social pressure
x	Demonstrate the ability to present and resolve interpersonal conflicts in constructive ways
x	Identify who, when, where, or how to seek help for oneself or others when needed

Unit Plan Title	Safety
Suggested Time Frame	Ongoing and Embedded in Units as Appropriate

Overview / Rationale
Safety in the classroom setting is important for students and teachers. Personal safety is reviewed at the beginning of each school year in science lessons and should be demonstrated and adhered to by teachers and students in all activities including class demonstrations, lab investigations, hands on projects, gardening, outdoor classroom settings and any other school setting as well as SummerWood.

Stage 1 – Desired Results

Established Goals:
Although there are no specific New Jersey Student Learning Standards in Science describing safety procedures or rules, teachers should refer to the standards in each unit that requires and utilizes laboratory activities, demonstrations and investigations to support meeting the standard(s).

Essential Questions:	**Enduring Understandings:**
● How can accidents and injuries be avoided in the classroom and laboratory settings? ● What steps should be taken to respond to emergencies and accidents in the classroom, laboratory and workplace setting?	● Safety precautions are important for all areas of life and should be practiced by everyone on a daily basis. ● It is important that safety practices are understood and exercised in the classroom, laboratory, and on the job.
Knowledge: *Students will know…* ● Lab safety rules and expectations ● Names and uses of lab equipment ● Location and use of safety equipment	**Skills:** *Students will be able to…* ● Explain appropriate health and safety practices in the classroom and laboratory. ● Identify common hazards in the classroom and school setting.. ● Identify name and use of material and equipment ● Explain how to respond to various safety situations and accidents. ● Demonstrate how to use materials and equipment. .

Interdisciplinary Connections
New Jersey Student Learning Standards -English Language Arts (2016) **NJSLSA.R10.** Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed. **New Jersey Student Learning Standards-Comprehensive Health and Physical Education(2020)** **2.1.5.PGD.1**: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity). **2.1.5.CHSS.1:** Identify health services and resources available and determine how each assists in addressing needs and emergencies in a school and in the community (e.g., counselors, medical professionals). **2.2.5.MSC.3:** Demonstrate and perform movement skills with developmentally appropriate control in isolated settings (e.g., skill practice) and applied settings (e.g., games, sports, dance, recreational activities). **2.3.5.PS.1:** Develop strategies to reduce the risk of injuries at home, school, and in the community.

Student Resources
n/a

Teacher Resources
Flinn Safety Course for teachers online (free with registration) https://labsafety.flinnsci.com/ NSTA Safety Resources https://www.nsta.org/topics/safety Duty of Care https://static.nsta.org/pdfs/DutyOfCare.pdf Safety and the NGSS https://static.nsta.org/pdfs/Safety%20and%20the%20Next%20Generation%20Science%20Standards_29Oct2020_FINAL.pdf Safety Practices with Demonstrations https://static.nsta.org/pdfs/MinimumSafetyPracticesAndRegulations.pdf

Stage 2 – Assessment Evidence

Pre-Assessments:

What do you know about safety?

Formative Assessments:

Equipment- names and uses
Room layout and safety equipment location
Use of Safety equipment- eye wash, hood, fire blanket, fire extinguisher
Fire drill exit
Call for help in school

New Jersey Student Learning Assessment - Science (NJSLA)

Practice samples
https://nj.mypearsonsupport.com/practice-tests/science/

Stage 3 – Learning Plan

- Explain and demonstrate safety expectation
- Safety tour of classroom-
- Practice fire drill
- Review Safety equipment - name, location, use
- Review scenarios and how to call for help
- Model how to handle materials and equipment
- Review safety procedures throughout the year and before any activity.
- Explain how to dispose of materials and broken glass

Unit Plan Title	Unit 1: Living Things and Ecosystems
Suggested Time Frame	20-22 days

Overview / Rationale
Students are formally introduced to the term "ecosystem" and explore the roles of producers and consumers. Students will analyze data from a hypothetical plant experiment and develop an argument from evidence where they answer the question "What does a plant really need to survive and grow?" Students also discuss how humans impact the ecosystem and develop solutions to reduce negative effects on ecosystems.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.

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.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Essential Questions:

- What is an ecosystem?
- What is the role of producers in an ecosystem?
- What is the role of consumers in an ecosystem?
- What Is the role of decomposers in an ecosystem?
- How do matter and energy move in an ecosystem?
- What makes an ecosystem healthy or unhealthy?
- How do ecosystems change?
- How do humans change ecosystems?

Enduring Understandings:

- An ecosystem is all the living and nonliving things that interact in an area.
- Scientists who study environments are called ecologists. Ecologists ask questions about ecosystems and the organisms within them. They determine how to best investigate these systems.
- Most of the matter, or stuff, that plants are made out of comes from water and from carbon dioxide in the air, not from the soil. The energy they need comes from sunlight.
- A food chain shows how energy flows through a few organisms in an ecosystem. A food web is more complex. It connects food chains together and shows more complicated feeding relationships between organisms.

- A food chain shows how energy flows through a few organisms in an ecosystem. A food web is more complex. It connects food chains together and shows more complicated feeding relationships between organisms.

Knowledge:

Students will know…

- An ecosystem is one in which multiple species of different types are each able to meet their needs.
- That plants acquire most of their material for growth from carbon dioxide in the air, and their energy from the sun.
- Plants acquire most of their material for growth from carbon dioxide in the air, and their energy from the sun.
- Producers are organisms in an ecosystem that make their own food. All the food energy in any ecosystem originally comes from producers. They get their energy from the sun through a process called photosynthesis.
- Bacteria, fungi (including yeast), and scavengers are decomposers. Decomposers break down dead plant and animal matter to get food and energy.
- Humans change ecosystems in many ways. Introducing invasive species to an ecosystem can disrupt the flow of energy and matter. Clearing land for farms and cities removes organisms from their ecosystem. Pesticides and fertilizer from farms can wash off and disrupt surrounding ecosystems.
- Humans can negatively affect ecosystems. But humans can positively affect ecosystems, too, by setting land aside for protection or replacing dead trees. Engineers also develop solutions to reduce negative effects on ecosystems.

Skills:

Students will be able to…

- Describe components and interactions in an ecosystem.
- Observe the interdependent relationship between living and nonliving things in different ecosystems
- Develop a conceptual model of different ecosystems and show how each ecosystem functions.
- Construct and support an argument with evidence, data, and a model.
- Ask questions about what would happen if a variable is changed.
- Use patterns as evidence to support an explanation and predict phenomena.
- Discuss ways consumers use energy and review that energy is transferred between things.
- Dissect an owl pellet to identify what owls eat.
- Use tools in an investigation to pull apart and separate parts of an owl pellet.
- Create a diagram that describes the movement of matter among plants, animals, and the environment.
- Use a diagram to show how energy transfers from the sun to plants, to a consumer, then to another consumer.
- Use a diagram to explain that food provides animals with what they need for body repair, growth, and energy.
- Provide evidence and reasoning that support that energy humans use was once energy from the sun.
- Identify scientific and non scientific questions about ecosystems.
- Discuss the impact humans have on ecosystems.

