Elementary Science Curriculum Grade 3

Grade 3



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

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

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SCHOOL DISTRICT MISSION STATEMENT

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

ELEMENTARY SCIENCE GRADE 3 CURRICULUM

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Elementary Science Grade 3

Acknowledgements

The Science Grade 3 Curriculum was developed for the NEPTUNE CITY elementary schools through the efforts of Pamela East, elementary teacher, in cooperation with Stacie Ferrara, Ed.D., Supervisor of STEM, and with the guidance of Sally A. Millaway, Ed.D., Director for Curriculum, Instruction and Assessment.

Ms. East is to be commended for her dedication in creating detailed learning plans that are aligned with the 2020 New Jersey Student Learning Standards in Science. These learning plans contain student-centered and inquiry-based activities. It is our hope that this guide will serve as a valuable resource for the staff members who teach third grade and that they will feel free to make recommendations for its continued improvement.

DISTRICT MISSION STATEMENT

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

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

NEPTUNE CITY School District

Educational Outcome Goals

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

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

INTEGRATED SOCIAL AND EMOTIONAL LEARNING COMPETENCIES *The following social and emotional competencies are integrated in this curriculum document:*

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

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

Overview / Rationale

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

Stage 1 – Desired Results

Established Goals:

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

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

Interdisciplinary Connections

New Jersey Student Learning Standards - English Language Arts (2016) NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

New Jersey Student Learning Standards-Comprehensive Health and Physical Education(2020)

2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one's wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity).

2.1.5.CHSS.1: Identify health services and resources available and determine how each assists in addressing needs and emergencies in a school and in the community (e.g., counselors, medical professionals).

2.2.5.MSC.3: Demonstrate and perform movement skills with developmentally appropriate control in isolated settings (e.g., skill practice) and applied settings (e.g., games, sports, dance, recreational activities).

2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

Teacher Resources

Flinn Safety Course for teachers online (free with registration) <u>https://labsafety.flinnsci.com/</u>

NSTA Safety Resources https://www.nsta.org/topics/safety

Duty of Care https://static.nsta.org/pdfs/DutyOfCare.pdf

Safety and the NGSS

https://static.nsta.org/pdfs/Safety%20and%20the%20Next%20Generation%20Science%20Stand ards_29Oct2020_FINAL.pdf

Safety Practices with Demonstrations <u>https://static.nsta.org/pdfs/MinimumSafetyPracticesAndRegulations.pdf</u>

Stage 2 – Assessment Evidence

Pre-Assessments:

What do you know about safety?

Formative Assessments:

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

Stage 3 – Learning Plan

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

Unit Plan Title	Unit 1: Weather and Climate
Suggested Time Frame	18-22 days

Overview / Rationale

Students learn about weather, how to measure precipitation, temperature, and wind. They learn about ways weather is predicted. Students analyze extreme weather and how it affects people. Students act as citizens of a coastal city and evaluate lightning rod and levee designs to keep their city safe from extreme storms.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-1 Obtain and combine information to describe climates in different regions of the world. 3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard.

Essential Questions:

- What makes the weather?
- How is temperature measured?
- How is wind measured?
- How are rain and snow measured?
- How is the weather predicted?
- How are weather and climate related?
- How does extreme weather affect people?
- How can people reduce extreme weather damage?

Enduring Understandings:

- There are different types of weather.
- Weather is changing constantly and these changes happen in patterns that scientists can study.
- Weather and climate are related.

Knowledge:

Students will know...

- Weather is what the atmosphere is like at a certain time and place.
- Weather changes.
- Climate is an area's expected weather over a long period of time.
- The primary elements of weather and climate are temperature, air pressure, wind, humidity, precipitation, visibility, clouds, and sunlight exposure.
- Anemometers, Wind Vanes, Thermometers, and Rain Gauges are examples of weather instruments used to measure the weather,
- Scientists look for patterns and measure temperature, wind, and humidity to help predict the weather.
- Weather and climate are related.

- Different types of extreme weather (thunderstorms, hurricanes, tornadoes, blizzards, dust storms, and wildfires) and they affect people.
- That scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- That climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
- Extreme weather events cannot be prevented, but people can use science to take steps to reduce their impacts.

Skills:

Students will be able to...

- Make observations about the weather.
- Observe weather in one day, record observations, and describe how the weather changed.
- Measure air temperature at different times and use data to make predictions about temperature.
- Collect and record data.
- Analyze data to identify patterns and use those patterns to predict future temperatures.
- Record data in charts and graph data to identify patterns.
- Build and test anemometers to measure wind speed.
- Measure wind speed at different times in one day and on different days.
- Record data in charts and graph data to identify patterns.
- Analyze wind data to identify patterns and to make predictions about wind speed.
- Build rain gauges to capture and measure rainfall.
- Measure rain for one week and calculate the amount of rainfall each day
- Use data to create bar graphs data
- Analyze bar graphs to find patterns and to make predictions about precipitation.
- Plan an investigation to record weather data to serve as a basis for evidence.
- Identify the criteria and constraints by identifying variables that will affect how well the weather station measures data ,identify the number of trials, and define what it means to fail the test.
- Build a weather station, test it, and record observations.
- Share results with others and use observations as evidence to improve the design.
- Study historical weather data and use recorded patterns of the weather to make predictions about a city's weather.
- Obtain and combine information from media to explain the climate of a specific location in the world.
- Construct an explanation of observed relationships about climate in the world.
- Explain extreme weather by using observations as evidence to support their explanations.
- Explain what causes different kinds of extreme weather.
- Identify steps humans can take to reduce being impacted by severe weather.
- Evaluate lightning rod and levee designs submitted by engineers to reduce effects of severe weather on a city.
- Define the problem to be solved and identify the criteria and constraints of the problem's solution.
- Make arguments about how well each design meets the criteria given the constraints.
- Cite evidence to support arguments.

Interdisciplinary Connections

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

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic.

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

W.3.7 Conduct short research projects that build knowledge about a topic.

W.3.8 Recall information from experiences or gather information from print and digital sources, take brief notes on sources and sort evidence into provided categories.

