Subject Area: Science
Grade Level: 4
Bedminster Township School

Unit 1:
Launching Science and Earth's Changing Surface

Dates: September- October	**Time Frame:** 7-8 weeks

Overview

In this unit, students investigate features and processes of the Earth's surface. Students explore the rapid process of volcanic eruptions and differences in lava types. In contrast, students also explore the gradual Earth processes of weathering and erosion. Students apply their knowledge and design solutions to mitigate the impacts of these processes on humans. Students also learn about rocks and fossils, garnering an understanding of the processes that cause them to change and how they help scientists learn about the Earth's storied past.

Enduring Understandings

- Understanding the wide range of roles and careers of scientists.
- Identifying volcanic patterns of the Earth's surface, including the Pacific Ring of Fire
- Differences in volcano shapes, types of eruptions, and volcanic rocks
- Modeling the processes of weathering and erosion
- Landslides and natural hazards as a result of erosion
- Engineering and design: creating models of fossils, weathering, and erosion processes
- Identifying patterns in scientific data or observations
- Identifying cause and effect relationships based on natural phenomena like erosion causing landslides
- Practice analyzing and interpreting data in logical settings
- Constructing a logical explanation using scientific evidence

Skill and Knowledge Objectives

Core Ideas

- Identify the various roles scientists play in their work fields.
- Describe the pattern to where most volcanoes exist today on the earth.
- Explain that volcanic rocks are lava that has been cooled.
- Recognize the pattern of volcanoes that exists today has changed over time.
- Distinguish between two different shapes of volcanoes and two different lava types.
- Explain how the thickness of lava explains the two major differences in a volcano's shape & style of eruption.
- Compare rocks at the bottom of a mountain to rocks at the top of a mountain.
- Describe how the process of weathering changes rock over time.
- Describe how weathering causes natural hazards such as landslides and rock falls.

- Discuss solutions that could be designed to protect people from natural hazards.
- Identify the importance of fossils for Geology as a whole
- Explain how fossils "tell a story" about the Earth of years past

Scientific and Engineering Practices

- **Analyze and interpret data** from recent volcanic eruptions.
- **Use findings as evidence** for an argument that volcanoes are (or are not) likely to erupt in their backyard.
- **Conduct an investigation** and model thin and thick lava.
- **Construct an explanation** for why some volcanoes explode and why some do not.
- **Investigate** by **modeling** how rocks erode over time.
- **Construct an explanation** for how rocks erode.
- **Design** solutions to protect a house from a rock slide.
- **Argue** for the merit of a design solution.
- Create your fossils using household ingredients and classroom materials (sea shells optional)

Cross-cutting Concepts

- **Identify patterns** about the location of the world's volcanoes.
- Reason about the **cause and effect** of the type of lava (cause) and the nature of the eruption (effect).
- Consider the **cause and effect** of ice and root wedging on rock.
- **Engineering** a solution to landslide hazards depends on **scientific knowledge** about the causes of landslides.
- **Write** a story (fictional or non-fictional) about a volcanic eruption or landslide

Assessments

Pre-Assessment/Benchmark:

- Pre-assess knowledge of vocabulary and prerequisite concepts for the TCI unit

Modifications:

- General Education (GenEd) - Standard/Full version of test
- IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins
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Formative Assessment:

- Teacher observation of student participation in class discussion stopping points.
- Teacher observation of student participation in investigations or activities.
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Resources

- *TCI, Grade 4 Science, Unit 3 "Earth's Changing Surface"*
- Activity materials
- Extension videos linked in TCI
- Digital notes, activity pages, and assessments (Google Drive)
- Classroom library books
- YouTube videos as selected and previewed by the Teacher

Standards

NJSLS: Science

- **4-ESS1-1: Earth's Place in the Universe**

- **Description:** Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

- **4-ESS2-1: Earth's Systems**
  - **Description:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- **4-ESS2-2: Earth's Systems**
  - **Description:** Analyze and interpret data from maps to describe patterns of Earth's features.
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- **4-ESS3-2: Earth and Human Activity**
  - **Description:** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

NJSLS: Design Thinking

1. **8.2.5.ED.1**
   - **Description:** Explain the functions of a system and how those functions contribute to the overall design.
2. **8.2.5.ED.2**
   - **Description:** Collaborate with peers to find solutions to a problem.
3. **8.2.5.ED.3**
   - **Description:** Follow the steps to design a prototype that meets the criteria and constraints of a problem.
4. **8.2.5.ED.4**
   - **Description:** Evaluate and modify a prototype based on peer feedback.
5. **8.2.5.ED.5**
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NJSLS: Computing Systems (apply at all times computers are utilized)

1. **8.1.5.CS.1**
   - **Description.** Model how computing devices connect to other components to form a system.
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NJSLS: Networks and the Internet

1. **8.1.5.NI.1**
   - **Description:** Develop models that illustrate how information is transmitted between devices and on the internet.
2. **8.1.5.NI.2**
   - **Description:** Describe physical and digital security measures for protecting sensitive personal information.