Interdisciplinary Connections
New Jersey Student Learning Standards for English Language Arts (2016) **RI.5.1.** Quote accurately from a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text. **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. **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. **RI.5.9** Integrate and reflect on (e.g. practical knowledge, historical/cultural context, and background knowledge) information from several texts on the same topic in order to write or speak about the subject knowledgeably. **W.5.1.** Write opinion pieces on topics or texts, supporting a point of view with reasons and information **W.5.2.** Write informative/explanatory texts to examine a topic and convey ideas and information clearly **NJSLSA.SL5.** Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. **New Jersey Student Learning Standards for Mathematics (2020)** **MP.1** Make sense of problems and persevere in solving them. **MP.3** Construct viable arguments and critique the reasoning of others. **5.MD.B.** Represent and interpret data. **New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)** **9.4.5.CI.1**: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions. **9.4.5.CT.1:** Identify and gather relevant data that will aid in the problem-solving process **9.4.5.CT.2:** Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem **New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)** **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim. **8.1.5.DA.4:** Organize and present climate change data visually to highlight relationships or support a claim.

Student Resources
● Interactive notebook (available in Spanish) ● Science Journal (available in Spanish)
Teacher Resources
● Teach TCI teacher subscription www.teachtci.com. Reach out to the STEM Supervisor for a login and password. ● Unit 1 Lesson guides 1-8 ● Science journal

- Teach TCI Handouts A-H
- Materials: Bag (plastic sandwich size), Cloth (cotton), Container, plastic, 64 oz, Craft stick, Coffee filter, Paper plates, Scissors, Seeds, beans, Sponge, Tape (scotch), Toothpick, Yarn, Apron (vinyl), Forcep, Gloves (disposable), Newspaper, Owl pellet, Paper towels, Balance (triple beam), Balloons, Bottle (500 mL with cap), Paper cup, Graduated cylinder, 100 mL, White paper, Plastic spoon, Sugar, Duct tape, Water, Yeast, Large paper clips, Yellow construction paper

Stage 2 – Assessment Evidence

Pre-Assessments: *n/a*

Formative Assessments:

Wrap Up: My Science Concepts
Make Sense of Phenomena
Show What You Know
Vocabulary
Lesson assessments:

- What Is an Ecosystem?
- What Is the Role of Producers in an Ecosystem?
- What Is the Role of Consumers in an Ecosystem?
- What Is the Role of Decomposers in an Ecosystem?
- How Do Matter and Energy Move in an Ecosystem?
- What Makes an Ecosystem Healthy or Unhealthy?
- How Do Ecosystems Change?
- How Do Humans Change Ecosystems?

Summative Assessments:

Unit assessment from TeachTCI Test Bank (English/Spanish version available)

Performance Task(s):

Performance Assessment: Planning an Episode of Colossal Travels

- Students develop a model for how matter cycles through an ecosystem. Then use the model to show and explain how energy flows through an ecosystem. Finally, students find a local plant and support an argument for how it gets materials to grow.

New Jersey Student Learning Assessment - Science (NJSLA)

Practice Tests
https://nj.mypearsonsupport.com/practice-tests/science/

Stage 3 – Learning Plan

Bold= Fast track (required activities)
Italic = Extended track (optional activities to support student learning)

Lesson 1
Objective: Students describe and discuss that an ecosystem is made up of various components and interactions. Students define what an ecosystem is.

Activities

- **Observing phenomena (5 min):Students observe photo and ask questions.**
- *Introduce a naturalist (10 min):Turn and discuss questions with partner*
- **Investigation-Take Your Own Ecological Journey (25 min)**
- **Debrief Trip (5min) :Review ecosystems and what you observed there.**
- *Identify Ecosystems(10 min): Watch video and discuss with partner to identify 3 ecosystems*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (5min)**
- **Show What you Know (10min): Write a letter to an ecologist describing what you've observed in this ecosystem.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Organisms and Their Environment
2. A tropical Rainforest Ecosystem
3. A Pond Ecosystem
4. How Scientist Study Ecosystems

Lesson 2 ***Students do with Summerwood Fall lesson***
Objective: Students construct and support an argument regarding the role of producers in an ecosystem.
Activities

- **Observing phenomena (5 min):Students observe photo and ask questions**
- **Think About Plants- check for background knowledge (2 mins)**
- *Conduct The Experiment (50 mins) Prelab discussion and experimental setups A-D for virtual investigation (slides)*
- *Make an argument (15 mins)- (writing) make a claim and support with evidence from investigation.*
- **Vocabulary (5 mins)**
- **Wrap up: My Science Concepts (5 min)**
- **Show What You Know (10 mins)**
- **Make Sense of Phenomena (5 mins)**

Text With Notes (Reading)
1.Producers Make Food
2.Photosynthesis Uses Both Matter and Energy
3.Producers Store Excess Food
4. Photosynthesis Produces Waste
5. Where the Matter for Photosynthesis Come From

Lesson 3 ***Students cover in WINTER Summerwood lesson***
Objective: Students discuss ways consumers use energy and review how energy is transferred between things. Students investigate owl pellets to identify what an owl eats and compare it to the transfer of energy.
Activities

- **Observing Phenomena (5 mins) show the picture and ask the prompt. Students write questions they have.**
- **Owl Pellet Lab (80 mins)** ***Students do with Summerwood Winter lesson***
- **Introducing Owl Pellets (10 mins)**
- **Dissecting Owl Pellet (45 mins)**
- **Creating a Model Based on Your Findings (15 mins)**
- **Using Your Model of Energy Transfer (10 mins)**
- **Vocabulary (5 mins)**
- **Wrap Up: My Science Concepts: Discussion**
- **Show Me What You Know (10 mins): Complete flowchart**
- **Make Sense of Phenomena (5 mins): Explain why pigs grow larger as they eat**

Text With Notes (Reading)
1. Consumers Eat Other Organisms
2. Digestion Breaks Down Food to Release Energy
3. Consumers Store Excess Food
4. Consumers Produce Waste
5. Humans Are Consumers

Lesson 4 ***Students define and discuss decomposers at Summerwood Fall lesson***
Objective: Students define the role of decomposers in the ecosystem.Students design an investigation by making predictions, testing, and observing what happens when yeast, sugar and water are combined.

