Ocean Academy Charter School
Curriculum Guide
Grade 4 - Science

Original Adoption:	August 2025
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OCEAN ACADEMY CHARTER SCHOOL Science Curriculum	
Content Area: Science	
Course Title: Science	
Grade Level: Grade 4	
Unit Title	**Pacing Guide in Days**
Trimester 1: **Energy**	**30 days**
Trimester 2: **Waves and their Applications in Technologies for Information Transfer** **Structure, Function, and Information Processing**	**30 Days**
Trimester 3: **Structure, Function, and Information Processing** **Earth's Place in the Universe/Earth's Systems/Earth and Human Activity** **Climate Change**	**30 Days**

OCEAN ACADEMY CHARTER SCHOOL Trimester 1 Overview
Content Area: Science

Ocean Academy Charter School
Curriculum Guide
Grade 4 - Science

Unit Title: Energy	**Duration:** 30 Days
Target Course/Grade Level: Grade 4	

Introduction/Unit Focus:

In this unit, fourth-grade students will explore the relationship between energy and motion, examining how the speed of an object is connected to the amount of energy it possesses. Through hands-on investigations and real-world examples, students will observe how energy can be transferred from place to place through sound, light, heat, and electrical currents. They will also explore what happens to energy when objects collide, recognizing that energy can change form but is not lost.

Students will deepen their understanding of energy transfer by designing, testing, and refining simple devices that convert energy from one form to another, such as electrical to light or mechanical to sound. This unit emphasizes experimentation, modeling, and engineering practices to help students build foundational knowledge of energy transformations and their impact in everyday life.

Disciplinary Concepts for the Unit

Standard 9.1 Personal Financial Literacy
This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training
This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills
This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science
Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking
Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

Diversity and Inclusion: C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

(1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;

(2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and

(3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

"Twenty-first century themes and skills" means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy."

Focus Standards (Major Standards) https://www.nj.gov/education/cccs

Content Standards: New Jersey Student Learning Standards for Science

4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.

4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
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.

Science and Engineering Practices	Disciplinary Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in grades 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships. ➢ Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include	**PS3.A: Definitions of Energy** ➢ The faster a given object is moving, the more energy it possesses. (4-PS3-1) ➢ Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3) **PS3.B: Conservation of Energy and Energy Transfer** ➢ Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another,	**Energy and Matter** ➢ Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4) ***Connections to Engineering, Technology, and Applications of Science*** **Influence of Science, Engineering and Technology on Society and the Natural World** ➢ Engineers improve existing technologies or develop new ones.

investigations that control variables and provide evidence to support explanations or design solutions. ➢ Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2) **Constructing Explanations and Designing** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ➢ Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) ➢ Apply scientific ideas to solve design problems. (4-PS3-4)	thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2), (4-PS3-3) ➢ Light also transfers energy from place to place. (4-PS3-2) ➢ Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2), (4-PS3-4) **PS3.C: Relationship Between Energy and Forces** ➢ When objects collide, the contact forces transfer energy so as to change the objects' motions. (4- PS3-3) **PS3.D: Energy in Chemical Processes and Everyday Life** ➢ The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)	(4-PS3-4) ***Connections to Nature of Science*** **Science is a Human Endeavor** ➢ Most scientists and engineers work in teams. (4-PS3-4) ➢ Science affects everyday life. (4-PS3-4)

	ETS1.A: Defining Engineering Problems ➢ Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3- 4	

New Jersey Student Learning Standards: Interdisciplinary Connections
https://www.nj.gov/education/cccs

RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text. (4-PS3-1)

RI.IT.4.3. Describe the impact of individuals and events throughout the course of a text, explaining events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on evidence in the text. (4-PS3-1)

RI.PP.4.5. Compare and contrast multiple accounts of the same event or topic; noting important similarities and differences in the point of view they represent. (4-PS3-1)

W. IW.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4- PS3-1)

W.WR.4.5. Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic. (4-PS3-2), (4-PS3-3), (4-PS3-4)

W.SE.4.6. Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.(4-PS3-1), (4-PS3-2), (4- PS3-3), (4-PS3-4)

4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown

quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4-PS3-4)	
New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills	
Core Ideas	**Performance Expectations (Identified with Standard Number and statement)**
The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.	9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.	9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).
New Jersey Student Learning Standards: Computer Science and Design Thinking	
Core Ideas	**Performance Expectations (Identified with Standard Number and Statement)**
Many factors influence the accuracy of inferences and predictions.	8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.	8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	**Performance Expectations (Identified with Standard Number and Statement)**
Energy and fuels that humans use are derived from natural sources and their use affects the environment in multiple ways. Some resources are renewable over time and others are not.	4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.	4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes and climate change have on humans.
Possible solutions to a problem	3-5-ETS1-1: Define a simple design problem reflecting a need

are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	or a want that includes specified criteria for success and constraints on materials, time or cost.
Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	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.
Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	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.

Knowledge and Skills
Unit Learning Targets (Objectives): *Students will be able to…*

- Use evidence to explain the connection between an object's speed and its energy.
- Demonstrate that a faster-moving object has more energy than a slower-moving one.
- Describe and predict changes in energy that occur when objects collide.
- Identify various forms of renewable energy and explore their uses.
- Collaborate with others to research and present alternative renewable energy sources.
- Describe how energy can be generated and transferred through simple circuits.
- Explain how using renewable energy sources can positively or negatively impact the environment.

Unit Enduring Understandings:
Students will know…

- The speed of an object is directly related to how much energy it has.
- Collisions between objects result in changes in energy, which can be observed and measured.
- Energy can move from place to place through sound, light, heat, and electric currents.
- There are many types of renewable energy, and they can be used in different ways to generate power.
- Circuits can be used to create and transfer energy for practical use.