NJSLS: Data & Analysis

1. **8.1.5.DA.1**

- **Description:** Collect, organize, and display data to highlight relationships or support a claim.

2. **8.1.5.DA.2**
   - **Description:** Compare the amount of storage space required for different types of data.
3. **8.1.5.DA.3**
   - **Description:** Organize and present collected data visually to highlight relationships and support a claim.
4. **8.1.5.DA.4**
   - **Description:** Explain how different types of data can be stored and processed in different ways.

NJSLS: Impacts of Computing

1. **8.1.5.IC.1**
   - **Description: Identify how computing devices have impacted the world.**
2. **8.1.5.IC.2**
   - **Description: Seek diverse perspectives to improve computational artifacts.**

NJSLS: Personal Financial Literacy

1. **9.1.4.PB.1**
   - **Description:** Describe the importance of prioritizing wants and needs.
2. **9.1.4.PB.2**
   - **Description:** Determine when there is a need to spend money and when there is a desire to save money.
3. **9.1.4.PB.3**
   - **Description:** Explain how saving money can lead to financial security.
4. **9.1.4.PB.4**
   - **Description:** Identify the factors that can influence spending decisions.
5. **9.1.4.PB.5**
   - **Description:** Explain the differences between financial institutions and their services.
6. **9.1.4.FP.1**
   - **Description:** Illustrate the steps involved in setting a personal financial goal.
7. **9.1.4.FP.2**
   - **Description:** Identify ways to earn and save money.
8. **9.1.4.CR.1**
   - **Description:** Identify the jobs people perform to earn money.
9. **9.1.4.GCA.1**
   - **Description:** Explain the difference between a private and public good.
10. **9.1.4.RM.1**
    - **Description:** Identify ways to manage personal financial risks and avoid risky financial situations.

NJSLS Career Readiness, Life Literacies, and Key Skills

- 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
- 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification.
- 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.

- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community, and global.

Ethics & Culture

1. **8.2.5.ETW.1**
   - **Description:** Identify how technology has changed or improved an individual's quality of life.
2. **8.2.5.ETW.2**
   - **Description:** Analyze how technology has changed people's lives in different eras and regions.
3. **8.2.5.ETW.3**
   - **Description:** Investigate the ways technology impacts our environment and living things.

Social and Emotional Competencies

- **Relationship Skills:** *Students communicate effectively in pairs, small groups, and whole-group units at appropriate discussion-stopping points. Students use Accountable Talk Moves to disagree respectfully, ask clarifying questions, etc. Students cooperate and work collaboratively to problem-solve and complete a task at hand.*
- **Responsible Decision Making:** *Students learn how to make a reasoned judgment after analyzing information and facts after each exploration and activity. Students identify solutions to a social problem.*

Unit 1: Earth's Changing Surface

Alternates with Social Studies Days 1-6

LINK to ALL Lesson Plans for this Unit (click here)

Lesson 1: How have Scientists arrived at our current understanding of the world? View in this Google Doc for specific plans.	**Lesson 2:** What is a scientist? View in this Google Doc for specific plans.	**Lesson 3:** What are some clues that Earth's Surface changes? View in this Google Doc for specific plans.	**Lesson 4:** How does water change the Earth's Surface? View in this Google Doc for specific plans.	**Lesson 5:** How does wind change the Earth's Surface? View in this Google Doc for specific plans.
Lesson 6: How do fossils form and what do they show? View in this Google Doc for specific plans.	**Lesson 7:** Where are earthquakes, volcanoes, and mountains found? View in this Google Doc for specific plans.	**Lesson 8:** What can people do about natural hazards? View in this Google Doc for specific plans.	**Lesson 9:** Review and Assessment of this unit Utilize the Assessment Library on TCI if desired, or create your own, tailored assessment.	

Differentiate Instruction, depending on individual student need (Students with an IEP, ELL Students; At-Risk Students; Gifted Students) **by:**

Presentation Accommodations

- Listen to audio recordings instead of reading text
- Learn content from audiobooks, movies, videos, and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Use a magnification device, screen reader, or Braille / Nemeth Code
- Use audio amplification device (e.g., hearing aid(s), auditory trainer, sound-field system (which may require teacher use of microphone)
- Be given a written list of instructions
- Have another student share class notes
- Be given a copy of the teacher's notes
- Be given a study guide to assist in preparing for assessments
- Use visual presentations of verbal material, such as word webs and visual organizers
- Use manipulatives to teach or demonstrate concepts
- Have curriculum materials translated into the native language
- Display student-created anchor charts throughout the unit for reference
- Pre-teach vocabulary and post it around the room for reference

Response Accommodations

- Use sign language, a communication device, Braille, other technology, or a native language other than English
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of "math facts"
- Respond directly in the test booklet rather than on an answer sheet.