Activities

- **Observe Phenomena (5 mins): Show the compost bin picture and as the prompts.**
- **Students write down questions they have.**
- **Read Text: What is the Role of Decomposers in an Ecosystem?**(See list below- can be assigned for homework prior to lesson)
- **Asking Scientific Questions (10 mins): Watch video and ask questions about what is happening.**
- **Investigation:**
    - *Designing the investigation (15 minutes)*
    - Setting Up investigation: Safety Tips (20 mins)
    - Conducting the Investigation (15 mins)
    - Observing Your Results (5 mins)
    - *Analyzing the Results (10 mins)*
- **Vocabulary (5 mins)**
- **Wrap up: My Science Concepts (5 min) review decomposers and their importance**
- **Show what you know (10 min) Draw a diagram of a compost pile at 3 points in time- beginning, two months later, and one year later.**
- **Make Sense of Phenomena: Have students use RACES (Restate, Answer, Cite Evidence, Explain, Sum it up) to answer "What could this compost be used for?"**

Text With Notes (reading)
1.Some Organisms Are Decomposers
2.Decomposers Recycle Matter

3.Some Decomposers Can STore Excess Food
4. Decomposers Produce Waste
5. Humans Can Help to Decompose Wastes

Lesson 5 ***Students cover this in SPRING Summerwood lesson***
Objective: Students research, create, and use a model of a food chain and food web to show its parts and interactions within an ecosystem.
Activities

- **Observe Phenomena (5 mins): Show the 3 pictures and ask the prompt. Students write down questions they have.**
- **Reviewing Producers, Composers and Decomposers (5 min)**
- **Building a Food Chain (20 mins): Watch video and create a diagram of a food chain.**
- **Presenting and Understanding Your Food Chain (15 min): students present their food chains and discuss where energy comes from and moves within it.**
- *Building a Food Web (30 minutes)*
- *Describing Matter in an Ecosystem(15 mins)*
- **Vocabulary (3 mins)**
- **Wrap up: My Science Concepts (5 min): show picture of lion and discuss 4 prompts**
- **Show what you know (10 min): Draw a diagram of one of the following ocean, pond, desert, or urban city. Label it accordingly**
- **Make Sense of Phenomena (5 min):Watch the 30 second clip about birds and answer prompts**

Text With Notes (reading)
1.Matter Remains in an Ecosystem
2.Energy is Lost from an Ecosystem
3.Energy Flows Through Food Chains
4. How Many OrganismsMake up a Food Web
5. Humans are Parts of Food Chains and Food Webs

Lesson 6
Objective: Students read about various problems in Yellowstone National Park's ecosystem and make an argument for a proposed answer to the problem, citing relevant evidence to support their argument.

Activities

- *Prior to Lesson 6 Read through each of the Yellowstone scenarios to familiarize yourself with this historical case study.* **(time permitting- students will see the articles again during the lesson)**
- **Observe Phenomena (5 mins): Show the 3 pictures and ask the prompt. Students write down questions they have.**
- *Introducing Yellowstone National Park*
- **Yellowstone in 1872 (20 min): Review and discuss**

- *Yellowstone in 1935 (20 min)*
- **Yellowstone in 1995 (20 min): Review and discuss**
- **Yellowstone in 2009 (20 min): Review and discuss**
- *Debriefing the Debate (5 minutes)*
- **Vocabulary (4 mins)**
- **Wrap up: My Science Concepts (4 min): show slide and discuss the talking points**
- **Show what you know (10 min): Draw and label a picture of a healthy ecosystem**
- **Make Sense of Phenomena (5 min): Use what you have learned to explain this phenomenon- The wintercreeper plant has taken over this area and toppled some trees.**

Text With Notes (reading)
1.Healthy Ecosystems
2.A Healthy Forest Ecosystem on Isle Royale
3.Unhealthy Ecosystems
4.An Unhealthy Forest Ecosystem on Isle Royale

Lesson 7
Objective: Students observe and describe the components of change in an ecosystem. Students research and discuss how these changes affect multiple species.
Activities

- **Observe Phenomena (5 mins): Show the 3 pictures and ask the prompt. Students write down questions they have.**
- **Observing Types of Environmental Change (15 min): Review and discuss**
- **Creating Multimedia Presentations (20 min): Review and discuss**
- **Yellowstone in 2009 (20 min): Review, discuss & create**
- *Communicating about Ecosystem Changes (40 minutes)*
- **Vocabulary (3 mins)**
- **Wrap up: My Science Concepts (4 min): show slide of fire and discuss the talking points.**
- **Show what you know (10 min): Think of one thing that can cause an ecosystem to change then Draw and label a before & after picture. Provide a short explanation.**
- **Make Sense of Phenomena (5 min): Show the short clip and review discussion questions.**

Text With Notes (reading)
1.Ecosystems Can Change
2.Disturbance Leads to Succession
3. Changes with the Seasons
4.Climate Change and Ecosystems
5.Super Simple Science- What a Dinosaur Needs

Lesson 8
Objective: Students review and discuss the impact humans have on ecosystems. Students engineer designs to create hydroponic solutions to human impacts on ecosystems.
Activities

- **Observe Phenomena (5 mins): Show the 3 pictures and ask the prompt. Students write down questions they have.**
- *Reviewing Effects on Ecosystems (5 minutes)*
- **Learning about Hydroponic Systems (2 min): Review and discuss**
- **Defining the Problem (8 min): discuss and review problems & limitations to growing hydroponically**
- **Designing a Hydroponic System (20 min): Review, discuss & create**
- **Testing your Design (10 min)**
- **Analyzing and Improving your Design (10 min): several weeks later check in and measure your success/failure**
- **Vocabulary (3 mins)**
- **Wrap up: My Science Concepts (4 min): show slide of polluted water and discuss the talking points**
- **Show what you know (10 min): Changes in ecosystem prompt**
- **Make Sense of Phenomena (5 min): Reflection of human effects on fish survival.**

<u>Text With Notes (Reading)</u>
1.Humans Can Change Ecosystems
2.Human Development and Ecosystems
3.Taking Resources from Ecosystems
4.Introducing Species to Ecosystems

Unit Plan Title	Unit 2: Earth's Systems
Suggested Time Frame	20-25 days

Overview / Rationale
Students are introduced to the unit's anchoring phenomenon of California's droughts. In this unit, students explore Earth's four systems, including how Earth's systems produce weather and climate and how Earth's systems change its surface. Students will assess the anchoring phenomenon and write an article about how Earth's four systems interact during a drought. Students also investigate human interactions on the Earth's systems including how farming, industry, and everyday life affect Earth's systems. Students discover what people can do to protect Earth's systems and create a public service announcement about the water in their communities in the final performance assessment.