New Jersey Student Learning Standards for Mathematics (2016)

MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters(l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g. by using drawings (such as a beaker with a measurement scale) to represent the problem.

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one-and two-step "how many more" and "how many less" problems using information presented in bar graphs.

New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Student Resources

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

Teacher Resources

- Teach TCI teacher subscription <u>www.teachtci.com</u>. Reach out to the STEM Supervisor for login/password.
- Unit lesson guides 1-8

- Science journal
- Interactive Student Notebook
- TeachTCI Handouts

Stage 2 – Assessment Evidence

Pre-Assessments: Pre-Assessments:

Observing Phenomena

Formative Assessments:

Vocabulary Questions and Observations of Student Work Throughout the Lesson Wrap Up: My Science Concepts Make Sense of Phenomena Lesson assessment from TCI Test Bank

Summative Assessments:

Unit Assessment from TCI Test Bank(available in Spanish)

Performance Task(s):

Show What You Know

Stage 3 – Learning Plan

Bold= Fast track (required activities)

Italic = *Extended track (optional activities to support student learning)*

Lesson 1: What Makes Weather?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Observing Weather (10 Minutes): Students watch four videos. Each video shows a different type of weather in a different location and at a different time. Students record their observations about the weather in their student notebook.

Creating a Script (16 minutes): Students create a movie scene and write a script for one of the videos, with a partner.

Rehearsing the Scene (20 minutes): Partners practice the scene with their partner using props to help bring the scene to life.

Showtime (20 minutes): Students act out the scene and as each pair performs, listen for these words: weather, temperature, wind, and humidity.

Debriefing (5 minutes): Students respond to questions and discuss the weather scenes.

Vocabulary (3 minutes)

Wrap-Up: My Science Concepts (4 minutes)

Show What You Know (!0 Minutes) Record the weather where you live once during the day and once at night. Write the date when you recorded the weather.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Weather Changes
- 2. Temperature and Weather
- 3. Wind and Weather
- 4. Water and Weather

Lesson 2: How is Temperature Measured?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Reviewing the Main Ideas (10 minutes): Students observe their thermometers and discuss what happens when the liquid in the bulb gets warm and what happens when it gets colder?

Measuring and Graphing Temperatures for 5 days (110 minutes): Students measure the temperature at three different times during the day using a thermometer for 5 days using the same location for these measurements. Students record the data and create a graph.

Measuring and Graphing Temperatures at Different Times of Day (70 minutes): Students measure the temperature at three different times during the day using the same location for these measurements. Students record the data and create a graph.

Reflecting (10 minutes): Students answer questions, share graphs, discuss observed patterns, and make predictions.

Finding Local Temperature Data (15 minutes): Students research temperature in their area during the past six years and will be assigned one year to analyze. Students record the data they find and make bar graphs of the data.

Comparing Temperature Data (15 minutes): Students share and answer questions about their graphs.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Write two patterns you see based on the temperature data in the graph provided.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading) 1.The Sun Heats Earth's Surface 2. Measuring Temperature 3.Temperature Patterns

Lesson 3: How is Wind Measured?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Reviewing Wind Measurement (10 minutes): Look at photos and review what was read in Text Notes 1-4 or pages 154-159 in student textbook.

Building and Testing Anemometers (25 minutes): In this investigation, students build an anemometer to measure wind speed.

Measuring Wind Speed for 5 Days (15 minutes): Students use their anemometers to measure the wind for five days and then create a graph of the data.

Measuring Wind Speed at Different Times (25 minutes): Use an anemometer to measure wind speed at three different times during the day using the same location for these measurements. Record the data and then create a graph.

Reflecting (5 minutes): Students answer questions, share graphs, discuss observed patterns, and make predictions.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Look at the table and answer questions using the data.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. The Sun and Wind
- 2. Measuring Wind Speed
- 3. Measuring Wind Direction
- 4. Wind Patterns

Lesson 4: How Are Rain and Snow Measured?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Reviewing the Main Ideas (5 minutes): Review different types of precipitation.

Building Rain Gauges (15 minutes): In this investigation, student groups will make a rain gauge to measure rainfall.

Measuring Rain (5 minutes): Rain gauges will be left outside for a week. Water levels will be recorded at the same time each day. Compute how much rain fell.

Graphing Rain Data (10 minutes): Make a bar graph that shows the rainfall each day.

Finding Local Rainfall Data (15 minutes): Research rainfall for our area during the past six years. Each group will be assigned a year to analyze and create both a data table and bar graph.

Comparing Rainfall Data (10 minutes): Share graphs with class and discuss patterns.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Look at the precipitation table and answer questions using the data.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Water in the Air
- 2. Types of Precipitation
- 3. Measuring Precipitation
- 4. Precipitation Patterns

Lesson 5: How Is Weather Predicted?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Planning and Designing Your Own Weather Station (35 minutes): Students will plan for how they can build and test their design.

Building and Testing Your Design (25 minutes): Students build their design and record their observations and any changes needed for their design.

Analyzing Chicago's Weather (5 minutes): Students answer questions using the data provided on a Chicago Weather Station graph.

Analyzing Weather Around the United States (20 minutes): Students make predictions based on provided weather data and will cite evidence to support predictions.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Look at the graphs and answer questions using the data.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Observing Sky Conditions
- 2. Describing Air Masses and Fronts
- 3. Using Weather Technology
- 4. Using Patterns to Predict Weather

Lesson 6: How Are Weather and Climate Related?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Reviewing Climate (10 minutes): Students observe and describe three types of climate shown on a map.

Learning About the World Tour (2 minutes): Students take a tour around the world to learn more about different climates. Students are given a Tour Location Placard and Handout. Each of these items have information on one of the stops. Each student group is responsible to lead the class tour at their assigned location!

Obtaining Information(10 minutes): Students will complete a table based on the information given to them on their Placard and Handout.

Writing a Script (10 minutes): Each student is assigned a role when leading the tour and will plan what each person will say in the script. Roles include the Pilot, Temperature Meteorologist, Rainfall Meteorologist, and Travel Guide.

The World Tour (35 minutes): Students watch a video and read their script on their first stop for their world tour.