Setting Accommodations

- Work or take an assessment in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
- Use special lighting or acoustics
- Take a test in a small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Use noise buffers such as headphones, earphones, or earplugs

Timing Accommodations

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

Scheduling Accommodations

- Take more time to complete a project
- Take a test in several timed sessions or over several days
- Take sections of a test in a different order
- Take a test at a specific time of day

Organization Skills Accommodations

- Use an alarm to help with time management
- Mark texts with a highlighter
- Have help coordinating assignments in a book or planner
- Receive study skills instruction

Assignment Modifications

- Complete fewer or different tasks than peers
- Write shorter responses
- Answer fewer or different test questions (see modified assessments in Drive)
- Create alternate projects or assignments

Curriculum Modifications

- Enrichment or extension activities for advanced learners
- Get graded or assessed using a different standard than the one for classmates

Other Modifications

- Think-Pair-Share: Design partnerships so that more advanced students can guide struggling students
- Provide bookmarks/reminder cards for how to participate effectively in discussions ("Purposeful Talk," "Discussion Starters")
- Help students set individual goals that meet teacher expectations (classwork and homework differentiated according to goals/expectations)
- Conference with students in small groups and individually to review concepts and skills as often as needed

Differentiate Instruction, depending on individual student needs (Students with a 504) **by:**

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Subject Area: Science
Grade Level: 4
Bedminster Township School

Unit 2:
Plant and Animal Structures

Dates: November-December	**Time Frame:** 6-7 weeks

Overview

In this unit, students investigate the structures and functions of plants, animals, and the human body. Students explore how we are made of atoms and molecules and how complex arrangements of such are organized as structures of the organism. Students also examine how these structures function to support survival, growth, behavior, and reproduction.

Enduring Understandings

- Structure and function of muscular and skeletal systems
- Structure and function of eyes
- The role of the brain and nerves in information processing
- Conducting investigations and building models
- Analyzing and interpreting data
- Structure and function of plants
- Cooperation between structures to contribute to the survival of the individual

Skill and Knowledge Objectives

Core Ideas

- Explain how muscles, tendons, and bones work together to create movement.
- Describe how external body parts are controlled by the brain.
- Compare the human body to a machine with parts.
- Identify the causes of vision problems.
- Describe the function and purpose of the iris, pupil, and retina in the eye.
- Explain the brain's role in receiving information from the senses, processing that information, and controlling the muscles
- Explain how the bodies of all living things are composed of systems that work together to aid in survival

Scientific and Engineering Practices

- **Build a model** of a finger
- **Construct an explanation** for how fingers move
- **Build a model** of an eyeball

- **Construct an explanation** of why some people have blurry vision
- **Investigate** to see how pupils change in response to light.
- **Build a model** of an eye to **explain** how changes in pupil size change the image that appears on the retina.
- **Conduct investigations** to explore how the brain processes information and responds to that information.
- **Analyze and interpret data** from investigations to determine how fast their reflexes are.

Cross-cutting Concepts

- Consider how human motion is made possible by a **system** of muscles, tendons, and bones.
- Discuss the **cause-and-effect** relationship between tendons and the muscles and bones that they move.
- Explain how specific structures have a role in the survival of a species.
- Explain how the eye works as a **system** of different parts.
- Discuss how light interacts with the system to determine what images we see (**cause and effect**.)
- Identify **patterns** based on how brains process information.

Assessments

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Modifications:

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Standards

NJ Student Learning Standards:

Life Sciences (LS)

- **4-LS1-1: From Molecules to Organisms: Structures and Processes**
  - **Description:** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- **4-LS1-2: From Molecules to Organisms: Structures and Processes**

- **Description:** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

- 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
  - Develop a model to describe phenomena. (4-PS4-2)
  - Cause and effect relationships are routinely identified. (4-PS4-2)

NJSLS: Reading / English Language Arts

- RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

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Social Emotional Competencies

- **Relationship Skills:** *Students communicate effectively in pairs, small groups, and whole-group units at appropriate discussion-stopping points. Students use Accountable Talk Moves to disagree respectfully, ask clarifying questions, etc. Students cooperate and work collaboratively to problem-solve and complete a task at hand.*
- **Responsible Decision Making**: *Students learn how to make a reasoned judgment after analyzing information and facts after each exploration and activity. Students identify solutions to a social problem.*

Unit 2: Plant and Animal Structures

Alternates with Social Studies Days 1-6

LINK to ALL Lesson Plans for this Unit (click here)

Lesson 1: What plant structures are used for support and growth? View in this Google Doc for specific plan	**Lesson 2:** What plant structures are used for protection? View in this Google Doc for specific plans.	**Lesson 3:** What plant structures are used for reproduction? View in this Google Doc for specific plans.	**Lesson 4:** How do plants respond to their environment? View in this Google Doc for specific plans.	**Lesson 5:** What animal structures are used for digestion and circulation? View in this Google Doc for specific plans.
Lesson 6: What animal structures are used for support, movement, and protection? View in this Google Doc for specific plans.	**Lesson 7:** What animal structures are used for reproduction? View in this Google Doc for specific plans.	**Lesson 8:**: What animal structures are used for sensing the environment? View in this Google Doc for specific plans.	**Lesson 9:** How do animals respond to their environment? View in this Google Doc for specific plans.	**Lesson 10:** Review and Assessment of this unit Utilize the Assessment Library on TCI if desired, or create your own, tailored assessment.