Unit Essential Questions:

- What is the relationship between the speed of an object and its energy?
- How does energy move through sound, light, heat, or electric currents?
- What happens to energy when objects collide?
- In what ways can energy be converted from one form to another?
- How are natural resources used to produce energy, and what effects does this have on the environment?

Instructional Plan

Students will engage in a science framework that enables them to investigate phenomena, design solutions to problems, make sense of evidence to construct arguments, and critique and discuss those arguments. This is a model to support students through mastery of the Next Generation Science Standards. Science Resources

5 E Instructional Model provides opportunities for students to engage, explore, explain, elaborate and evaluate science content.

The Science block will consist of the following components:
Engage: Raise a question and use compelling storytelling and visuals to introduce students to a scientific phenomenon and get them excited to investigate. Activate prior knowledge and prepare students for the day's learning. This is also known as an advance organizer, hook, or set induction.

Resources:

- ➢ Present Phenomena (Mystery Science, Youtube, Photo, etc)
- ➢ K-W-L or K-L-E-W chart
- ➢ Demonstration/Activity and Discussion
- ➢ PebbleGo/PebbleGo Next

Explore: Students experience key concepts through a collaborative hands-on, inquiry activity. They test predictions, share ideas and record observations. Teachers act as a facilitator, supporting students in establishing relationships and communicating their experience and ideas. This could be done through read alouds, videos, experiments, STEM/STEAM challenges and projects.

Resources:

- ➢ Mystery Science- **Energizing Everything Unit**
  - Lesson 1: Speed and Energy (Activity: Twist-O-Matic Tester)
  - Lesson 2: Collisions and Energy Transfer (Activity: Bumper Coasters Part 1)
  - Lesson 3: Energy Transfer and Engineering (Activity: Bumper Coasters Part 2)
  - Lesson 4: Energy Transfer and Engineering (Activity: Build a Chain Reaction Part 1)
  - Lesson 5: Energy Transfer and Engineering (Activity: Build a Chain Reaction Part 2)
  - Lesson 6: Electrical Energy (Activity: Build a Flashlight)
  - Lesson 7: Heat Energy and Energy Transfer (Activity: Heat Spinner)
  - Lesson 8: Renewable Energy and Natural Resources (Activity: Power this Town)

Storyline Lessons: Energy: Movement, Changes, and Sources

- Anchoring Phenomenon: Car Energy Video Clip
- Lesson 1: Bumper Cars Video Clip, Force and Motion in Kickball Science Video
- Lesson 2: Billiards Video Clip
- Lesson 3: Observe Convection Currents Process Activity, String Telephones Process Activity, Heat Energy Unit Nonfiction Book, Sound Unit Nonfiction Book, Light Unit Nonfiction Book, Thermal Energy Transfer, Interactive Science Lesson
- Lesson 4: Rube Goldberg Quick Read, What Is Electricity? Science Video, Properties of Sound Investigation Pack, Natural Heat Sources Investigation Pack, Complex Machines Investigation Pack, A Rube Goldberg Machine Science Video
- Lesson 5: Circuits Interactive Science Lesson
- Lesson 6: Human-Powered Generator Science Video, Electricity from Steam Science Diagram, Energy Resources Unit Nonfiction Book
- Lesson 7: Air Pollution Video Clip, Energy Resources Unit Nonfiction Book, Gallon of Gas Science Video, Fission and Fusion Quick Read, Renewable Energy Investigation Pack, Cow Power Science Video, Discovering Solar Energy Science Video, Waterwheels and Windmills FOCUS Book, Wind Trees Generate Electricity,

Science in the News, Geothermal Power Quick Read, Renewable and Nonrenewable Resources

Explain: Students have frequent opportunities to connect their prior knowledge to new concepts. They share their thoughts and build explanations. Post-activity questions encourage students to engage in sense-making, linking their findings to the Mystery question. Video exploration can build upon the student discussion and provide scientific explanation

Resources:

- **Mystery Science:**
  - Lesson 1: Speed and Energy (Twist-O-Matic Worksheet)
  - Lesson 2: Collisions and Energy Transfer (Collision Experiments Worksheets)
  - Lesson 3: Energy Transfer and Engineering (Bumper Coaster Worksheet)
  - Lesson 4: Energy Transfer and Engineering (Bumper Coaster Worksheet)
  - Lesson 5: Energy Transfer and Engineering (Journal Write or Discussion Questions)
  - Lesson 6: Electrical Energy (Journal Write or Discussion Questions)
  - Lesson 7: Heat Energy and Energy Transfer (Heat Engine Worksheet)

Elaborate: Opportunity for students to apply their learning to a similar or new situation. Project ideas and readings can help extend the learning

Resources:

- Mystery Science:
  - Performance Task: Energy and Engineering (Can You Turn on a Flashlight Without Touching it?)
  - Reading, Writing, and Video Extensions (within each lesson)

Evaluate: Assess student understanding of learning objective

- Mystery Science Assessments:
  - Lesson 1: Speed and Energy
  - Lesson 2: Collisions and Energy Transfer
  - Lesson 3: Energy Transfer and Engineering
  - Lesson 4: Energy Transfer and Engineering
  - Lesson 5: Energy Transfer and Engineering
  - Lesson 6: Electrical Energy
  - Lesson 7: Heat Energy and Energy Transfer
  - Final Unit Summative Assessment

Evidence of Student Learning

Formative Assessments

- Graphic Organizers & Guided Note Taking

- Directed Reading
- Cooperative Group Learning
- Journal Entries

Summative Assessments:
- Mystery Science Unit Assessments
- Projects

Benchmark Assessments:
- Associated Unit tests, quizzes
- Labs and engineering based projects

Performance Task
- RST- Research Simulation Task

Alternative Assessments:
- Projects

Suggested Options for Differentiation and Modifications

Special Education

- Follow all IEP modifications.
- Use visuals, graphic organizers, and hands-on models.
- Pre-teach and review vocabulary and scientific concepts.
- Provide outlines, word banks, and study guides.
- Use leveled texts and simplified resources when needed.
- Provide small-group or one-on-one instruction.
- Assign peer tutors or lab partners for support.
- Read aloud directions and model scientific procedures.
- Offer preferential seating near teacher or materials.
- Give extra time for labs, projects, and tests.
- Accept oral or dictated responses instead of written work.
- Modify or reduce the number of questions on assignments.
- Provide access to large-print, Braille, or digital text with audio tools.
- Use scribes or augmentative communication devices when required.