Finding Patterns (10 minutes): Students reflect on what they learned about climates around the world.

Conducting Research (30 minutes): Students use the Internet to conduct independent research on three locations around the world with similar climates and present their findings to the class.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Use the Internet, information from the book, or own experiences to complete the table.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading) 1. Where Climate Data Come From 2. Climates Around the World 3. Using Climate Data

Lesson 7: How Does Extreme Weather Affect People?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Learning About Storm Chasers (2 minutes): Students will demonstrate understanding of Storm Chasers and get ready to act as Storm Chasers as they observe videos of extreme storms.

Chasing Storm A (8 minutes): Watch the video of Storm A. Students will identify and draw the extreme weather labeling two parts of the storm that they observe.

Chasing Storm B (8 minutes): Watch the video of Storm B. Students will identify and draw the extreme weather labeling two parts of the storm that they observe.

Chasing Storm C (8 minutes): Watch the video of Storm C. Students will identify and draw the extreme weather labeling two parts of the storm that they observe.

Chasing Storm D (8 minutes): Watch the video of Storm D. Students will identify and draw the extreme weather labeling two parts of the storm that they observe.

Chasing Storm E (8 minutes): Watch the video of Storm E. Students will identify and draw the extreme weather labeling two parts of the storm that they observe.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students respond to an email by using the information from the text.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Extreme Weather
- 2. Thunderstorms
- 3. Hurricanes
- 4. Tornadoes
- 5. Blizzards
- 6. Dust Storms and Wildfires

Lesson 8: How Can People Reduce Extreme Weather Damage?

Observing Phenomena (5 minutes): Students observe a photo and answer a question.

Setting the Stage (5 minutes): Students will read about and vote on a design for lightning rods and for a levee.

Gulf Coast City Lightning Rods (15 minutes): Students will identify the problem that the engineers are trying to solve after receiving a copy of *Handout: Gulf Coast City Bulletin: Lightning Rods*.

Evaluating Designs (20 minutes): Students will analyze and discuss each of the lightning rod designs in their group after reading a copy of the *Handout: Lightning Rod Design Solutions*.

Gulf Coast City Levee (15 minutes): Students identify the problem the engineers are trying to solve after reading a copy of Handout: Gulf Coast City Bulletin: Levee.

Evaluating Designs (20 minutes): Students will write a claim about which design their group thinks is the best after reading a copy of Handout: Levee Design Solutions.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students read information about a tornado shelter and will recommend a design based on the criteria, constraints, and use evidence for support.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Scientists Investigate Storms
- 2. Engineers Help Reduce Storm Damage
- 3. Communities Help Reduce Storm Danger

Unit Plan Title	Unit 2: Forces and Motion
Suggested Time Frame	18-22 days

Overview / Rationale

Students learn about motion and forces, how forces have a strength and direction, and how these forces change motion. Students describe the position and motion of objects and then identify the forces acting on the object and how these forces affect the object's motion. Students also learn about balanced and unbalanced forces and how these forces affect motion. They learn how forces can be measured and participate in an investigation in which they observe balanced and unbalanced forces, a simulation, and an experimental set-up using spring scales and a pulley system. Students conduct trials, collect and analyze data, identify cause-and-effect relationships, and make claims supported by evidence.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

3-PS2-3 Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

3-PS2-4 Define a simple design problem that can be solved by applying scientific ideas about magnets.

Essential Questions:

- What do forces do?
- What happens when forces are balanced or unbalanced?
- How can you predict patterns of motion?
- What can magnetic forces do?
- What can electric forces do?

Enduring Understandings:

- A force is a push or pull.
- Balance and unbalanced forces acting on an object affect its motion.
- Studying patterns of motion can help predict how an object might move.
- Engineers use what they know about magnets to solve problems.
- Electric forces can be strong or weak which can be produced and also be found in nature.

Knowledge:

Students will know...

- A force is a push or pull.
- Forces can cause an object to speed up, slow down, or change direction.
- Motion is a change in the position of an object.
- Position is an object's location compared to its surroundings.
- Balanced forces are forces that together do not cause a change in motion.
- Gravity is a force that pulls down.
- Unbalanced forces are forces that together cause a change in motion.

- Scientists use different tools to measure forces.
- Patterns of motion can be predicted by observing and explaining patterns of motion.
- A magnetic force is a push or pull between two or more magnets or between a magnet and certain types of metal.
- A permanent magnet is a magnet that cannot turn on and off. They always pull with magnetic force.
- An electromagnet is a magnet that can turn on and off. When electricity flows through an electromagnet, it pulls with magnetic force but stops pulling when electricity stops flowing.
- Electric force is a push or pull between objects that have electric charges.
- Static electricity is an imbalance of positive and negative charges.
- That a force that acts on an object has strength and direction and that objects can exert forces on each other.
- A force acting on an object has both strength and direction and an object remains still when balanced forces act upon it, and an object moves when forces are unbalanced.
- Magnetic forces between objects do not require the objects to be in contact.

Skills:

Students will be able to...

- Observe images and describe the position of an object using directions, such as right and left as well as the location of other objects to describe the position of the object.
- Describe ways forces can cause an object to speed up, slow down, or change direction.
- Observe balanced and unbalanced forces through videos, a simulation, and explore these forces by setting up spring scales and a pulley system.
- Conduct trials, collect, and analyze data, identify cause-and-effect relationships, and make claims supported by evidence.
- Observe motion and use patterns of change to make predictions.
- Observe and make quantitative measurement patterns of motion.
- Analyze results and predict future motion based on patterns observed.
- Analyze data in order to provide evidence for an explanation.
- Understand that electric and magnetic forces between objects do not require the objects to be in contact.
- Investigate magnetic forces and come up with and answer cause-and-effect questions about bar magnets and electromagnets.
- Use their understanding of how magnetic interactions impact two objects to design and build a jewelry box latch.
- Observe with an electroscope that electric forces between objects do not require the objects to be in contact.
- Come up with good questions that can be answered by investigating.
- Gather evidence in an investigation to use as data to answer questions about electric forces.