Stage 1 – Desired Results
Established Goals: **New Jersey Student Learning Standards in Science (2020)** **5-ESS3-1** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. **5-ESS2-1** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. **5-ESS2-2** Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. **3-5-ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
Essential Questions: ● What are Earth's four systems? ● How do Earth's systems produce weather and climate? ● How do Earth's systems change Earth's surface? ● How do farming and industry affect Earth's systems? ● How do people's everyday lives affect Earth's systems? ● What can people do to protect Earth's system?
Enduring Understandings: ● Earth can be divided into four interacting systems: the atmosphere, biosphere, hydrosphere, and geosphere. ● Water cycles between different land and atmosphere reservoirs. As it cycles, water can change between fresh and salt water reservoirs. No water is lost in the water cycle. ● Soil is made by the interactions of all four of Earth's systems over hundreds, sometimes thousands, of years. ● Weather and climate occur in the atmosphere. ● Changes in the atmosphere can be measured by changes in air pressure and temperature. ● Precipitation is caused by interactions between the atmosphere and hydrosphere. When rain, snow, or hail fall from the clouds and hit the ground, it interacts with the geosphere. ● Earth's systems interact with each other to change Earth's surface. ● Farming affects Earth's systems by harvesting crops and using fertilizers that have harmful runoff.

- Mining carves into the Earth's geosphere and industry machinery releases harmful chemicals into the atmosphere.
- The engineering design process involves clearly defining a problem, designing solutions and weighing their advantages and disadvantages, building and testing the solution, and improving the solution based on tests.

Knowledge:

Students will know…

- how the four Earth systems interact.
- the effect of human activities on Earth's systems and determine their significance and impact on the drought
- the value and importance of clean freshwater and what a precious resource it is, especially in times of drought.
- that the atmosphere is always involved in producing weather and climate.
- different weather is associated with different cloud types. At particular locations on Earth, the atmosphere is affected by ocean currents and prevailing wind.
- the atmosphere, hydrosphere, and biosphere break down, carry away, and drop parts of the geosphere. Pieces of rock are eroded when wind or water carry them away. When the pieces are dropped, they are deposited.

Skills:

Students will be able to…

- Build a clay model of Earth's four systems (geosphere, hydrosphere, biosphere, and atmosphere).
- Identify how the added system interacts with Earth's other systems and draw a diagram of their model.
- Analyze their graphs to answer questions.
- Compare texts and analyze information to answer questions.
- Analyze different types of weather and climate to describe how Earth's systems interact to produce it.
- Observe images of and identify changes to Earth's surface.
- Create, identify and explain limitations of models.
- Obtain and combine information about ways individual communities use ideas to protect the Earth's resources and environment.
- Design and build a water filter by planning a goal and defining criteria and constraints that limit their design.
- Draw a diagram, build, and test their design.
- Evaluate their success and discuss how they can improve their design.

Interdisciplinary Connections

New Jersey Student Learning Standards for English Language Arts (2016)

RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

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.

RI.5.9. Integrate and reflect on (e.g. practical knowledge, historical/cultural context, and background knowledge) information from several texts on the same topic in order to write or speak about the subject knowledgeably

W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

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.

New Jersey Student Learning Standards for Mathematics (2016)
MP.1 Make sense of problems and persevere in solving them.
MP.4 Model with mathematics.
5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)
9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions.
9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process
9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem

New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)
8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.

Student Resources
● Interactive notebook (available in Spanish) ● Science Journal (available in Spanish) ● Student Handout: Earth System Chips
Teacher Resources
● TeachTCI teacher subscription www.teachtci.com ● Unit 2 Lesson guides 1-6 ● Science journal ● TeachTCI Picture Cards A-H (Picture Cards A-H) ● Handout: Changes to Earth's Surface Descriptions ● Materials: Bead, Paper bowl, 4 colors of modeling clay, Cotton ball, Inflatable Earth model, Food coloring (set of 4), Disposable gloves, Assorted color pencils, Sand (medium), Chocolate chip cookies, Paper cup, Plastic fork, Plastic knife, Large paper clip, Paper towels, Toothpicks, Water, Vinyl Apron, Beaker (250 mL), Plastic Bin shoe box sized, Bottle (500 mL with cap), Cotton ball, Coffee Filter, Gravel, Small rocks, Ruler, Scissors, Soil, Sponge, Plastic spoon

Stage 2 – Assessment Evidence
Pre-Assessments: N/A ***Formative Assessments:*** Wrap Up: My Science Concepts

Make Sense of Phenomena
Show What You Know
Vocabulary
Lesson assessment:

- What Are Earth's Four Systems?
- How Do Earth's Systems Produce Weather and Climate?
- How Do Earth's Systems Change Earth's surface?
- How Do Farming and Industry Affect Earth's Systems ?
- What Can People Do to Protect Earth's Systems?

Summative Assessments:

Unit assessment from TeachTCI Test Bank *(English/Spanish version available)*

Performance Task(s):

Writing an Article on Earth's Systems

- Students graph the amounts of saltwater and freshwater on Earth and where it is located. Then they examine a study to determine how Earth's spheres interact. Finally, students write an article describing earth systems and their effects on one another.

Creating a Public Service Announcement About Water in Your Community

- Students obtain information about how their local community protects its resources or environment. Then they examine evidence to help them brainstorm ways they can help protect the environment. Students then develop a public service announcement to help inform people about how they can help protect their community.

New Jersey Student Learning Assessment - Science (NJSLA)

Practice Tests
https://nj.mypearsonsupport.com/practice-tests/science/

Stage 3 – Learning Plan

Bold= Fast track (required activities)
Italic = Extended track (optional activities to support student learning)

Lesson 1
Objective: Students create models of Earth's 4 Systems and discuss interactions.
Activities

- **Observing phenomena (5 min):How does a lake look different in the summer versus in the winter?**
- *Reviewing Effects on Ecosystems (5 min):Turn and discuss questions with partner*
- **Modeling Earth's Systems (40 min)**
- *Tallying and Graphing Water and Land (20 min)*
- *Graphing Salt and Fresh Water (10 min)*
- *Graphing Freshwater Sources (10 min)*
- *Analyzing Graphs (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Draw a picture of what you see outside.**

- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Earth Has Four Systems
2. The Atmosphere
3. The Biosphere
4. The Hydrosphere
5. Earth's Water Cycle
6. The Geosphere
7. Soil