Students with 504 Plans

- Follow the 504 plan.
- Provide extended time for labs, projects, and assessments.
- Offer small-group or quiet testing environments.
- Accept oral or dictated responses.

- Provide large-print, Braille, or digital text with audio features.
- Allow use of a scribe or communication device.

Students at Risk of School Failure

- Use visuals, real objects, and demonstrations for science concepts.
- Pre-teach vocabulary and connect it to real-life examples.
- Provide step-by-step directions and frequent check-ins.
- Offer small-group instruction with guided practice.
- Break down experiments and projects into smaller tasks.
- Assign peer support for collaborative activities.
- Provide preferential seating and structured routines.
- Give frequent feedback and encouragement.

Gifted and Talented

- Ask open-ended questions to promote higher-order thinking.
- Encourage independent investigations and research projects.
- Provide enrichment tasks, such as STEM challenges or experiments beyond grade-level.
- Offer advanced reading materials and videos on science topics.
- Group flexibly for inquiry projects and debates.
- Allow choice in projects, reports, or presentations.
- Provide opportunities for cross-curricular connections (e.g., math in data analysis, ELA in lab reports).
- Encourage reflection and presentation of findings to peers.

Multilingual Learners

- Collaborate with ESL/MLL teachers.
- Provide small-group instruction and partner learning.
- Pre-teach and revisit vocabulary with visuals and realia (objects, pictures).
- Use bilingual glossaries or picture dictionaries.
- Provide sentence frames and discussion stems for lab work.
- Scaffold writing with graphic organizers and labeled diagrams.
- Allow extended time and oral responses.
- Use recorded directions, audio supports, or captioned videos.

Diversity and Inclusion

- Respect and include cultural traditions and perspectives in science examples.
- Provide alternative formats for assignments (oral, visual, or hands-on projects).
- Use visuals, diagrams, and clear, direct language.
- Avoid slang and idioms; use precise science vocabulary.
- Collaborate with support staff and cultural liaisons.
- Create an inclusive, respectful classroom environment.
- Provide sufficient wait time before calling on students.
- Build positive relationships with families and invite them into science learning.

Supplemental Resources

Instructional Materials

- www.mysteryscience.com

Supplemental Materials

- www.readinga-z.com
- www.brainpop.com
- www.flocabulary.com
- PebbleGo/PebbleGo Next

Intervention Materials

- Mini workshops to re-teach or extend skills: A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
- Varying scaffolding of same organizer: Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.

Read Alouds:

- What Magnets Can Do
- Electricity
- Switch On, Switch Off
- Lightening: It's Electrifying

Electricity and Magnetism LEVELS N-R (6 Books Each)

- Amazing Magnetism (Level P)
- Lightning (Level P)
- Magnetism and Electromagnets (Level R)
- Electricity (Level Q)
- Experiments with Electricity (Level N)
- Shocking World of Electricity with Max Axiom (Level S)
- Fried!: When Lightning Strikes (Level T)
- Electricity: A Question and Answer Book (Level U)
- Magnets: Magnetism (Level V)
- Electrical Experiments: Electricity and Circuits (Level W)

Teacher Notes

OCEAN ACADEMY CHARTER SCHOOL Trimester 2 Overview Part 1 of 2	
Content Area: Science	
Unit Title: Waves and their Applications in Technologies for Information Transfer	**Duration:** 15 Days
Target Course/Grade Level: Grade 4	

Introduction/Unit Focus:

In this unit, fourth-grade students will explore the nature of waves and how they function in the world around them. Through hands-on investigations and modeling activities, students will learn to describe patterns in how waves move, including water waves and sound waves, and how these patterns help us understand the behavior of energy in motion. They will also develop models to show how light is reflected when it bounces off objects, helping them understand how we see the world.

Students will explore how patterns in waves and light can be used to transfer information, such as using sound or light signals for communication. They will apply this understanding to design challenges where they define simple problems based on a specific need or want. Through collaboration and critical thinking, students will generate, test, and compare possible solutions, strengthening their ability to apply scientific principles to real-world engineering problems. This unit supports foundational skills in both physical science and the engineering design process.