Interdisciplinary Connections

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

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic.

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

W.3.7 Conduct short research projects that build knowledge about a topic.

W.3.8 Recall information from experiences or gather information from print and digital sources, take brief notes on sources and sort evidence into provided categories.

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MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters(l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g. by using drawings (such as a beaker with a measurement scale) to represent the problem.

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one-and two-step "how many more" and "how many less" problems using information presented in bar graphs.

New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school,

community agencies, governmental, online) that can aid in solving the problem.

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Student Resources

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

Teacher Resources

- Teach TCI teacher subscription <u>www.teachtci.com</u>, reach out to STEM Supervisor for login and password.
- Unit 2 lesson guides 1-5
- Science journal
- Interactive Student Notebook
- Teach TCI Handouts

Stage 2 – Assessment Evidence Pre-Assessments: Pre-Assessments: Observing Phenomena Formative Assessments: Vocabulary Questions and Observations of Student Work Throughout the Lesson

Questions and Observations of Student Work Throughout the Lesso Wrap Up: My Science Concepts Make Sense of Phenomena Lesson assessments from TCI Test Bank (available in Spanish)

Summative Assessments:

Unit assessment from TCI Test Bank (available in Spanish)

Performance Task(s):

Show What You Know

Stage 3 – Learning Plan

Bold= Fast track (required activities)

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

Lesson 1: What Do Forces Do?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Observing Videos (20 minutes): In this investigation, students will practice identifying and describing the forces acting on objects. Students will watch three videos, each with a different object.

Describing Forces (15 minutes): Watch the same three videos and complete the "How the Force Changes Motion" column in the provided table.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students read a letter and answer the questions using the text. Then, students will create 2 questions involving forces and motion.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Motion Is a Change in Position
- 2. Forces Are Pushes and Pulls
- 3. Forces Have Strength and Direction
- 4. Forces Change Motion

Lesson 2: What Happens When Forces Are Balanced or Unbalanced?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Reviewing Balanced and Unbalanced Forces (5 minutes): Observe videos and describe the forces that are pushing on the object.

Recognizing and Measuring Patterns of Motion (10 minutes): Students complete the interactive tutorial and discuss questions.

Observing Forces (15 minutes): In this investigation, students will use a pulley and weights to investigate balanced and unbalanced forces on an object.

Investigating Situations (30 minutes): Students plan and conduct an investigation to gather evidence for four situations that involve balanced and unbalanced forces on still and moving objects.

Making and Supporting Claims (20 minutes): Students complete the four claims in their journal and provide evidence. Each group will present and discuss the claims they came up with.

Finding Examples in Everyday Life (5 minutes): Brainstorm examples from everyday life when balanced or unbalanced forces act on moving or still objects.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students will make predictions based on what they know of balanced and unbalanced forces.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Adding Forces
- 2. Forces in Balance
- 3. Forces Not in Balance
- 4. Measuring Forces

Lesson 3: How Can You Predict Patterns of Motion?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Discovering Patterns of Motion (5 minutes): Observe a video and discuss the pattern of motion.

Recognizing and Measuring Patterns of Motion (25 minutes): Perform an investigation to observe and measure a pattern of motion.

Reflecting on Patterns of Motion (20 minutes): Students will compare results of investigation and provide evidence for responses.

Discussing Fair Results (10 minutes): Evaluate results of a provided investigation and discuss if results are fair.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students will use their understanding of unbalanced forces to explain patterns.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Observing Patterns of Motion
- 2. Explaining Patterns of Motion
- 3. Predicting Patterns of Motion

Lesson 4: What Can Magnetic Forces Do?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Exploring Cause-and-Effect Relationships with Bar Magnets (15 minutes): In this investigation, students will build a magnet and test its properties.

Building and Exploring Electromagnets (15 minutes): Students will build an electromagnet and test its properties.

Exploring Both Magnets (10 minutes): In groups, students will create cause-and-effect questions about the magnetic force when electromagnets and bar magnets act together and then investigate to find the answers.

Sharing Discoveries (5 minutes): Students share a question they created and what their group discovered about magnets.

Designing Solutions with Magnetic Forces (20 minutes): Solve a problem by using the Engineering Design Process.

Planning Your Design (15 minutes): Create multiple designs considering criteria and constraints for the latch on the box.

Building and Testing Your Latch (15 minutes): Build, test, present your design and analyze if your design solved the problem.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Design a magnetic latch that will keep the door opened.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Magnetic Forces
- 2. Stronger and Weaker Magnetic Forces
- 3. Permanent Magnets
- 4. Electromagnets
- 5. Magnets and Technology
- 6. Solving Problems with Magnets

Lesson 5: What Can Electric Forces Do?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Discussing Static Electricity (5 minutes): Discuss examples and causes of Static Electricity.

Building Electroscopes (15 minutes): Watch video and build an Electroscope.

Coming Up with Questions (10 minutes): Students create a good question that can be answered using evidence gathered in the investigation.

Investigating Questions (30 minutes): Students use Electroscopes to help answer questions during the investigation.

Reflecting On Your Results (15 minutes): Student Groups present their questions that they investigated and the effects that they observed.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Compare and contrast magnetic forces and electric forces.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Electric Forces
- 2. Stronger and Weaker Electric Forces
- 3. Static Electricity
- 4. Electric Forces in Nature

Unit Plan Title	Unit 3: Environment and Living Things
Suggested Time Frame	18-22 Days

Overview / Rationale

Students are introduced to the unit's anchoring phenomenon of paleontologists discovering mammoth fossils across North and Central America. Students explore environments and living things. Students examine where organisms live and how living in a group helps some animals to survive. Students will analyze how environments change and what happens to organisms in changing environments, including taking a look at what fossils of extinct organisms show about past environments. Acting as Natural History Museum junior paleontologists, students explain why Columbian Mammoths died off thousands of years ago by using the clues the mammoths' fossils give about their environment.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

3-LS2-1 Construct an argument that some animals form groups that help members survive.

3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Essential Questions:

- Where do organisms live?
- How does living in a group help some animals survive?
- How do environments change?
- What happens to organisms in a changing environment?
- How do people learn about extinct organisms?
- What do fossils show about environments of long ago?