Lesson 2
Objective: Students will go to eight different placards and gather information about how Earth's systems interact to produce weather and climate.
Activities
- **Observing phenomena (5 min):What does the sky look like when it is raining?**
- *Watching a Thunderstorm (5 min)*
- *Analyzing Data (15 min)*
- **Creating a Weather Report (20 min)**
- **Presenting a Weather Report (15 min)**
- *Reaching a Conclusion (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Record observations of what the weather is like where you are.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Earth's Systems Interact
2. Air Pressure and Temperature
3. Clouds and Precipitation
4. Ocean Currents
5. Prevailing Winds

Lesson 3
Objective: Students observe images then develop and communicate a model to understand and explain complicated Earth system interactions by creating and performing a skit that models how Earth's systems interact to cause changes.
Activities
- **Observing phenomena (5 min):Have you been to a rocky beach? Why do you think the rocks are the shape they are?**
- **Assigning Changes to the Earth's Surface (3 min)**
- **Creating Your Act-It-Out (25 min)**
- **Presenting Your Act-It-Out (15 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Turn an image of a landform into a diagram.**

- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Earth's Surface Changes
2. How Islands Form
3. Weathering, Erosion, and Deposition
4. How Soil Forms

Lesson 4
Objective: Students observe a series of farming and mining images and explain which human activity affected Earth's systems.
Activities

- **Observing phenomena (5 min):How do factories affect global warming?**
- *Reviewing Effects on Farming and Industry (10 min):Turn and discuss questions with partner*
- **Preparing for Mining Chips (15 min)**
- **Mining Chips Round One (13 min)**
- **Mining Chips Round Two (8 min)**
- **Comparing Results (5 min)**
- *Developing Ideas to Reduce the Impact of Farming and Industry (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Use the Suggested Reading to complete the speech bubbles.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Humans Affect Earth's Systems
2. Farming Affects Earth's Systems
3. Industry Affects Earth's Systems
4. Scientists Study Pollution

Lesson 5
Objective: Students view examples of everyday activities and discuss how the activity affects Earth's systems with your group. Students brainstorm ways to reduce the negative impact the activity has on Earth.
Activities

- **Observing phenomena (5 min):Think about everything you use on a daily basis. Where do all the materials to make these things originally come from?**
- **Setting the Stage (1 min)**
- *Eating Breakfast and Earth's Systems (15 min)*
- *Driving to School and Earth's Systems (15 min)*
- **Playing at Recess an Earth's Systems (15 min)**
- **Doing Homework and Earth's Systems (15 min)**
- *Using Electronics and Earth's Systems (15 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**

- **Show What You Know (10 min): Interview a family member or teacher about an everyday activity.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Affecting Earth's Systems in the Morning
2. Affecting Earth's Systems at School
3. Affecting Earth's Systems at Home

Lesson 6
Objective: Students to design and build a water filter using a set of materials. Students research different ways people protect Earth's systems with their group and create a podcast to report your research.
Activities

- **Observing phenomena (5 min):What are some of the main causes of pollution that you can think of?**
- *Observing a Filter (10 min)*
- **Defining the Problem (8 min)**
- **Designing and Testing Your Filter (20 min)**
- **Creating and Testing Your New Design (15 min)**
- *Discussing Filters (5 min)*
- *Researching Your Topic (15 min)*
- *Writing a Script (15 min)*
- *Earth Expo (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Write a letter to a peer about what can be done about air pollution.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Protecting Earth's Systems Is Important
2. Individuals Can Protect Earth's Systems
3. Engineers Can Protect Earth's Systems
4. Communities Can Protect Earth's Systems
5. Countries Can Protect Earth's Systems

Unit Plan Title	Unit 3: Changes in Matter
Suggested Time Frame	20-25 days

Overview / Rationale

Students are introduced to the unit's anchoring phenomenon of transforming gooey batter into fluffy pancakes. In this unit, students explore what matter is made of and why materials are different. Students identify substances, and examine what causes them to change, how those changes affect a substance's weight, and how scientists know when substances change. Students also find out how engineers improve materials. Last, students test pancake batter's properties to identify each ingredient. Using their knowledge on changes in matter, can students identify mystery ingredients by their properties to make improvements to pancake batter before it hits the griddle?

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.
5-PS1-3 Make observations and measurements to identify materials based on their properties.
5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
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.
3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Essential Questions:

- What is matter made of?
- Why are materials different?
- How can substances be identified?
- How do scientists know when substances change?
- What causes substances to change?
- How do changes to substances affect their weights?
- How do engineers improve materials?

Enduring Understandings:

- All things are made up of matter.
- 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.
- Matter is made of particles.
- 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.
- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.

- When two or more different substances are mixed, a new substance with different properties may be formed.
- No matter what reaction or change in properties occurs, the total weight of the substances does not change.

Knowledge:

Students will know…

- Matter is anything that has weight and takes up space. Matter is made up of tiny particles too small to be seen.
- Air has weight and takes up space, but you cannot see it. Therefore, there is some matter you cannot see.
- There are millions of kinds of substances. A mixture is a combination of two or more substances whose particles are not joined together. Mixtures can be separated.
- Some properties, such as color and reflectivity, are easy to observe without any tools. However, hardness and brittleness are properties that need to be tested first.
- Particles have weight, so they are affected by gravity. Though the particles of liquid are moving over and around each other, they remain along the bottom of the container.
- Particles of a gas move faster than particles of a liquid. More and faster random movement results in the particles taking up the entire container instead of merely the bottom. Though they take up the whole container, particles of a gas are still affected by gravity towards Earth's center. This is why the air gets thinner as you climb a mountain.

Skills:

Students will be able to…

- develop and use a conceptual model of matter that describes matter as consisting of particles that are too small to be seen.
- explain how sugar water is a mixture of two substances and show that there are sugar particles in the water.
- evaluate a cause and effect relationship between sugar and water when a sugar cube appears to disappear when dropped into a cup of water.
- analyze and interpret data to explain whether they think a new substance with different properties was formed during a change.
- measure the weight of substances before and after a change to investigate what happens to the weight of substances during different kinds of changes.
- discover that the total weight of the substances does not change.
- use the engineering design process including generating and comparing multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem to identify what makes good glue and then test different processes to find the best one.

Interdisciplinary Connections

New Jersey Student Learning Standards for English Language Arts (2016)

5.RI.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

5.RI.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.

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.

W.5.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

New Jersey Student Learning Standards for Mathematics (2016)
5.MD.A. Convert like measurement units within a given measurement system.
5.MD.B. Represent and interpret data
5.MD.C. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)
9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions.
9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process
9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.