Disciplinary Concepts for the Unit

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4-PS4-1	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	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.
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.
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Science and Engineering Practices	Disciplinary Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
Developing and Using Models Modeling in 3-5 builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.	**PS3.A: Definitions of Energy** ➢ The faster a given object is moving, the more energy it possesses. (4-PS3-1) ➢ Energy can be moved from place to place	**Patterns** ➢ Similarities and differences in patterns can be used to sort and classify natural phenomena. (4- PS4-1) ➢ Similarities and differences in patterns can be used to sort and classify designed

➢ Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1) ➢ Develop a model to describe phenomena. (4-PS4-2) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ➢ Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)	by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3) **PS3.B: Conservation of Energy and Energy Transfer** ➢ Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2), (4- PS3-3) ➢ Light also transfers energy from place to place. (4-PS3-2) ➢ Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical	products. (4- PS4-3) **Cause and Effect** ➢ Cause and effect relationships are routinely identified. (4-PS4-2) ***Connections to Engineering, Technology, and Applications of Science*** **Interdependence of Science, Engineering, and Technology** ➢ Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4- 3) ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** ➢ Science findings are based on recognizing patterns. (4-PS4-1)

	energy. (4- PS3-2), (4-PS3-4) **PS3.C: Relationship Between Energy and Forces** ➢ When objects collide, the contact forces transfer energy so as to change the objects' motions. (4- PS3-3) **PS3.D: Energy in Chemical Processes and Everyday Life** ➢ The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) **ETS1.A: Defining Engineering Problems** ➢ Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the	

	specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3- 4)	

New Jersey Student Learning Standards: Interdisciplinary Connections https://www.nj.gov/education/cccs
RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text. (4-PS4-3) RI.CT.4.8. Compare and contrast the treatment of similar themes, topics and patterns of events in informational texts from authors of different cultures. (4-PS4-3)
SL.UM.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-1), (4-PS4-2)
MP.4 Model with mathematics. (4-PS4-1), (4-PS4-2) 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-1), (4-PS4-2)

New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills	
Core Ideas	**Performance Expectations (Identified with Standard Number and statement)**
The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.	9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.	9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).

New Jersey Student Learning Standards: Computer Science and Design Thinking	
Core Ideas	**Performance Expectations (Identified with Standard Number and Statement)**
Many factors influence the accuracy of inferences and predictions.	8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist,	8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

each better in some way than the others.	
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	**Performance Expectations (Identified with Standard Number and Statement)**
Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	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.
Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	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.
Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	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.

Knowledge and Skills

Unit Learning Targets (Objectives):
Students will be able to…

- Create and use models to explain wave patterns, including amplitude and wavelength.
- Demonstrate how different types of waves (such as sound and water waves) travel through various materials and cause motion.
- Show how waves can transfer energy and information from one place to another.
- Use simple technology or communication tools (e.g., light signals, sound patterns) to represent how information can be transferred using wave patterns.

Unit Enduring Understandings:
Students will know…

- Waves have specific patterns, including amplitude and wavelength, which help describe how they behave and move through space and materials.
- Waves can transfer energy and cause objects to shift, vibrate, or move depending on their strength and type.
- Waves can be used to transmit information over distances using patterns, such as signals in light and sound technologies.

Unit Essential Questions:

- What are waves, and how do they function in our world?
- How do waves move energy and cause motion in objects?
- In what ways can we use wave patterns to send or receive information?
- How do the characteristics of a wave (like amplitude and wavelength) affect what it can do?

Instructional Plan

Students will engage in a science framework that enables them to investigate phenomena, design solutions to problems, make sense of evidence to construct arguments, and critique and discuss those arguments. This is a model to support students through mastery of the Next Generation Science Standards. Science Resources

5 E Instructional Model provides opportunities for students to engage, explore, explain, elaborate and evaluate science content.

The Science block will consist of the following components:

Engage: Raise a question and use compelling storytelling and visuals to introduce students to a scientific phenomenon and get them excited to investigate. Activate prior knowledge and

prepare students for the day's learning. This is also known as an advance organizer, hook, or set induction.

- ➢ **Resources:**
  - Present Phenomena (Mystery Science, Youtube, Photo, etc)
  - K-W-L or K-L-E-W chart
  - Demonstration/Activity and Discussion

Explore: Students experience key concepts through a collaborative hands-on, inquiry activity. They test predictions, share ideas and record observations. Teachers act as a facilitator, supporting students in establishing relationships and communicating their experience and ideas. This could be done through read alouds, videos, experiments, STEM/STEAM challenges and projects.

- ➢ **Resources:**
  - Mystery Science: Waves of Sound
    - Lesson 1: Sound, Vibrations and Engineering (Activity: Paper Cup Telephone)
    - Lesson 2: Sound Vibrations (Activity: Act Out a Sound)
    - Lesson 3: Sound Waves and Wavelengths (Activity: Making Waves)

Explain: Students have frequent opportunities to connect their prior knowledge to new concepts. They share their thinking and build explanations. Post-activity questions encourage students to engage in sense-making, linking their findings to the Mystery question. Video exploration can build upon the student discussion and provide scientific explanation

- ➢ **Resources:**
  - Mystery Science:
    - Lesson 1: Sound, Vibrations and Engineering (Discussion questions and worksheet)
    - Lesson 2: Sound Vibrations (Discussion questions)
    - Lesson 3: Sound Waves and Wavelengths (Sound Vibrations Worksheet)

Elaborate: Opportunity for students to apply their learning to a similar or new situation. Project ideas and readings can help extend the learning

- ➢ **Resources:**
  - Mystery Science:
    - Performance Task: Sound Waves and Engineering (How Can you Make Sound Waves Visible?)
    - Reading, Writing, and Video Extensions (within each lesson)

Evaluate: Assess student understanding of learning objective

- **Resources:**
  - Mystery Science Assessments:
    - Lesson 1: Sound, Vibration, and Engineering
    - Lesson 2: Sound and Vibrations
    - Lesson 3: Sound Waves and Wavelength
    - Final Unit Summative Assessment
  - PebbleGo/PebbleGo Next

Evidence of Student Learning

Formative Assessments
- Graphic Organizers & Guided Note Taking
- Directed Reading
- Cooperative Group Learning
- Journal Entries

Summative Assessments:
- Mystery Science Unit Assessments
- Projects

Benchmark Assessments:
- Associated Unit tests, quizzes
- Labs and engineering based projects

Performance Task
- RST- Research Simulation Task

Alternative Assessments:
- Projects

Suggested Options for Differentiation and Modifications

Special Education

- Follow all IEP modifications.
- Use visuals, graphic organizers, and hands-on models.
- Pre-teach and review vocabulary and scientific concepts.
- Provide outlines, word banks, and study guides.
- Use leveled texts and simplified resources when needed.
- Provide small-group or one-on-one instruction.
- Assign peer tutors or lab partners for support.
- Read aloud directions and model scientific procedures.
- Offer preferential seating near teacher or materials.
- Give extra time for labs, projects, and tests.