Enduring Understandings:

- An environment is all the living and nonliving things that surround an organism.
- Organisms live where they can meet their needs.
- Some kinds of animals live in groups for survival.
- Environments can change.
- Species have adaptations.
- Scientists study fossils to learn about many extinct species.
- Fossils show about environments of long ago.

Knowledge:

Students will know...

• An environment is all living and nonliving things that surround an organism.

- Plants and animals are organisms and that these organisms live in particular environments.
- Another name for a living thing is called an organism.
- Bacteria are a type of tiny organism that cannot be seen without a microscope.
- A rainforest is a forest environment that gets a very large amount of rain.
- Corals are tiny animals that build large rocky structures called reefs.
- Coral reefs are colorful ocean environments where tiny organisms called corals live and meet their needs there.
- Prey is an animal that is hunted and eaten.
- Social animals are animals of the same kind that live in a group to meet their needs.
- A species is a group of living things of the same kind.
- A natural resource is a useful material that comes from the environment.
- A behavior is an action that an organism does.
- A behavior or body part that helps an organism survive or reproduce in its environment is called an adaptation.
- To reproduce is to make more of the same kind of organism.
- Extinct means having no living members.
- Endangered means when a species is in danger of going extinct.
- A fossil is the remaining piece or trace of an organism that lived long ago.
- To infer means to use evidence to draw a conclusion.
- Wetlands are low, soggy areas where land and water meet.
- Populations live in a variety of habitats and change in those habits affects the organisms that live there.
- Changes to the environment can affect the animals within that environment.

Skills:

Students will be able to...

- Obtain and combine information from the media about an organism.
- Describe an environment's system in terms of its components and its interactions.
- Construct an argument based on evidence to decide in which environment the organism can survive.
- Determine that for a particular environment, some organisms survive better than others.
- Identify and understand cause-and-effect relationships of changing environments.
- Use a model to simulate a predator attacking a group of fish.
- Make observations and trials to produce data.
- Represent data in tables to reveal patterns.
- Identify cause and effect relationships to answer questions.
- Construct an argument supported by data gathered in an investigation.
- Show results in a picture graph.
- Construct an argument for why one animal lives alone and another lives in a group.
- Examine images of different environments and predict how that environment would change if it were affected by a particular event, such as a landslide.
- Identify ways environmental systems can change quickly or over time.
- Support an argument about an environmental change using a drawing as a model.
- Identify cause and effect relationships between an event and the resulting consequences of that event to the environment and to the organisms that live in that environment.
- Identify cause and effect relationships to explain how animals have adaptations to help them survive in their environments.
- Explain how when environments change, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

- Study a hypothetical proposal from a state park with the request to find an animal crossing that best fits its needs.
- Use different engineering design processes and design criteria and constraints, based on what the state park needs, and analyze possible animal crossings and choose the best crossing for the situation.
- Communicate to others about proposed solutions.
- Choose a design, present an argument, and provide evidence to support it.
- Evaluate information from photos and audio to answer questions about ways paleontologists observe fossils.
- Participate in a fossil dig to and observe living things once lived long ago.
- Observe evidence that plants and animals once living on Earth are no longer found anywhere.
- Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they once lived.
- Categorizing fossils using evidence to support reasoning.
- Observe that living things exist from the very small to the immensely large or from very short to very long time periods.
- Analyze images of dinosaur fossils and relate shapes of teeth to their functions.
- Use the features of dinosaurs' teeth as evidence for their claim that the dinosaur ate mostly meat or mostly plants.
- Identify patterns in dinosaur fossils.
- Communicate scientific information as data in a chart.

Interdisciplinary Connections

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RI.3.8 Describe the logical connection between particular sentences and paragraphs in a text (e.g. comparison, cause/effect).

RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic.

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

W.3.7 Conduct short research projects that build knowledge about a topic.

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Stage 2 – Assessment Evidence

Pre-Assessments:

Observing Phenomena

Formative Assessments:

Vocabulary

Questions and Observations of Student Work Throughout the Lesson

Wrap Up: My Science Concepts

Make Sense of Phenomena

Lesson assessment in TCI Test Bank (available in Spanish)

Summative Assessments:

Performance Task(s):

Show What You Know

Stage 3 – Learning Plan

Bold= Fast track (required activities)

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

Lesson 1: Where Do Organisms Live?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Examining Environments (10 minutes): Students analyze images of each environment, take notes on what they see, and will share with class.

Matching Organisms to Environments (15 minutes): Partners receive one placard with an organism, analyze image, read the information to learn about the assigned organism's needs, and discuss which of the four environments the organism would best survive in.

Sorting Organisms (25 minutes): Students will analyze an environment and decide which four organisms would survive best in that environment and discuss how the organisms' needs would be met. Students will then complete a graphic organizer for each environment.

Guess the Environment (15 Minutes): A mystery organism will be described. Each clue will give more information about the organism. As students click each clue, they will try to guess which environment the organism lives in.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Choose one of the four environments to illustrate and write three clues about an organism that might live there.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Types of Organisms
- 2. Organisms and Their Environments
- 3. Rainforest Environments
- 4. Coral Reef Environments

Lesson 2: How Does Living in a Group Help Some Animals Survive?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Discussing Animals in Groups (10 minutes): Students watch a video and answer questions pertaining to the video.

Preparing the Fishing Hole (5 minutes):Gather materials needed to complete the investigation and create a fishing hole.

Fishing (20 Minutes): Students will choose various roles (predator, swirler, and counter) to complete the fishing investigation and record the number of fish caught during each trial. Students will reflect by responding to questions.

Fishing in a School of Five (10 minutes): Add five fish to the water, including the fish with the dot, and repeat fishing investigation changing student roles (predator, swirler, and counter) for each trial. Conduct five trials and record data.

Fishing in Larger School (20 minutes): Add 20 fish in the fishing hole, including the fish with the dot. Hold them down so they sink. Then, conduct trials.