New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)
8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Student Resources

- Interactive notebook (available in Spanish)
- Science Journal (available in Spanish)

Teacher Resources

- Teach TCI teacher subscription www.teachtci.com
- Unit 3 Lesson guides 1-7
- Science journal
- TeachTCI Handouts A-H
- Materials: Balloon, Food coloring (set of 4), Newspaper, Ruler, Non-iodized salt, Scissors, Plastic spoon, Tape, Balsa Wood, Yarn, Plastic sandwich bag, Plastic Bin shoe box sized,Craft stick, Flour, Graduated cylinder (100mL), 3/4" metal washer, Meter stick, Black & white construction paper, White paper, Masking tape, Apron, Baking powder, Baking soda, Beaker (250 mL), Plastic medicine cup (30 mL), Eyedropper,Flour, Safety gloves,Safety Goggles, Iodine solution [(.05%) 100 mL], Plastic jar, Hand lens, Paper towels, Plastic spoon, Granulated sugar, Talc powder, Vinegar, Water, Calcium chloride,Paper cup, Whipping Cream

Stage 2 – Assessment Evidence

Pre-Assessments:N/A

Formative Assessments:
Wrap Up: My Science Concepts
Make Sense of Phenomena
Show What You Know
Vocabulary
Lesson assessment:

- What Is Matter Made Of?
- Why Are Materials Different?
- How Can Substances Be Identified?
- How Do Scientists Know When Substances Change?
- What Causes Substances to Change?
- How Do Changes to Substances Affect Their Weights?
- How Do Engineers Improve Materials?

Summative Assessments:
Unit assessment from TeachTCI Test Bank *(English/Spanish version available)*

Performance Task(s):
Testing Pancake Ingredients

- Students conduct an investigation to identify pancake ingredients. Students make pancake batter and see how its properties change when it cooks. They will measure and graph changes in weight.Finally, students develop a model to describe what happens when pancakes cook.

New Jersey Student Learning Assessment - Science (NJSLA)

Practice Tests
https://nj.mypearsonsupport.com/practice-tests/science/

Stage 3 – Learning Plan

Bold= Fast track (required activities)
Italic = Extended track (optional activities to support student learning)

Lesson 1
Objective: Observe and discuss that 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.
Activities

- **Observing phenomena (5 min):Do you think the air around you is made of anything? Explain why or why not?**
- *Mixing Salt and Water (5 min)*
- *Discussing Matter (5 min)*
- **Blowing Up and Balancing Balloons (15 min)**
- *Flying Wood (10 min)*
- **Developing a Model of Matter (10 min)**
- *Using Your Model of Matter (10 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Predict what happens when you blow up a bike tire.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Matter Is Made of Particles
2. States of Matter:
3. Matter Seems to Appear and Disappear

4. Some Matter You Cannot See
5. Odors Come from Matter

Lesson 2

Objective: Students review that matter is made up of particles and discuss that matter can be subdivided into particles that are too small to see but can be detected by other means.

Activities

- **Observing phenomena (5 min):How can the sky go from clear to rainy? If there was water in the air, why couldn't you see or feel it when it was clear?**
- *Modeling States of Matter (5 min)*
- **Modeling a Solid (10 min)**
- **Modeling a Liquid (10 min)**
- **Modeling a Gas (10 min)**
- *Changing Matter (10 min)*
- *Modeling Mixtures and Substances (20 min)*
- **Drawing a Model of Matter (5 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (5 min): Explain evidence of mixtures.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. There Are Many Different Materials
2. Different Types of Materials
3. Separating Mixtures into Substances

Lesson 3

Objective: Students identify a mystery powder by making a claim and supporting it with evidence.

Activities

- **Observing phenomena (5 min):Have you ever tried to mix water and flour? What happened?**
- *Reviewing Properties (5 min)*
- *Identifying Substances (5 min)*
- **Conducting Tests (25 min)**
- **Identifying Your Mystery Powder (15 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Analyze an investigation to identify an unknown substance.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. Substances Have Identifiable Properties
2. Properties You Can See
3. Some Properties Are Harder to See
4. Scientists Use Properties to Identify Substances

Lesson 4

Objective: Students discuss cause and effect relationships to explain changes in the properties of matter. Students observe that when two or more different substances are mixed, a new substance may form.

Activities

- **Observing phenomena (5 min):What happens when you cook an egg on the stove? What differences do you see in the egg before and after its cooked?**
- **Reviewing Property Changes and Chemical Reactions (10 min)**
- **Observing Property Changes (20 min)**
- *Debriefing Your Observations (10 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Draw a picture of a substance changing state.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. Changes in Matter Can Be Seen
2. Substances Can Change State
3. New Substances Have New Properties
4. Substance Changes in Your Kitchen

Lesson 5

Objective: Students discuss a variety of properties that can be used to identify materials. Students conduct an investigation to determine whether mixing two or more substances results in a new substance.

Activities

- **Observing phenomena (5 min):What happens to metal that has been left outside in the rain for a long time? Why do you think this is?**
- *Designing and Investigation (10 min)*
- *Reviewing Properties (5 min)*
- **Planning Mixtures (15 min)**
- **Carrying Out the Investigation (25 min)**
- *Interpreting the Data (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (5 min): Explain changes in substances based on data.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. Changes to Substances Have Consistent Changes
2. Heating and Cooling Cause Changes
3. Mixing Substances Causes Changes
4. Why You Use a Refrigerator

Lesson 6

Objective: Students review that when two or more different substances are mixed, a new substance with different properties may form. Students graph quantities to show evidence that regardless of the type of change, the total weight of matter is conserved.

Activities

- **Observing phenomena (5 min):What happens to water when it freezes? Do you think its weight is changing?**
- *Reviewing Changes (5 min)*
- **Melting Water (5 min)**
- **Freezing Water (5 min)**
- *Dissolving Salt (15 min)*
- *Separating Cream (25 min)*
- **Checking the Melted Ice and Freezing Water (10 min)**
- **Dissolving Antacid Tablets in Water (15 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Calculate and analyze results.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. Matter Is Conserved
2. Weight and Changes in Temperature
3. Weight and Changes from Mixing
4. Science Assumes All Matter Is Conserved

Lesson 7

Objective: Students plan an investigation to determine whether the mixing of two or more substances results in new substances.