- Accept oral or dictated responses instead of written work.
- Modify or reduce the number of questions on assignments.
- Provide access to large-print, Braille, or digital text with audio tools.
- Use scribes or augmentative communication devices when required.

Students with 504 Plans

- Follow the 504 plan.
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- Offer small-group or quiet testing environments.
- Accept oral or dictated responses.
- Provide large-print, Braille, or digital text with audio features.
- Allow use of a scribe or communication device.

Students at Risk of School Failure

- Use visuals, real objects, and demonstrations for science concepts.
- Pre-teach vocabulary and connect it to real-life examples.
- Provide step-by-step directions and frequent check-ins.
- Offer small-group instruction with guided practice.
- Break down experiments and projects into smaller tasks.
- Assign peer support for collaborative activities.
- Provide preferential seating and structured routines.
- Give frequent feedback and encouragement.

Gifted and Talented

- Ask open-ended questions to promote higher-order thinking.
- Encourage independent investigations and research projects.
- Provide enrichment tasks, such as STEM challenges or experiments beyond grade-level.
- Offer advanced reading materials and videos on science topics.
- Group flexibly for inquiry projects and debates.
- Allow choice in projects, reports, or presentations.
- Provide opportunities for cross-curricular connections (e.g., math in data analysis, ELA in lab reports).
- Encourage reflection and presentation of findings to peers.

Multilingual Learners

- Collaborate with ESL/MLL teachers.
- Provide small-group instruction and partner learning.
- Pre-teach and revisit vocabulary with visuals and realia (objects, pictures).
- Use bilingual glossaries or picture dictionaries.
- Provide sentence frames and discussion stems for lab work.
- Scaffold writing with graphic organizers and labeled diagrams.
- Allow extended time and oral responses.
- Use recorded directions, audio supports, or captioned videos.

Diversity and Inclusion

- Respect and include cultural traditions and perspectives in science examples.
- Provide alternative formats for assignments (oral, visual, or hands-on projects).
- Use visuals, diagrams, and clear, direct language.
- Avoid slang and idioms; use precise science vocabulary.
- Collaborate with support staff and cultural liaisons.
- Create an inclusive, respectful classroom environment.
- Provide sufficient wait time before calling on students.
- Build positive relationships with families and invite them into science learning.

Supplemental Resources

Instructional Materials

- www.mysteryscience.com

Supplemental Materials

- www.readinga-z.com
- www.brainpop.com
- www.flocabulary.com
- PebbleGo/PebbleGo Next

Intervention Materials

- Mini workshops to re-teach or extend skills: A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
- Varying scaffolding of same organizer: Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.

Teacher Notes

OCEAN ACADEMY CHARTER SCHOOL Trimester 2 Part 2 and Trimester 3 Part 1 Unit Overview	
Content Area: Science	
Unit Title: From Molecules to Organisms: Structures and Processes	**Duration:** 15 Days
Target Course/Grade Level: Grade 4	

Introduction/Unit Focus:

In this unit, fourth-grade students will explore how the internal and external structures of plants and animals help them survive, grow, behave, and reproduce. Students will investigate the ways specific structures, such as roots, stems, leaves, and flowers in plants, or bones, muscles, and sensory organs in animals serve unique functions that support life processes and environmental adaptation. Through observations, discussions, and hands-on investigations, students will deepen their understanding of how form supports function in living organisms.

Additionally, students will examine how animals use their senses to gather information about their environment. They will learn how this sensory input is processed by the brain and how it leads to various behavioral responses. By studying these systems, students will gain insight into how animals respond to danger, find food, communicate, and adapt their behavior to survive. This unit emphasizes the interconnectedness of structure and function in the animal kingdom and highlights how organisms are equipped to respond to the world around them.

Disciplinary Concepts for the Unit

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science
Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking
Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

Diversity and Inclusion: C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

(1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;

(2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and

(3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)
Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills
“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and

communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy."

Focus Standards (Major Standards) https://www.nj.gov/education/cccs

Content Standards: New Jersey Student Learning Standards for Science

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-LS1-2 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.

Science and Engineering Practices	Disciplinary Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ➢ Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ➢ Construct an argument with evidence, data,	**LS1.A: Structure and Function** ➢ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) **LS1.D: Information Processing** ➢ Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's	**Systems and System Models** ➢ A system can be described in terms of its components and their interactions. (4-LS1-1), (4-LS1-2)

and/or a model. (4-LS1-1)	brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)	

New Jersey Student Learning Standards: Interdisciplinary Connections
https://www.nj.gov/education/cccs

W.AW.4.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)

SL.UM.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2),(4-LS1-2)

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.	9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.	9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).

New Jersey Student Learning Standards: Computer Science and Design Thinking

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Many factors influence the accuracy of inferences and predictions.	8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.	8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	**Performance Expectations (Identified with Standard Number and Statement)**
Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	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.
Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	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.
Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	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.

Knowledge and Skills

Unit Learning Targets (Objectives):
Students will be able to…

- Use models to demonstrate how animals receive sensory information and how the brain processes and responds to it in different ways.
- Construct arguments that explain how the internal and external structures of plants and animals support survival, growth, behavior, and reproduction.
- Identify and describe the function of specific structures in organisms that help them adapt to their environment.