Optional Unit Performance Task: How are animals and plants like machines?

Materials:

- TCI Science Digital Platform
- Research materials (books, technology, etc.)
- Animal options and handouts (teacher-created)

Activity: In the Performance Task, students research another animal or plant. They create a system model to explain how the animal's or plant's parts work together as a system to receive information, process it, and respond to its environment.

Assessment: Performance Task Rubric

Differentiate Instruction, depending on individual student needs (Students with an IEP, ELL Students; At-Risk Students; Gifted Students) **by:**

Presentation Accommodations

- Listen to audio recordings instead of reading text
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- Use manipulatives to teach or demonstrate concepts
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- Display student-created anchor charts throughout the unit for reference
- Pre-teach vocabulary and post it around the room for reference

Response Accommodations

- Use sign language, a communication device, Braille, other technology, or a native language other than English
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of "math facts"
- Respond directly in the test booklet rather than on an answer sheet.

Setting Accommodations

- Work or take an assessment in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
- Use special lighting or acoustics
- Take a test in a small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Use noise buffers such as headphones, earphones, or earplugs

Timing Accommodations

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

Scheduling Accommodations

- Take more time to complete a project

- Take a test in several timed sessions or over several days
- Take sections of a test in a different order
- Take a test at a specific time of day

Organization Skills Accommodations

- Use an alarm to help with time management
- Mark texts with a highlighter
- Have help coordinating assignments in a book or planner
- Receive study skills instruction

Assignment Modifications

- Complete fewer or different tasks than peers
- Write shorter responses
- Answer fewer or different test questions (see modified assessments in Drive)
- Create alternate projects or assignments

Curriculum Modifications

- Enrichment or extension activities for advanced learners
- Get graded or assessed using a different standard than the one for classmates

Other Modifications

- Think-Pair-Share: Design partnerships so that more advanced students can guide struggling students
- Provide bookmarks/reminder cards for how to participate effectively in discussions ("Purposeful Talk," "Discussion Starters")
- Help students set individual goals that meet teacher expectations (classwork and homework differentiated according to goals/expectations)
- Conference with students in small groups and individually to review concepts and skills as often as needed

Differentiate Instruction, depending on individual student needs (Students with a 504) **by:**

Presentation Accommodations

- Listen to audio recordings instead of reading text
- Learn content from audiobooks, movies, videos, and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Use a magnification device, screen reader, or Braille / Nemeth Code
- Use audio amplification device (e.g., hearing aid(s), auditory trainer, sound-field system (which may require teacher use of microphone)
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- Have another student share class notes
- Be given a copy of the teacher's notes
- Be given a study guide to assist in preparing for assessments
- Use visual presentations of verbal material, such as word webs and visual organizers
- Use manipulatives to teach or demonstrate concepts
- Have curriculum materials translated into a native language
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Subject Area: Science
Grade Level: 4
Bedminster Township School

Unit 3:
Energy

Dates: January-February	**Time Frame:** 8 weeks

Overview

In this unit, students explore energy. Students investigate how energy is stored, how it can make objects move, and how collisions transfer energy between objects. Students also construct devices that convert energy from one form into another, such as heat into motion and electricity into light.

Enduring Understandings

- Energy can be stored, released as movement, or transferred.
- There is a relationship between speed and energy.
- There is a relationship between height as stored energy and speed.
- Inventions can be made that convert stored energy to movement and transfer energy along a pathway.
- Electricity is a form of energy that we use to produce movement, light, heat, and more.
- Explore alternative natural sources of energy such as solar, wind, and water.
- Analyzing and interpreting data
- Building models and conducting investigations
- Engineer and design solutions to environmental issues.

Skill and Knowledge Objectives

Core Ideas

- Identify different ways energy can be stored.
- Explain how moving things get their energy from stored energy.
- Describe the relationship between speed and energy.
- Describe the relationship between height as stored energy and speed.
- Explain how energy can be transferred from one object to another.
- Explain how energy such as electricity is transferred through a pathway.
- Compare engines to chain reaction machines that transfer energy.
- Identify alternative natural sources of energy such as solar, wind, and water.
- Explain how alternative natural sources of energy affect the environment and are solutions to climate change.