Activities

- **Observing phenomena (5 min):Why do you think city buildings are no longer made entirely of wood?**
- *Engineering Substances (5 min)*
- **Creating a Control Recipe (10 min)**
- **Defining the Problem (10 min)**
- **Creating Group Recipes (20 min)**
- *Improving Recipes (20 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Identify criteria for success and constraints.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. Properties Have Different Uses
2. Engineers Choose the Best Material
3. Engineers Create New Materials
4. Engineer Your Own Material

Unit Plan Title	Unit 4: Earth, Moon, and the Stars
Suggested Time Frame	20-25 Days

Overview / Rationale

Students are introduced to the unit's anchoring phenomenon of life being different on a space station than it is on Earth. In this unit, students first investigate the effect of gravity. Next, students examine why distance plays a role in the brightness of the sun compared to other stars, and how Earth's rotation causes day and night. Students observe how shadows change during the day and year and how stars seem to move during the night and year, as well as how the moon seems to move and change shape. Last, students find out about what tools scientists use to observe space and how astronauts are trained for the ISS. What differences between life on a space station and life on Earth will students discover?

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

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.

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.

5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Essential Questions:

- What does gravity do?
- Why is the sun brighter than other stars?
- Why is there day and night?
- What would daytime and nighttime be like on board the space station?
- How do shadows change during the day and year?
- How do stars seem to move during the night and year?
- How does the moon seem to move and change shape?
- What tools do scientists use to observe space?

Enduring Understandings:

- When a ball is released in the air, it falls to the ground. The force of gravity pulls objects on or near Earth's surface "down" toward the center of Earth.
- Gravity pulls objects on Earth's surface toward Earth's center, gravity is strongest at Earth's surface, all objects have gravity, weight is the force of gravity, and gravity causes meteors.

- Understand that the orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns of different positions of the sun, moon, and stars at different times of the day, month, and year.
- Earth's rotation on its axis causes shadows to change in length and direction throughout the day. Shadows are also affected by the angle of the sun. When it is low in the sky (morning and evening), shadows are long. When it is high in the sky (noon), shadows are short.
- Engineers use the engineering design process to design and build solutions to problems. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Knowledge:

Students will know…

- The effects of gravity and compare how gravity is on Earth versus the space station.
- Whether there are differences in the appearance and brightness of stars in space versus on Earth.
- That Earth's rotation is directly observable high up in the space station, yet on Earth, it is indicated by the different positions of stars at different times of the day.
- Telescopes are one of the many tools that help humans understand space. The space station utilizes many tools to aid in that understanding.
- That the Earth's rotation makes it look like the sun is "moving" throughout the sky in a consistent pattern. This causes the pattern of day and night. The sun rises in the east every morning and sets in the west every night.
- Shadows caused by the sun always fall to the side of an object opposite the sun.
- It takes 29 to 30 days for a moon to complete its cycle. You can observe how the moonrise and moonset times change every moon cycle. The moon rises and sets at a later time each day.
- The time the moon rises and sets is related to the moon phase. Each moon phase rises and sets at around the same time every cycle.

Skills:

Students will be able to…

- Analyze data and look for patterns to explain how the length of shadows changes over the course of a day.
- Graph data about four constellations to reveal patterns of the seasonal appearance of some stars in the night sky.
- Compare and analyze patterns of moonrise time and the pattern of moon phases to answer questions.
- Plot data in a graph to reveal patterns and show relationships between the moonrise and moonset times for their moon phases.
- Collaborate to design a spyglass and include criteria for success as well as constraints on material, time, size and costs.
- Evaluate the effectiveness of a spyglass design using fair tests using controlled variables and several trials.
- Generate and compare multiple possible solutions of the spyglass design.
- Use data to evaluate and improve their design solutions.
- Explain how scientists use tools to observe that stars range greatly in their distance from Earth.

Interdisciplinary Connections
New Jersey Student Learning Standards for English Language Arts (2016) **5.RI.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. **5.RI.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. **5.RI.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. **5.W.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. **5.W.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. **New Jersey Student Learning Standards for Mathematics (2016)** **5.G.A.1.** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate). **5.G.A.2.** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. **New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)** **9.4.5.CI.1:** Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions. **9.4.5.CT.1:** Identify and gather relevant data that will aid in the problem-solving process **9.4.5.CT.2:** Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem. **New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)** **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim. **8.1.5.DA.3:** Organize and present collected data visually to communicate insights gained from different views of the data.

Student Resources
● Interactive notebook (available in Spanish) ● Science Journal (available in Spanish)

Teacher Resources

- Teach TCI teacher subscription www.teachtci.com
- Unit 4 Lesson guides 1-7
- Science journal
- TeachTCI Handouts A-H
- Materials: Battery (size D), Inflatable Earth model, Flashlight, Graph Paper, Sticker, Yellow Poster Board, Paper bowl, White chalk, Light bulb (60 W), Light socket (porcelain w/cord), Markers, Large paper clip, White Paper, Pencil, Ruler, Sticky notes (3x3), Tape (scotch), Paper (cardstock), Colored Pencils, Aluminum foil, Apron (vinyl), Gloves, Lens, double concave (FL 10 cm), Lens, double convex (FL 15 cm), Paper (construction, assorted colors), Scissors, Tape(masking), Tube (cardboard), 4.71"L, Tube, cardboard, 5.86"L, Yard sticks

Stage 2 – Assessment Evidence

Pre-Assessments:

N/A

Formative Assessments:

Wrap Up: My Science Concepts
Make Sense of Phenomena
Show What You Know
Vocabulary
Lesson assessment:

- What Does Gravity Do?
- Why Is the Sun Brighter than Other Stars?
- Why Is There Day and Night?
- How Do Shadows Change During the Day and Year?
- How do stars seem to move during the night and year?
- How Does the Moon Seem to Move and Change Shape?
- What Tools Do Scientists Use to Observe Space?

Summative Assessments:

Unit assessment from TeachTCI Test Bank (English/Spanish version available)

Performance Task(s):

Training Astronauts for the ISS

- Students graph data about the cycle of day and night on Earth. Then they compare sunrises and sunsets on Earth and on the ISS. Students then support their arguments about gravity and apparent brightness of stars. Finally, they create a training presentation that compares life on Earth with life on the ISS.