Unit Enduring Understandings:
Students will know…

- Animals gather different types of sensory information, process it in their brains, and respond through various behaviors.
- The internal and external structures of plants and animals serve specific purposes that help them survive, grow, behave, and reproduce.
- Sensory input and the brain's processing of that information play a critical role in an animal's response to its surroundings.

Unit Essential Questions:

- How do internal and external structures help plants and animals meet their needs?
- In what ways do plants and animals grow, behave, and reproduce based on their structures?
- How do animals gather and respond to information from their environment?
- What role does the brain play in how animals respond to sensory information?

Instructional Plan

Students will engage in a science framework that enables them to investigate phenomena, design solutions to problems, make sense of evidence to construct arguments, and critique and discuss those arguments. This is a model to support students through mastery of the Next Generation Science Standards. Science Resources

5 E Instructional Model provides opportunities for students to engage, explore, explain, elaborate and evaluate science content.

The Science block will consist of the following components:

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prepare students for the day's learning. This is also known as an advance organizer, hook, or set induction.

- ➢ **Resources:**
  - Present Phenomena (Mystery Science, Youtube, Photo, etc)
  - K-W-L or K-L-E-W chart
  - Demonstrations /Activity and Discussion

Explore: Students experience key concepts through a collaborative hands-on, inquiry activity. They test predictions, share ideas and record observations. Teachers act as a facilitator, supporting students in establishing relationships and communicating their experience and ideas. This could be done through read alouds, videos, experiments, STEM/STEAM challenges and projects.

- ➢ **Resources:**
  - Mystery Science: **Human Machine: Human Body, Vision, and the Brain**
    - Lesson 1: Muscles and Skeleton (Activity: Robot Finger)
    - Lesson 2: Light, Eyes, and Vision (Activity: Eye Model)
    - Lesson 3: Structure and Function of Eyes (Activity: Pupil Card)
    - Lesson 4: Brain, Nerves, and Information Processing (Activity: Think Fast)

Explain: Students have frequent opportunities to connect their prior knowledge to new concepts. They share their thoughts and build explanations. Post-activity questions encourage students to engage in sense-making, linking their findings to the Mystery question. Video exploration can build upon the student discussion and provide scientific explanation

- ➢ **Resources:**
  - Mystery Science:
    - Lesson 1: Muscles and Skeleton (Discussion questions)
    - Lesson 2: Light, Eyes, and Vision (Discussion questions)
    - Lesson 3: Structure and Function of Eyes (Discussion questions)
    - Lesson 4: Brain, Nerves, and Information Processing (Think Fast Worksheet)

Elaborate: Opportunity for students to apply their learning to a similar or new situation. Project ideas and readings can help extend the learning

- ➢ **Resources:**
  - Mystery Science:
    - Performance Task: Energy and Engineering (System Modeling and Explanation: How are Plants and Animals Like Machines?)
    - Reading, Writing, and Video Extensions (within each lesson)
  - PebbleGo/PebbleGo Next

Evaluate: Assess student understanding of learning objective

- Mystery Science Assessments:
  - Lesson 1: Muscles and Skeleton
  - Lesson 2: Light, Eyes, and Vision
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  - Final Unit Summative Assessment

Evidence of Student Learning

Formative Assessments

- ➢ Graphic Organizers & Guided Note Taking
- ➢ Directed Reading
- ➢ Cooperative Group Learning
- ➢ Journal Entries

Summative Assessments:

- ➢ Mystery Science Unit Assessments
- ➢ Projects

Benchmark Assessments:

- ➢ Associated Unit tests, quizzes
- ➢ Labs and engineering based projects

Performance Task

- ➢ RST- Research Simulation Task

Alternative Assessments:

- ➢ Projects

Suggested Options for Differentiation and Modifications

Special Education

- ➢ Follow all IEP modifications.
- ➢ Use visuals, graphic organizers, and hands-on models.
- ➢ Pre-teach and review vocabulary and scientific concepts.
- ➢ Provide outlines, word banks, and study guides.
- ➢ Use leveled texts and simplified resources when needed.
- ➢ Provide small-group or one-on-one instruction.
- ➢ Assign peer tutors or lab partners for support.
- ➢ Read aloud directions and model scientific procedures.
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- Give extra time for labs, projects, and tests.
- Accept oral or dictated responses instead of written work.
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Students with 504 Plans

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- Collaborate with ESL/MLL teachers.
- Provide small-group instruction and partner learning.
- Pre-teach and revisit vocabulary with visuals and realia (objects, pictures).
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- Respect and include cultural traditions and perspectives in science examples.
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- Mini workshops to re-teach or extend skills: A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
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Teacher Notes

OCEAN ACADEMY CHARTER SCHOOL Trimester 3 Part 2 Overview	
Content Area: Science	
Unit Title: Earth's Place in the Universe/Earth's Systems/Earth and Human Activity	**Duration:** 15 Days
Target Course/Grade Level: Grade 4	

Introduction/Unit Focus:

In this unit, fourth grade students will explore the structure of the Earth and the natural processes that shape its surface over time. Through investigations and the analysis of maps and models, students will study patterns in rock formations and fossil records to understand how landscapes have changed throughout Earth's history. They will examine evidence of weathering and erosion, identifying how natural forces such as wind, water, and ice break down and reshape the land.

Students will also use data from maps to identify patterns in Earth's features, including mountains, valleys, rivers, and fault lines. These patterns help reveal how Earth's surface is continually being altered through both slow and rapid processes.

In addition, students will begin to understand how humans use natural resources, such as energy and fuels, and how these uses impact the environment. They will analyze the connection between natural resources, their consumption, and environmental changes, developing an awareness of sustainability and human impact on Earth's systems.