Making a Picture Graph (5 minutes): Create Picture Graphs from the data gathered during investigation. Answer questions.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): List three benefits to an animal that lives mostly alone or lives in a group.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Some Kinds of Animals Live in Groups
- 2. The Benefits of Living in Groups
- 3. Some Kinds of Animals Live Alone

Lesson 3: How Do Environments Change?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Setting the Stage (5 minutes): Observe images and discuss ways how environments can change.

Predicting Changes (45 minutes): Observe images and illustrate missing parts of the environment. Answer questions involving the changes that affect the species that live there. Discuss how some species are harmed by the changes and how others might benefit.

Create an Act-It-Out (70 minutes): Students create an Act-It-Out and write a script to explain one cause of environmental change.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students look closely at pictures and identify what caused the change to each environment and if it was a slow or fast change.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Environments Can Change
- 2. Slow Environmental Changes
- 3. Fast Environmental Changes
- 4. Engineers Can Change Environments

Lesson 4: What Happens to Organisms in Changing Environments?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Examining Adaptations (10 minutes): Observe slides and videos of different adaptations of animals. Discuss if the animal has adapted to live in air, on land, or in water. Discuss how animals live in a changed environment. Students will vote for their favorite design for a wildlife crossing.

Introducing Wildlife Crossings (5 minutes): Students read through the information to learn why the park needs a wildlife crossing.

Defining the Problem (15 minutes): Students discuss what problem the wildlife crossing solved. After reading more information, students will discuss criteria and constraints for the wildlife crossing.

Reviewing and Choosing the Designs (12 minutes): Read and learn about the top four designs for the wildlife crossing. Then review the ratings for each design provided in handouts and rank the four designs.

Changing Constraints (5 minutes): New information is provided about the wildlife crossings. Given the new information, rank the four wildlife crossings.

Presenting Arguments (10 minutes): Each group will present their claim as to which solution is the best, give evidence to support their rankings, and vote for the wildlife crossing they picked as number one.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Observe a photo, draw an organism that lives there, label its adaptation to this environment, and write how this adaptation helps this organism survive.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Species Have Adaptations
- 2. Some Organisms Adjust to Changing Environments
- 3. Organisms in a Changing Rainforest
- 4. Organisms in a Changing Coral Reef
- 5. Some Organisms Move to New Environments

Lesson 5: How Do People Learn About Extinct Organisms?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Fossil Dig Investigation (10 minutes): Watch a Fossil Dig video and answer questions.

Reviewing Types of Fossils (5 minutes): Match images to each description.

Digging for Fossils (15 minutes): Students will pretend to be a scientist digging for fossils and will answer questions.

Learning the Dig Procedure (5 minutes): Read procedures for Fossil Dig.

Conducting the Dig (50 minutes): Follow the directions to investigate fossils. Record findings.

Categorizing Fossils (10 minutes): Sort the fossils found into categories. Partners receive one fossil placard and look at the fossil that they are assigned. Students will Identify the category that describes their type of fossil. Discuss what scientists can learn from each of these type of fossils.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Respond to the questions provided in an interview.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1.Extinction
- 2.Fossils
- 3.Learning About Dinosaurs from Fossils
- 4.Most Organisms Do Not Form Fossils

Lesson 6: What Do Fossils Show About Environments of Long Ago?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Setting the Stage (5 minutes): Identify living and nonliving things found in your classroom environment.

Examining Skulls (10 minutes): Identify which animal skull goes with which animal.

Learning About a Dinosaur (15 minutes): Each student receives a Dinosaur Grouping Card and needs to find three other students who have the same dinosaur. The group discusses any observations they can make about their dinosaur. Using Handout B on Dinosaur Fossils, discuss questions involving the kind of teeth and food your dinosaur had and ate.

Fossil Presentations (15 minutes): Record notes on a table as each group reports its findings.

Connecting Fossils to the Environment (10 minutes): Discuss what other parts of an animal, besides its teeth, can help us learn about the environment the animal lived in.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Look at each fossil. Decide if the animal was a meat eater or plant eater. Decide if it lived on land or in the water. Cite evidence from the fossil to explain your answers.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Environments Change over Millions of Years
- 2. Studying Old Environments
- 3. Studying Dinosaurs' Environments
- 4. Dinosaur Extinct

Unit Plan Title	Unit 4:Life Cycles and Traits
Suggested Time Frame	18-22 Days

Overview / Rationale

Students are introduced to the unit's anchoring phenomenon of how two frogs may look the same, but one of them is poisonous. In this unit, students explore the traits of diverse organisms and how those traits are affected by both inheritance and the environment. Students take a look at traits to understand inherited traits and how the environment can affect traits. Students also explore the survival abilities of certain species. Next, students examine the life cycles of plants, vertebrates, and invertebrates. Based on what they know about life cycles and traits, students will report their findings for an article and infographic for Science Monthly.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

3-LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. 3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Essential Questions:

- Why do offspring look similar to their parents?
- How does the environment affect traits?
- How are traits affected by both inheritance and the environment?
- Why do some members of a species survive and not others?
- What are the life cycles of plants?
- What are the life cycles of animals with backbones?
- What are the life cycles of animals without backbones?

Enduring Understandings:

- Living things of the same kind have similar traits, or characteristics.
- Species have traits and produce offspring.
- The environment can cause an organism's traits to change.
- The environment can cause organisms in the same species to look different from each other.
- All organisms try to survive and reproduce.
- Plants change as it goes through its life cycle.
- Studying patterns in a life cycle can help predict how an animal will change as it grows up.
- Scientists look for patterns in invertebrate life cycles when studying new species.

Knowledge:

Students will know...