Scientific and Engineering Practices

- **Build a model** of an amusement park ride

- **Investigate** to examine the relationship between energy and speed.
- **Analyze and interpret data from models,** comparing the speed of the ride using a thin versus thick rubber band.
- **Build a model** of a roller coaster.
- **Analyze and interpret data** from the model to explain the connection between height, energy, and speed.
- **Conduct an investigation** using a model roller coaster to determine how energy can be stored in the hills of the coaster.
- **Analyze and interpret data** from the model.
- **Design** a chain reaction machine.
- **Design** a flashlight, and **experiment** with different ways of constructing flashlights so that they turn on and off.
- **Investigate** to explain how heat makes things move.
- **Obtain and evaluate information** about the needs of each source of energy.
- **Analyze and interpret data** about a community's resources to create a solution.

Cross-cutting Concepts

- Explain how the amount of **energy** that is put into a **system** is related to the speed.
- Discuss how **energy** is stored, released, and transferred in a **system.**
- Explain the **cause-and-effect** relationship between nonrenewable forms of energy and damage to the environment.

Assessments

Pre-Assessment/Benchmark:

- Pre-assess knowledge of vocabulary and prerequisite concepts for the TCI unit

Modifications:

- General Education (GenEd) - Standard/Full version of test
- IEP -Limited multiple choice selections, choice of long-response essay, word bank for fill-ins
- 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins
- G&T - Extension questions, additional writing tasks, greater depth
- At-Risk - Limit scope or number of higher-order thinking questions
- MLL - Translate function available on Chromebook

Formative Assessment:

- Teacher observation of student participation in class discussion stopping points.
- Teacher observation of student participation in investigations or activities.
- Guided notes and/or graphic organizers
- Activity recording sheets and questions as evidence for understanding

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Self-Reflection/Self-Assessment:

- Individual and group reflection after TCI-based lessons

Modifications:

- General Education (GenEd) - standard method of self-check
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Summative Assessment:

- End-of-Lesson or Project-Based Assessments (use the rubric to score responses)
- End of Unit Assessment

Modifications:

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- MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided / formula sheet provided

Resources

- *TCI Science Digital: Grade 4, Unit 2*
- Activity materials
- Extension videos linked in each TCI Lesson
- Digital notes, activity pages, and assessments (Google Drive)
- Classroom library books
- Allan Drummond's books- *Energy Island, Solar Story, Green City,* and *Pedal Power*
- YouTube videos as selected and previewed by the Teacher

Standards

NJ Student Learning Standards:

Physical Sciences (PS)

- **4-PS3-1: Energy**

    - **Description:** Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- **4-PS3-2: Energy**
    - **Description:** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- **4-PS3-3: Energy**
    - **Description:** Ask questions and predict outcomes about the energy changes that occur when objects collide.
- **4-PS3-4: Energy**
    - **Description:** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Earth & Space Sciences (ESS)

- **4-ESS3-1: Earth and Human Activity**
    - **Description:** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Engineering Design (ETS)

- **3-5-ETS1-1: Engineering Design**
    - **Description:** 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: Engineering Design**
    - **Description:** 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: Engineering Design**
    - **Description:** 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.

NJSLS: Reading / English Language Arts

- RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

NJSLS: Design Thinking

1. **8.2.5.ED.1**
    - **Description:** Explain the functions of a system and how those functions contribute to the overall design.
2. **8.2.5.ED.2**
    - **Description:** Collaborate with peers to find solutions to a problem.
3. **8.2.5.ED.3**
    - **Description:** Follow the steps to design a prototype that meets the criteria and constraints of a problem.
4. **8.2.5.ED.4**
    - **Description:** Evaluate and modify a prototype based on peer feedback.
5. **8.2.5.ED.5**

- **Description:** Develop a plan to improve a product, process, or system based on the needs of the user.

NJSLS: Computing Systems (apply at all times computers are utilized)

1. **8.1.5.CS.1**
   - **Description:** Model how computing devices connect to other components to form a system.
2. **8.1.5.CS.2**
   - **Description:** Identify potential solutions for simple hardware and software problems using common troubleshooting strategies.

NJSLS: Networks and the Internet

1. **8.1.5.NI.1**
   - **Description:** Develop models that illustrate how information is transmitted between devices and on the internet.
2. **8.1.5.NI.2**
   - **Description:** Describe physical and digital security measures for protecting sensitive personal information.

NJSLS: Data & Analysis

1. **8.1.5.DA.1**
   - **Description:** Collect, organize, and display data in order to highlight relationships or support a claim.
2. **8.1.5.DA.2**
   - **Description:** Compare the amount of storage space required for different types of data.
3. **8.1.5.DA.3**
   - **Description:** Organize and present collected data visually to highlight relationships and support a claim.
4. **8.1.5.DA.4**
   - **Description:** Explain how different types of data can be stored and processed in different ways.

NJSLS: Impacts of Computing

1. **8.1.5.IC.1**
   - **Description: Identify how computing devices have impacted the world.**
2. **8.1.5.IC.2**
   - **Description: Seek diverse perspectives to improve computational artifacts.**

NJSLS: Personal Financial Literacy

1. **9.1.4.PB.1**
   - **Description:** Describe the importance of prioritizing wants and needs.
2. **9.1.4.PB.2**
   - **Description:** Determine when there is a need to spend money and when there is a desire to save money.