Disciplinary Concepts for the Unit

Standard 9.1 Personal Financial Literacy
This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training
This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills
This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science
Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking
Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

Diversity and Inclusion: C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

(1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;

(2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and

(3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)
Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills
“Twenty-first century themes and skills” means themes such as global awareness; financial,

economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy."

Focus Standards (Major Standards) https://www.nj.gov/education/cccs

Content Standards: New Jersey Student Learning Standards for Science

4-ESS1-1 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 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-ESS2-1 (2?) Analyze and interpret data from maps to describe patterns of Earth's features.

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

4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes and climate change have on humans.

Science and Engineering Practices	Disciplinary Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ➢ Identify the evidence that supports particular points in an explanation. (4-ESS1-1)	**ESS1.C: The History of Planet Earth** ➢ Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	**Patterns** ➢ Patterns can be used as evidence to support an explanation. (4-ESS1-1) **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ➢ Science assumes consistent patterns in natural systems. (4-ESS1-1) **Patterns**

➢ Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2 **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ➢ Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1) **Analyzing and Interpreting Data** Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. ➢ Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in	**ESS2.A: Earth Materials and Systems** ➢ Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2- 1) **ESS2.B: Plate Tectonics and LargeScale System Interactions** ➢ The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2) **ESS2.E: Biogeology**	➢ Patterns can be used as evidence to support an explanation. (4-ESS2- 2) **Cause and Effect** ➢ Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1) ➢ Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1) ➢ Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS3-2) ***Connections to Engineering, Technology, and Applications of Science*** **Interdependence of Science, Engineering, and Technology** ➢ Knowledge of relevant scientific concepts and research findings is important in engineering. (4-ESS3- 1) **Influence of Science, Engineering and Technology on Society and the Natural World** ➢ Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1)

3-5 builds on K-2 experiences and progresses to evaluate the merit and accuracy of ideas and methods. ➢ Obtain and combine information from books and other reliable media to explain phenomena. (4- ESS3-1)	➢ Living things affect the physical characteristics of their regions. (4-ESS2-1) **ESS3.A: Natural Resources** ➢ Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3- 1) **ESS3.B: Natural Hazards** ➢ A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (Note: This Disciplinary Core Idea can also be found in 3.WC.) **ETS1.B: Designing Solutions to Engineering Problems** ➢ Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)	➢ Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)

New Jersey Student Learning Standards: Interdisciplinary Connections https://www.nj.gov/education/cccs
RI.CR.4.1. Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text. (4-ESS3-2) RI.PP.4.5. Compare and contrast multiple accounts of the same event or topic; noting important similarities and differences in the point of view they represent. (4-ESS3-2) W.SE.4.6. Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources. (4-ESS1-1),(4-ESS2-2)
MP.2 Reason abstractly and quantitatively. (4-ESS1-1),(4-ESS2-1),(4- ESS3-2) MP.4 Model with mathematics. (4-ESS1-1),(4-ESS2-1)(4-ESS3-2) MP.5 Use appropriate tools strategically. (4-ESS2-1) 4.M.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1),(4-ESS2-1) 4.M.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1), (4-ESS2-2) 4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1), (4-ESS3-2)

New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills	
Core Ideas	**Performance Expectations (Identified with Standard Number and statement)**
The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.	9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.	9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).
New Jersey Student Learning Standards: Computer Science and Design Thinking	

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Many factors influence the accuracy of inferences and predictions.	8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.	8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	**Performance Expectations (Identified with Standard Number and Statement)**
Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	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.
Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	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.

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	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.

Knowledge and Skills

Unit Learning Targets (Objectives):
Students will be able to…

- Explain how landscapes can change over long periods of time due to natural processes.
- Identify fossils and rock layers, and recognize patterns that help explain Earth's history.
- Provide evidence of weathering and erosion by observing changes to Earth's surface.
- Analyze maps to describe patterns in Earth's surface features such as mountains, rivers, and valleys.
- Recognize that energy and fuels come from natural resources and explain how their use can impact the environment.
- Observe and describe patterns in rock formations to determine how they were formed.

Unit Enduring Understandings:
Students will know…

- Fossils and rock layers show patterns that provide evidence of Earth's history and past environments.
- Landscapes change over time due to natural forces like weathering, erosion, and deposition.
- Weathering and erosion shape landforms and leave observable evidence.
- Earth's features form patterns that can be studied and described using data from maps.
- Energy and fuels are derived from natural resources, and human use of these resources can impact the environment in both positive and negative ways.

Unit Essential Questions:

- How do fossils and rock layers help us understand Earth's past?
- What causes Earth's landscapes to change over time?
- How can we observe and measure the effects of weathering and erosion?
- What patterns in landforms can we see when analyzing maps?
- In what ways are natural resources used for energy and fuel, and how does this affect the environment?
- What clues do rock formations provide about how they were created?

Instructional Plan

Students will engage in a science framework that enables them to investigate phenomena, design solutions to problems, make sense of evidence to construct arguments, and critique and discuss those arguments. This is a model to support students through mastery of the Next Generation Science Standards. Science Resources

5 E Instructional Model provides opportunities for students to engage, explore, explain, elaborate and evaluate science content.

The Science block will consist of the following components:

Engage: Raise a question and use compelling storytelling and visuals to introduce students to a scientific phenomenon and get them excited to investigate. Activate prior knowledge and prepare students for the day's learning. This is also known as an advance organizer, hook, or set induction.

- ➢ **Resources:**
  - Present Phenomena (Mystery Science, Youtube, Photo, etc)
  - K-W-L or K-L-E-W chart
  - Demonstrations /Activity and Discussion

Explore: Students experience key concepts through a collaborative hands-on, inquiry activity. They test predictions, share ideas and record observations. Teachers act as a facilitator, supporting students in establishing relationships and communicating their experience and ideas. This could be done through read alouds, videos, experiments, STEM/STEAM challenges and projects.