New Jersey Student Learning Assessment - Science (NJSLA)

Practice Tests
https://nj.mypearsonsupport.com/practice-tests/science/

Stage 3 – Learning Plan

Bold= Fast track (required activities)
Italic = Extended track (optional activities to support student learning)

Lesson 1
Objective: Students will identify cause and effect relationships between gravity and motion.
Activities

- **Observing phenomena (5 min):Suppose you tossed a ball into the air. Where does it land? How do you know?**
- **Jumping (5 min)**
- **Dropping Objects (5 min)**
- **Questioning Gravity (10 min)**
- *Analyzing, Modeling and Applying Gravitational Direction (15 min)*
- *Revising Your Argument (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Explain how gravity affects various objects.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1.Gravity Pulls You Toward Earth's Center
2.Gravity Causes Meteors
3.Gravity Is Strongest at Earth's Surface
4.All Objects Have Gravity
5.Weight Is the Force of Gravity

Lesson 2
Objective: Students will organize data on graph paper to reveal patterns about brightness and size of light circles. Students use a model to identify cause and effect relationships and describe how light from the stars travels to Earth.
Activities

- **Observing phenomena (5 min):Have you ever been to the mountains or the wilderness and looked at the stars? Why could you see more of them than you can in the city?**
- *Reviewing Stars (5 min)*
- *Analyzing Flashlight Brightness (15 min)*
- *Understanding Starlight (15 min)*
- **Modeling the Sun and Other Stars (10 min)**
- **Comparing Models (10 min)**
- **Connecting Our Model to Stars (5 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Draw a diagram that explains why the sun appears to be so much brighter and bigger than other stars.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Light from Stars Travels to Earth
2. Measuring Distances in Space
3. Distance Affects a Star's Apparent Brightness
4. Other Factors Affect a Star's Apparent Brightness

Lesson 3
Objective: Students will use a lamp and globe to model the Sun and Earth. Students represent data about day and night in a diagram showing how Earth's rotation causes day and night.
Activities

- **Observing phenomena (5 min):Think about where you live. Does the sun rise and set at the same time every day?**
- **Modeling the Sun and Earth (5 min)**
- **Modeling Day and Night (10 min)**
- **Modeling Sunrise and Sunset (10 min)**
- *Modeling Time Zones (5 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Diagram and explain changes in amounts of light people experience.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Earth Spins on Its Axis
2. Earth's Rotation Causes Day and Night
3. It Is a Different Time of Day in Different Places
4. The Amount of Daylight Changes During the Year

Lesson 4
Objective: Students model sunrise and measure and graph the length of the shadows at five different simulated times to use as data to explain shadow lengths.
Activities

- **Observing phenomena (5 min):Think about what you know about shadows. Have you seen your shadow change shape?**
- *Modeling Light on a Globe (30 min)*
- **Using a Sundial (35 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Use evidence to explain shadow phenomena.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Shadows Follow a Daily Pattern
2. Shadows Follow A Yearly Pattern
3. Using Shadows to Measure Time
4. Shadows Point in Different Directions in Different Places

Lesson 5

Objective: Students observe a video of stars during one year and identify patterns in star changes during the seasons. Students use their bodies to model and describe the relationship between the Earth, sun, and other stars.

Activities

- **Observing phenomena (5 min):Have you ever gone stargazing before? Why do you think the constellations appear to be moving over time?**
- *Observing the Stars (15 min)*
- **Modeling the Stars (25 min)**
- *Confirming Our Model (5 min)*
- *Planning an Investigation (30 min)*
- **Building an Explanation (5 min)**
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Creating a diagram that models why you cannot see the stars in Orion during the summer.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)

1. Star Pattern Form Pictures in the Sky
2. Stars Seem to Move During the Night
3. Using Stars and Star Patterns to Navigate
4. Constellations Seem to Changes with the Seasons
5. People Use Constellations to Tell Stories
6. Scientists Use Star Charts to Map the Sky

Lesson 6

Objective: Students answer questions to show an understanding that the orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns in moon cycles.

Activities

- **Observing phenomena (5 min):Think about times you've observed the moon. What different shapes have you seen the moon take?**
- **Understanding Moonrise and the Moon's Phases (10 min)**
- *Comparing Patterns (10 min)*
- **Collecting Data (10 min)**
- **Plotting Your Data (10 min)**
- *Plotting Class Data (10 min)*
- *Analyzing Moon Patterns (5 min)*
- *Challenge Questions (10 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Identify patterns of moon phases.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. The Sun Lights Up the Moon
2. The Moon Rises and Sets in a Pattern
3. Moon Phases Follow a Pattern
4. The Moon's Patterns Are Related

Lesson 7
Objective: Students define a problem (seeing objects far away or small objects more clearly) that can be solved by developing a spyglass.
Activities

- **Observing phenomena (5 min):Have you ever seen a satellite at night in the sky?**
- **Planning Your Solution (15 min)**
- **Designing and Building Your Telescope (25 min)**
- *Comparing Designs (5 min)*
- **Testing Your Solution (20 min)**
- *Improving Your Solution (15 min)*
- **Vocabulary (3 min)**
- **Wrap Up: My Science Concepts (4 min)**
- **Show What You Know (10 min): Research historical events in telescope technology development.**
- **Make Sense of Phenomena (5 min) Use what you have learned to explain a phenomenon**

Text With Notes (Reading)
1. Tools Help Scientists See Light from Stars
2. Lenses Refract Light
3. Refracting Telescopes
4. Isaac Newton and Reflecting Telescopes
5. Space Telescopes
6. Radio Telescopes

Accommodations and Modifications:

Below please find a list of suggestions for accommodations and modifications to meet the diverse needs of our students. Teachers should consider this a resource and understand that they are not limited to the recommendations included below.
An accommodation changes HOW a student learns; the change needed does not alter the grade-level standard. A modification changes WHAT a student learns; the change alters the grade-level expectation.

Special Education and 504 Plans All modifications and accommodations must be specific to each individual child's IEP (Individualized Educational Plan) or 504 Plan.

- Provide redirection
- Provide notes and copies of handouts with
- Pre-teach or preview vocabulary
- Have students repeat directions
- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments
- Model skills/techniques to be mastered
- Emphasize key words or critical information by highlighting
- Use of graphic organizers
- Teachers should note any issue that may impact safety- ex. contact lenses, allergies.

English Language Learners:
All modifications and accommodations should be specific to each individual child's LEP level as determined by the WIDA screening or ACCESS, utilizing the WIDA Can Do Descriptors.
- Pre-teach or preview vocabulary
- Repeat or reword directions
- Have students repeat directions
- Use of small group instruction
- Scaffold language based on their Can Do Descriptors
- Alter materials and requirements according to Can Do Descriptors

Students at Risk of Failure:
- Use of self-assessment rubrics for check-in
- Pair visual prompts with verbal presentations
- Ask students to restate information and/or directions
- Opportunity for repetition and additional practice
- Model skills/techniques to be mastered
- Extended time
- Provide copy of class notes
- Strategic seating with a purpose
- Provide students opportunity to make corrections and/or explain their answers
- Support organizational skills

High Achieving:

Extension Activities

- Allow for student choice from a menu of differentiated outcomes; choices grouped by complexity of thinking skills; variety of options enable students to work in the mode that most interests them
- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more complex material
- Allow opportunities for peer collaboration and team-teaching
- Set individual goals

NEPTUNE CITY SCHOOL DISTRICT
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An Affirmative Action Equal Opportunity Employer

2025