3. **9.1.4.PB.3**
    - **Description:** Explain how saving money can lead to financial security.
4. **9.1.4.PB.4**
    - **Description:** Identify the factors that can influence spending decisions.
5. **9.1.4.PB.5**
    - **Description:** Explain the differences between financial institutions and their services.
6. **9.1.4.FP.1**
    - **Description:** Illustrate the steps involved in setting a personal financial goal.
7. **9.1.4.FP.2**
    - **Description:** Identify ways to earn and save money.
8. **9.1.4.CR.1**
    - **Description:** Identify the jobs people perform to earn money.
9. **9.1.4.GCA.1**
    - **Description:** Explain the difference between a private and public good.
10. **9.1.4.RM.1**
    - **Description:** Identify ways to manage personal financial risks and avoid risky financial situations.

NJSLS Career Readiness, Life Literacies, and Key Skills

- 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
- 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification.
- 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.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community, and global.

Ethics & Culture

1. **8.2.5.ETW.1**
    - **Description:** Identify how technology has changed or improved an individual's quality of life.
2. **8.2.5.ETW.2**
    - **Description:** Analyze how technology has changed people's lives in different eras and regions.
3. **8.2.5.ETW.3**
    - **Description:** Investigate the ways technology impacts our environment and living things.

Social-Emotional Competencies

- **Relationship Skills:** *Students communicate effectively in pairs, small groups, and whole-group units at appropriate discussion-stopping points. Students use Accountable Talk Moves to disagree respectfully, ask clarifying questions, etc. Students cooperate and work collaboratively to problem-solve and complete a task at hand.*
- **Responsible Decision Making**: *Students learn how to make a reasoned judgment after analyzing information and facts after each exploration and activity. Students identify solutions to a social problem.*

Unit 3: Energy

Alternates with Social Studies Days 1-6

LINK to ALL Lesson Plans for this Unit (click here)

Lesson 1: How are energy and motion related? View in this Google Doc for specific plans.	**Lesson 2:** How is energy transferred by colliding objects? View in this Google Doc for specific plans.	**Lesson 3:** How is energy transferred by sound, light, and heat? View in this Google Doc for specific plans.	**Lesson 4:** How is energy transferred by electric currents? View in this Google Doc for specific plans.	**Lesson 5:** How is energy stored and used? View in this Google Doc for specific plans.
Lesson 6: How do people choose energy resources? View in this Google Doc for specific plans.	**Lesson 7:** Review and Assessment of this unit Utilize the Assessment Library on TCI if desired, or create your own, tailored assessment.			

Differentiate Instruction, depending on individual student needs (Students with an IEP, ELL Students; At-Risk Students; Gifted Students) **by:**

Presentation Accommodations

- Listen to audio recordings instead of reading text
- Learn content from audiobooks, movies, videos, and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Use a magnification device, screen reader, or Braille / Nemeth Code
- Use audio amplification device (e.g., hearing aid(s), auditory trainer, sound-field system (which may require teacher use of microphone)
- Be given a written list of instructions
- Have another student share class notes
- Be given a copy of the teacher's notes
- Be given a study guide to assist in preparing for assessments
- Use visual presentations of verbal material, such as word webs and visual organizers
- Use manipulatives to teach or demonstrate concepts
- Have curriculum materials translated into a native language
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Response Accommodations

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Setting Accommodations

- Work or take an assessment in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
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- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Use noise buffers such as headphones, earphones, or earplugs

Timing Accommodations

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

Scheduling Accommodations

- Take more time to complete a project
- Take a test in several timed sessions or over several days
- Take sections of a test in a different order
- Take a test at a specific time of day

Organization Skills Accommodations

- Use an alarm to help with time management
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Assignment Modifications

- Complete fewer or different tasks than peers
- Write shorter responses
- Answer fewer or different test questions (see modified assessments in Drive)
- Create alternate projects or assignments

Curriculum Modifications

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- Get graded or assessed using a different standard than the one for classmates

Other Modifications

- Think-Pair-Share: Design partnerships so that more advanced students can guide struggling students
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"Discussion Starters")

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Subject Area: Science
Grade Level: 4
Bedminster Township School

Unit 4:
Waves and Information

Dates: March-May	**Time Frame:** 7-8 weeks

Overview

In this unit, students investigate the concept of energy transfer via waves. Students will understand that information such as sound, light, and digital signals all exist in the form of waves. This includes the science of sound. Students construct physical devices to feel the vibrations that allow us to communicate across distances. Students also use digital devices to visualize the characteristics of different sound waves that cause us to hear different things. Digital devices, like computers, use waves to communicate with each other.