- ➢ **Resources**:
  - Mystery Science: The Birth of Rocks
    - Lesson 1: Volcanoes and Patterns of Earth's Features (Activity: Mapping Volcanoes)
    - Lesson 2: Volcanoes and Rock Cycle (Activity: Bubble Trouble)
    - Lesson 3: Weathering and Erosion (Activity: Sugar Shake)
    - Lesson 4: Erosion, Natural Hazards and Engineering (Activity: Slide City)

Explain: Students have frequent opportunities to connect their prior knowledge to new concepts. They share their thoughts and build explanations. Post-activity questions encourage students to engage in sense-making, linking their findings to the Mystery question. Video exploration can build upon the student discussion and provide scientific explanation

- ➢ **Resources:**

- Mystery Science: The Birth of Rocks
  - Lesson 1: Volcanoes and Patterns of Earth's Features (Volcano Mapping worksheet and Discussion questions)
  - Lesson 2: Volcanoes and Rock Cycle (Lava Experiments worksheet and Discussion questions)
  - Lesson 3: Weathering and Erosion (Discussion questions)
  - Lesson 4: Erosion, Natural Hazards and Engineering (Saving My Slide-City worksheet and discussion questions)

Elaborate: Opportunity for students to apply their learning to a similar or new situation. Project ideas and readings can help extend the learning

➢ **Resources:**
  - Mystery Science:
    - Performance Task: Rocks and Earth's Surfaces (How do you figure out where rocks come from?)
    - Reading, Writing, and Video Extensions (within each lesson)

Evaluate: Assess student understanding of learning objective

- Mystery Science Assessments:
  - Lesson 1: Volcanoes and Patterns of Earth's Features
  - Lesson 2: Volcanoes and Rock Cycle
  - Lesson 3: Weathering and Erosion
  - Lesson 4: Erosion, Natural Hazards and Engineering
  - Final Unit Summative Assessment

Evidence of Student Learning

Formative Assessments
- ➢ Graphic Organizers & Guided Note Taking
- ➢ Directed Reading
- ➢ Cooperative Group Learning
- ➢ Journal Entries

Summative Assessments:
- ➢ Mystery Science Unit Assessments
- ➢ Projects

Benchmark Assessments:
- ➢ Associated Unit tests, quizzes
- ➢ Labs and engineering based projects

Performance Task

- RST- Research Simulation Task

Alternative Assessments:

- Projects

Suggested Options for Differentiation and Modifications

Special Education

- Follow all IEP modifications.
- Use visuals, graphic organizers, and hands-on models.
- Pre-teach and review vocabulary and scientific concepts.
- Provide outlines, word banks, and study guides.
- Use leveled texts and simplified resources when needed.
- Provide small-group or one-on-one instruction.
- Assign peer tutors or lab partners for support.
- Read aloud directions and model scientific procedures.
- Offer preferential seating near teacher or materials.
- Give extra time for labs, projects, and tests.
- Accept oral or dictated responses instead of written work.
- Modify or reduce the number of questions on assignments.
- Provide access to large-print, Braille, or digital text with audio tools.
- Use scribes or augmentative communication devices when required.

Students with 504 Plans

- Follow the 504 plan.
- Provide extended time for labs, projects, and assessments.
- Offer small-group or quiet testing environments.
- Accept oral or dictated responses.
- Provide large-print, Braille, or digital text with audio features.
- Allow use of a scribe or communication device.

Students at Risk of School Failure

- Use visuals, real objects, and demonstrations for science concepts.
- Pre-teach vocabulary and connect it to real-life examples.
- Provide step-by-step directions and frequent check-ins.
- Offer small-group instruction with guided practice.
- Break down experiments and projects into smaller tasks.
- Assign peer support for collaborative activities.

- Provide preferential seating and structured routines.
- Give frequent feedback and encouragement.

Gifted and Talented

- Ask open-ended questions to promote higher-order thinking.
- Encourage independent investigations and research projects.
- Provide enrichment tasks, such as STEM challenges or experiments beyond grade-level.
- Offer advanced reading materials and videos on science topics.
- Group flexibly for inquiry projects and debates.
- Allow choice in projects, reports, or presentations.
- Provide opportunities for cross-curricular connections (e.g., math in data analysis, ELA in lab reports).
- Encourage reflection and presentation of findings to peers.

Multilingual Learners

- Collaborate with ESL/MLL teachers.
- Provide small-group instruction and partner learning.
- Pre-teach and revisit vocabulary with visuals and realia (objects, pictures).
- Use bilingual glossaries or picture dictionaries.
- Provide sentence frames and discussion stems for lab work.
- Scaffold writing with graphic organizers and labeled diagrams.
- Allow extended time and oral responses.
- Use recorded directions, audio supports, or captioned videos.

Diversity and Inclusion

- Respect and include cultural traditions and perspectives in science examples.
- Provide alternative formats for assignments (oral, visual, or hands-on projects).
- Use visuals, diagrams, and clear, direct language.
- Avoid slang and idioms; use precise science vocabulary.
- Collaborate with support staff and cultural liaisons.
- Create an inclusive, respectful classroom environment.
- Provide sufficient wait time before calling on students.
- Build positive relationships with families and invite them into science learning.

Supplemental Resources

Instructional Materials

- www.mysteryscience.com

Supplemental Materials

- www.readinga-z.com
- www.brainpop.com
- www.flocabulary.com
- PebbleGo/PebbleGo Next

Intervention Materials

- Mini workshops to re-teach or extend skills: A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
- Varying scaffolding of same organizer: Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.

Teacher Notes