- A species is a group of living things of the same kind.
- Traits are characteristics that living things have.
- An offspring is when a species makes more members of their own species.
- An inherited trait is a characteristic passed by a parent to its offspring.
- Animals and plants pass on traits.
- Offspring are similar to their parents.
- Offspring can be different from their parents.
- The environment is all the living and nonliving things that surround an organism.
- A learned behavior is a trait that an organism learns during its lifetime.
- Genes are inherited information that tells offspring what traits to have.
- Plants and animals inherit genes.
- Organisms reproduce, or make more of their own species of organism.
- To survive means to stay alive.
- Camouflage is when an animal's color makes it hard to see.
- A mate is another animal of the same species with which the animal can reproduce.
- Plants have different life spans.
- A life span is the typical amount of time that members of a species live, from birth to death.
- Plants reproduce.
- A life cycle is the pattern of changes that a member of a species goes through during its lifetime.
- Vertebrates are animals that have backbones.
- Metamorphosis is a large change in body shape that happens during the life cycles of some animal species.
- Invertebrates are animals without backbones.
- Many invertebrates, such as insects, have a hard body covering called an exoskeleton.
- Nymphs are young insects that go through gradual metamorphosis.

Skills:

Students will be able to...

- Discuss that different organisms vary in how they look and function because they have different inherited information.
- Observe similarities and differences in patterns and use them to sort animals by species.
- Find patterns in animals and use these patterns as evidence to support explanations about animals of the same species.
- Analyze and interpret data to answer questions about organisms.
- Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- Review that the environment affects the trait than an organism develops and that other characteristics result from individuals' interactions with the environment.
- Analyze images and use visual clues to describe ways the environment affects traits (causes) and how the trait was changed (effects).
- Use evidence to support the claim that an organism's traits can be influenced by the environment.
- Read flowcharts to understand how different organisms vary in how they look and function because they have different inherited information.
- Observe that many characteristics of organisms are inherited from their parents.
- Discuss cause and effect relationships environments have on plants.
- Explain how the environment affects the traits that an organism develops.
- Understand that reproduction is essential to the continued existence of a plant.

- Use evidence from flowcharts to support the idea that offspring have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- Use evidence from flowcharts to support an explanation about how offspring are affected by its inheritance and environment.
- Analyze and interpret data to answer questions about catching moths in different environments.
- Compare and contrast data from different groups in order to look for patterns and discuss similarities and differences in findings.
- Identify cause and effect relationships about moths and their environments.
- Use evidence to explain how the variations in characteristics among moths of the same species may provide advantages in surviving.
- Conclude that sometimes the differences in characteristics between individuals of the same species provide advantages in surviving.
- Discuss that science findings are based on recognizing patterns and that patterns of change can be used to make predictions.
- Develop a model of the stages of a life cycle by performing an act-it-out to represent each stage (birth, growth, reproduction, death)
- Model the sunflower's life cycle to describe each life cycle stage.
- Combine the Student Text with information from diagrams to support discussion about life cycles.
- Review life cycles of animals and identify different stages of animal life cycles.
- Communicate a life cycle of a species by presenting it as a story.
- Make a presentation that describes the birth, grown, reproduction, and death of an animal.
- Identify patterns in life cycle diagrams of animals.
- Develop models for the life cycles of animals and identify different stages of animal and plant life cycles.
- Identify different stages of different types of organisms.
- Observe the life cycle of a butterfly and develop a model for that species' life cycle.
- Use visuals as models to describe life cycles of animals.
- Compare life cycles of different organisms and explain the differences and similarities between the life cycles of animals without backbones, animals with backbones, and plants.
- Identify the place of reproduction in models of life cycles and discuss the accuracy of models.

Interdisciplinary Connections

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

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

RI.3.8 Describe the logical connection between particular sentences and paragraphs in a text (e.g. comparison, cause/effect).

RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic.

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

W.3.7 Conduct short research projects that build knowledge about a topic.

W.3.8 Recall information from experiences or gather information from print and digital sources, take brief notes on sources and sort evidence into provided categories.

New Jersey Student Learning Standards for Mathematics (2016)

MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters(l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g. by using drawings (such as a beaker with a measurement scale) to represent the problem.

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one-and two-step "how many more" and "how many less" problems using information presented in bar graphs.

New Jersey Student Learning Standards for Career Readiness,Life Literacies, and Key Skills (2020)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

New Jersey Student Learning Standards for Computer Science and Design Thinking (2020)

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Student Resources

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

Teacher Resources

- Teach TCI teacher subscription <u>www.teachtci.com</u>
- Unit 4 lesson guides 1-7
- Science journal
- Interactive Student Notebook
- TeachTCI Handouts

Stage 2 – Assessment Evidence

Pre-Assessments:

Observing Phenomena

Formative Assessments:

Vocabulary Questions and Observations of Student Work Throughout the Lesson Wrap Up: My Science Concepts Make Sense of Phenomena Lesson Assessment in TCI Test Bank (available in Spanish)

Summative Assessments:

Unit Assessment in TCI Bank (available in Spanish)

Performance Task(s):

Show What You Know

Stage 3 – Learning Plan

Bold= Fast track (required activities)

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

Lesson 1: Why Do Offspring Look Similar to Their Parents?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Setting the Stage (5 minutes): In this investigation, students will sort cards to match parents with their offspring. Observe a photo and answer questions.

Sorting Species (20 minutes): Students answer questions based on the visual data that were examined during the investigation.

Sorting Offspring (20 minutes): Students answer questions based on the visual data that were examined during the investigation.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Observe two images and respond to questions involving offspring and traits.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Different Animal and Plant Species Exist
- 2. Species Have Traits and Produce Offspring
- 3. Animals and Plants Pass on Traits
- 4. Offspring Are Similar to Their Parents
- 5. Offspring Can Be Different from Their Parents

Lesson 2: How Does the Environment Affect Traits?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Setting the Stage (5 minutes): Identify two traits of the animal in the provided image. Identify one living thing and one nonliving thing in this animal's environment.

Finding Evidence (15 minutes): Observe image and find evidence for the environment affecting traits of organisms. Answer questions pertaining to the image.

Engineering to Help Animals (35 minutes): Apply what you have learned about traits to help organisms survive! Work with a team. Answer the questions provided.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Describe three pieces of evidence that support the claim: Traits can be influenced by the environment.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Some Traits Are Not Passed to Offspring
- 2. Traits Can Change in Animals
- 3. Traits Can Change in Humans
- 4. Traits Can Change in Plants

Lesson 3: How Are Traits Affected by Both Inheritance and the Environment?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Reviewing Inheritance and Environment (5 minutes): Vocabulary activity.