Enduring Understandings

- Sound is a vibration that travels through a material
- Differences in vibrations determine if a sound's pitch is high or low.
- Identifying, investigating, and analyzing patterns in sound vibrations
- Information can be transferred using electromagnetic waves such as radio waves
- Sound and light can be produced by devices that interpret patterns in electromagnetic waves
- Computer devices can utilize electromagnetic waves to connect to the Internet
- Messages can be sent electronically using waves

Skill and Knowledge Objectives

Core Ideas

- Prove that sound is a vibration using evidence.
- Explain that sound is produced only when a vibration can travel through a material.
- Compare differences in sound wavelengths.
- Describe the relationship between sound wavelengths and the pitch of a sound.
- Explain how waves transfer energy from place to place
- Explain how electromagnetic waves can carry information, like sound, light, and internet connectivity
- Explain how computers communicate with each other using electronic patterns and electromagnetic waves

Scientific and Engineering Practices

- Create a **model** of a paper cup telephone.

- **Design a series of investigations** to figure out how to make the telephone work better in varying circumstances.
- **Construct an explanation** of how the telephone works.
- **Conduct investigations** with balloons to experience sound vibrations.
- **Construct an explanation** that sound is a vibration.
- **Analyze and interpret data** from oscilloscopes to determine how wavelengths differ between high and low-pitch sounds.
- Students **make claims and argue from evidence** about which wavelength patterns were generated from different pitches.

Cross-cutting Concepts

- Identify **patterns** and the relationship between the tension of the string and the quality of the sound it produces.
- Consider the **effect** of vibrations on the movement of objects.
- Students identify and analyze the oscilloscope **patterns.**

Assessments

Pre-Assessment/Benchmark:

- Pre-assess knowledge of vocabulary and prerequisite concepts for the TCI unit

Modifications:

- General Education (GenEd) - Standard/Full version of test
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- Teacher observation of student participation in investigations or activities.
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Summative Assessment:

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- YouTube videos as selected and previewed by the Teacher

Standards

NJ Student Learning Standards:

Physical Sciences (PS)

- **4-PS4-1: Waves and Their Applications in Technologies for Information Transfer**
  - **Description:** Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- **4-PS4-2: Waves and Their Applications in Technologies for Information Transfer**
  - **Description:** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
- **4-PS4-3: Waves and Their Applications in Technologies for Information Transfer**

- **Description:** Generate and compare multiple solutions that use patterns to transfer information.

Earth & Space Sciences (ESS)

- **4-ESS3-1: Earth and Human Activity**
  - **Description:** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Engineering Design (ETS)

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  - **Description:** 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: Engineering Design**
  - **Description:** 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.

NJSLS: Reading / English Language Arts

- RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

NJSLS: Design Thinking

1. **8.2.5.ED.1**
   - **Description:** Explain the functions of a system and how those functions contribute to the overall design.
2. **8.2.5.ED.2**
   - **Description:** Collaborate with peers to find solutions to a problem.
3. **8.2.5.ED.3**
   - **Description:** Follow the steps to design a prototype that meets the criteria and constraints of a problem.
4. **8.2.5.ED.4**
   - **Description:** Evaluate and modify a prototype based on peer feedback.
5. **8.2.5.ED.5**
   - **Description:** Develop a plan to improve a product, process, or system based on the needs of the user.

NJSLS: Computing Systems (apply at all times computers are utilized)

1. **8.1.5.CS.1**
   - **Description:** Model how computing devices connect to other components to form a system.
2. **8.1.5.CS.2**
   - **Description:** Identify potential solutions for simple hardware and software problems using

common troubleshooting strategies.

NJSLS: Networks and the Internet

1. **8.1.5.NI.1**
   - **Description:** Develop models that illustrate how information is transmitted between devices and on the internet.
2. **8.1.5.NI.2**
   - **Description:** Describe physical and digital security measures for protecting sensitive personal information.

NJSLS: Data & Analysis

1. **8.1.5.DA.1**
   - **Description:** Collect, organize, and display data to highlight relationships or support a claim.
2. **8.1.5.DA.2**
   - **Description:** Compare the amount of storage space required for different types of data.
3. **8.1.5.DA.3**
   - **Description:** Organize and present collected data visually to highlight relationships and support a claim.
4. **8.1.5.DA.4**
   - **Description:** Explain how different types of data can be stored and processed in different ways.

NJSLS: Impacts of Computing

1. **8.1.5.IC.1**
   - **Description: Identify how computing devices have impacted the world.**
2. **8.1.5.IC.2**
   - **Description: Seek diverse perspectives to improve computational artifacts.**

NJSLS: Personal Financial Literacy

1. **9.1.4.PB.1**
   - **Description:** Describe the importance of prioritizing wants and needs.
2. **9.1.4.PB.2**
   - **Description:** Determine when there is a need to spend money and when there is a desire to save money.
3. **9.1.4.PB.3**
   - **Description:** Explain how saving money can lead to financial security.
4. **9.1.4.PB.4**
   - **Description:** Identify the factors that can influence spending decisions.
5. **9.1.4.PB.5**
   - **Description:** Explain the differences between financial institutions and their services.
6. **9.1.4.FP.1**
   - **Description:** Illustrate the steps involved in setting a personal financial goal.
7. **9.1.4.FP.2**
   - **Description:** Identify ways to earn and save money.

8. **9.1.4.CR.1**
    - **Description:** Identify the jobs people perform to earn money.
9. **9.1.4.GCA.1**
    - **Description:** Explain the difference between a private and public good.
10. **9.1.4.RM.1**
    - **Description:** Identify ways to manage personal financial risks and avoid risky financial situations.

NJSLS Career Readiness, Life Literacies, and Key Skills

- 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
- 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification.
- 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.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community, and global.

Ethics & Culture

1. **8.2.5.ETW.1**
    - **Description:** Identify how technology has changed or improved an individual's quality of life.
2. **8.2.5.ETW.2**
    - **Description:** Analyze how technology has changed people's lives in different eras and regions.
3. **8.2.5.ETW.3**
    - **Description:** Investigate the ways technology impacts our environment and living things.

Social-Emotional Competencies

- **Relationship Skills:** *Students communicate effectively in pairs, small groups, and whole-group units at appropriate discussion-stopping points. Students use Accountable Talk Moves to disagree respectfully, ask clarifying questions, etc. Students cooperate and work collaboratively to problem-solve and complete a task at hand.*
- **Responsible Decision Making**: *Students learn how to make a reasoned judgment after analyzing information and facts after each exploration and activity. Students identify solutions to a social problem.*

Unit 4: Waves and Information

Alternates with Social Studies Days 1-6

LINK to ALL Lesson Plans for this Unit (click here)

Lesson 1: What are some examples of waves? View in this Google Doc for specific plans.	**Lesson 2:** What are some properties of waves? View in this Google Doc for specific plans.	**Lesson 3:** How do waves affect objects? View in this Google Doc for specific plans.	**Lesson 4:** Which waves travel through Earth? View in this Google Doc for specific plans.	**Lesson 5:** How can sound waves be used to send messages? View in this Google Doc for specific plans.
Lesson 6: How can patterns be used to send messages? View in this Google Doc for specific plans.	**Lesson 7:** Review and Assessment of this unit Utilize the Assessment Library on TCI if desired, or create your own, tailored assessment.			

Optional Unit Performance Task: How can you make sound waves visible?
Materials:

- TCI Digital Science Access
- Hands-on activity materials (Possible Sound Detectors, multipurpose/construction materials)
- My Sound Wave Watcher handout (Mystery Science)

Activity: In the Performance Task, students attempt to create devices that can create visual representations of sound waves.

Assessment: My Sound Wave Watcher Rubric

Differentiate Instruction, depending on individual student needs (Students with an IEP, ELL Students; At-Risk Students; Gifted Students) **by:**

Presentation Accommodations

- Listen to audio recordings instead of reading text
- Learn content from audiobooks, movies, videos, and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Use a magnification device, screen reader, or Braille / Nemeth Code
- Use audio amplification device (e.g., hearing aid(s), auditory trainer, sound-field system (which may require teacher use of microphone)
- Be given a written list of instructions
- Have another student share class notes
- Be given a copy of the teacher's notes
- Be given a study guide to assist in preparing for assessments
- Use visual presentations of verbal material, such as word webs and visual organizers
- Use manipulatives to teach or demonstrate concepts
- Have curriculum materials translated into a native language
- Display student-created anchor charts throughout the unit for reference
- Pre-teach vocabulary and post it around the room for reference

Response Accommodations

- Use sign language, a communication device, Braille, other technology, or a native language other than English
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of "math facts"
- Respond directly in the test booklet rather than on an answer sheet.

Setting Accommodations

- Work or take an assessment in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher, away from distractions)
- Use special lighting or acoustics
- Take a test in a small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Use noise buffers such as headphones, earphones, or earplugs

Timing Accommodations

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task

Scheduling Accommodations

- Take more time to complete a project
- Take a test in several timed sessions or over several days
- Take sections of a test in a different order
- Take a test at a specific time of day

Organization Skills Accommodations

- Use an alarm to help with time management
- Mark texts with a highlighter
- Have help coordinating assignments in a book or planner
- Receive study skills instruction

Assignment Modifications

- Complete fewer or different tasks than peers
- Write shorter responses
- Answer fewer or different test questions (see modified assessments in Drive)
- Create alternate projects or assignments

Curriculum Modifications

- Enrichment or extension activities for advanced learners
- Get graded or assessed using a different standard than the one for classmates

Other Modifications

- Think-Pair-Share: Design partnerships so that more advanced students can guide struggling students
- Provide bookmarks/reminder cards for how to participate effectively in discussions ("Purposeful Talk," "Discussion Starters")
- Help students set individual goals that meet teacher expectations (classwork and homework differentiated according to goals/expectations)
- Conference with students in small groups and individually to review concepts and skills as often as needed

Differentiate Instruction, depending on individual student needs (Students with a 504) **by:**

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