Analyzing Flowcharts (25 minutes): Observe and discuss images. Then, examone the provided flowchart and answer questions.

Filling in a Flowchart (15 minutes): Compare and Contrast two photographs. Answer questions and complete flowchart.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Create a flowchart that explains how tree frog traits are both inherited from parents and affected by the environment.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Plants Inherit Genes
- 2. Plant Inheritance and the Environment
- 3. Animals Inherit Genes
- 4. Animal Inheritance and the Environment

Lesson 4: Why Do Some Members of a Species Survive and Not Others?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Modeling Birds Hunting for Moths (20 minutes): Participate in simulation of birds hunting for moths. Record moth collection data.

Repeating the Moth Hunt (15 minutes): Students gather more data in new environments. Students will repeat the simulation at this station by taking turns in the same order as before. Record data for each round.

Sharing Data (10 minutes): Discuss patterns observed from the data.

Interpreting Data (5 minutes) :Analyze patterns from data collected to explain which type of moth is most likely to survive in each environment.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Students will read descriptions of provided images and explain how differences in a trait help that organism.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Survival Is Important to Organisms
- 2. Some Individuals Do Not Survive or Reproduce
- 3. An Animal Has Traits That Help It Survive
- 4. An Animal Has Traits That Help It Reproduce
- 5. A Plant Has Traits That Help It Survive
- 6. A Plant Has Traits That Help It Reproduce

Lesson 5: What Are the Life Cycles of Plants?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Introducing Sunflower Life Cycles (10 minutes): Identify patterns observed in the images.

Modeling Each Stage of a Life Cycle (20 minutes): After watching videos, act out the stages of a sunflower's life cycle.

Modeling the Sunflower's Life Cycle (15 minutes): Students put all of the act-it-outs together to model the life cycle of the sunflower.

Debriefing the Experience (10 minutes): Discuss provided lesson questions with the class. Then illustrate and label the stages of a sunflower's life cycle.

Discussing Models (5 minutes): Discuss what is observed in the diagram showing the life cycle of a sunflower.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Write a story about the life of a sunflower seed.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Plants Have Different Life Spans
- 2. Plants Reproduce
- 3. Sunflowers Have a Life Cycle
- 4. Apple Trees Have a LIfe Cycle

Lesson 6: What Are the Life Cycles of Animals with Backbones?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Reviewing Life Cycle Stages (10 minutes): Read each statement. Decide whether it best describes birth, growth, reproduction, or death.

Assigning Animals (10 minutes): Students will learn about the life cycles of many different vertebrates. Each group will be assigned to one species and will learn about its life cycle. Then students will write, record, and present a story about that species' life cycle.

Learning About Your Animal's Life Cycle (20 Minutes): Read the life cycle descriptions on the provided handout. Discuss and decide what the correct order is for the statements with assigned groups.

Creating Your Story (20 minutes): Using the information on the handout, write a story that describes the life cycle of your species.

Recording Your Story (30 minutes): Record each story using a free app or software.

Preparing to Present (5 minutes): Each group will come up to present their audio broadcast and will click on their chosen images to enlarge them. During the presentations from other groups, each member of your group will take notes on one of the four life cycle stages.

Presenting (40 Minutes): Group plays audio broadcast. Click to enlarge images at appropriate time. Students take note about their assigned life cycle stage.

Debriefing the Presentations (5 minutes): Compare and contrast the life cycles that were presented with assigned groups and then with the class.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Create your own vertebrate and predict its life cycle.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Some Animals Have Backbones
- 2. Mammals Have a Similar Life Cycle
- 3. Bird, Reptile, and Fish Life Cycles Are Similar
- 4. Amphibians Go Through Metamorphosis

Lesson 7: What Are the Life Cycles of Animals Without Backbones?

Observing Phenomena (5 minutes): Students will analyze a photo and answer a question.

Thinking About Models (5 minutes): Discuss what aspects of the butterfly the models pictured show and what aspects of the butterfly do the models not show.

Modeling Life Cycles (30 minutes): Cut out the squares from the handout. As class reviews each life cycle, match the cut out squares to the correct row of the table. Discuss with partners which squares belong in the row and in what order. Then enter the answers in the table.

Observing and Caring for Butterflies (20 minutes): Students will take care of a Painted Lady butterfly larva to observe. Students will discuss what is observed and what part of the life cycle it is currently in.

Comparing Life Cycles (15 minutes): Compare and contrast a butterfly's growth and changes to a sunflower's.

Discussing Results (5 minutes): Describe the life cycle of a plant or animal to someone.

Vocabulary (3 minutes)

Wrap-Up My Science Concepts (4 minutes)

Show What You Know (10 minutes): Observe four life cycle diagrams and discuss which life cycle would a moth's life cycle be most similar to.

Making Sense of Phenomena (5 minutes) Use what you have learned to explain this phenomenon.

Text with Notes (Reading)

- 1. Some Animals Do Not Have Backbones
- 2. Butterflies Go Through Metamorphosis
- 3. Dragonflies Go Through Metamorphosis
- 4. Lobster Life Cycles

Accommodations and Modifications:

Below please find a list of suggestions for accommodations and modifications to meet the diverse needs of our students. Teachers should consider this a resource and understand that they are not limited to the recommendations included below.

An accommodation changes HOW a student learns; the change needed does not alter the grade-level standard. A modification changes WHAT a student learns; the change alters the grade-level expectation.

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

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

English Language Learners:

All modifications and accommodations should be specific to each individual child's LEP level as determined by the WIDA screening or ACCESS, utilizing the WIDA Can Do Descriptors.

- Pre-teach or preview vocabulary
- Repeat or reword directions
- Have students repeat directions
- Use of small group instruction
- Scaffold language based on their Can Do Descriptors
- Alter materials and requirements according to Can Do Descriptors

Students at Risk of Failure:

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

• Support organizational skills

High Achieving:

Extension Activities

• Allow for student choice from a menu of differentiated outcomes; choices grouped by complexity of thinking skills; variety of options enable students to work in the mode that most interests them

- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more complex material
- Allow opportunities for peer collaboration and team-teaching
- Set individual goals

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

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