

NC Public Schools – Supplemental STEM programming

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PARTNERSHIP *for the* Sounds

MISSION STATEMENT

Partnership for the Sounds is dedicated to celebrating the nature and culture of the Albemarle-Pamlico Peninsula. We share the history of this unique region through our environmental education facilities, with the goal of inspiring all our visitors to cherish everything that eastern North Carolina has to offer.



OUTREACH GOALS

The Partnership for the Sounds is excited to expand their outreach within the local and surrounding communities. We want to share the history of this unique region with the next generation through fun, hands on educational programs. Our programs are created with the goal of inspiring environmental stewardship, critical thinking, and a well-rounded mindset to shape the future generation as they continue to the next chapter of their lives—whether it be a higher level of education or the workforce. The Partnership for the Sounds looks forward to every upcoming opportunity to partner with North Carolina Schools to increase the effectiveness of their already existing curriculum in the areas of STEAM.

OVERVIEW OF PROGRAMS

All programs have 2 general goals:

1. Engage students in hands on activities
2. Enhance already existing curriculum

ENGAGING STUDENTS

Adding a level of diversity to instruction can help engage students in the material. By presenting topics through different medium, students are able to delve deeper and create a higher level of understanding. Engagement encourages students to think critically about topics they have been presented and makes them utilize the information in a practical way, which is comparable to real life situations in upper level education or the workforce. This academic engagement re-energizes student's enthusiasm for the material helping both in and out of the classroom.

ENHANCE CURRICULUM

The North Carolina Public School curriculum gives objectives by grade level which are taken into consideration when developing programs. It is our goal to *supplement* the already existing curriculum so students can receive long term benefits by building on the information they already have at their disposal. Our programs encourage students to think critically both in school and their daily lives which creates strong school systems as students' progress and build on the information both in and out of a classroom setting. The process to create programs involves input from every level and considers first and foremost the needs of the students.

Programs are outlined and available based on interest. Additional programs modified or customized to the needs of your specific students are also available by request. We are open and willing to work with you in any STEAM related subject to develop a program either at the RCRC or within your school.

DEVELOPING COOPERATIVE LEADERSHIP SKILLS

Working in groups can present a challenging task regardless of age however it is one of the most valuable skills required in upper level education and the workplace. Most programs require students to work in small groups to accomplish the task at hand.

While any method of grouping students is available, there are certain methods that add an extra layer of leadership development to programs. This option is available based on time constraints and length of program.

TRUE COLORS

A LEADERSHIP STYLE TEST

This “test” is often used in leadership development and has been modified to fit younger age groups. The test believes every person has the ability to be a leader if they are able to understand both theirs and others’ leadership styles, and are willing to recognize their strengths and weaknesses. Students take the test and are grouped in to one of 4 colors. The colors are then explained to the entire group- including both the strengths and weaknesses of each style. This not only helps develop leadership but also has the potential to help students understand their differences and increase cooperation.

Groups of 4 made up of one student representing each color are in theory the ideal group. Each color has a different outlook on problem solving, and when working together to solve problems diverse cooperative groups create the best and most efficient solutions.

Programs

- Cartography
- Animal Identification
- Board Game
- Oil Spill Challenge
- Constructing Flood Barriers
- Hurricane Engineering
- Water Cycle Bracelet
- Sound Waves
- Ecosystems
- Scientific Field Journal
- Weather Maps
- Animal Adaptations
- Testing Dirt
- Missing Information
- Scientific Observations
- Lighting Options

CARTOGRAPHY

MAIN OBJECTIVES

- learn about the history of cartography and how mapmaking was done before satellite imagery was available
- use critical thinking and math skills such as ratios and fraction simplification to translate a large scale area to a map
- work together in a group to accomplish a task

ACTIVITY

Create a map of the school (or portion of the school) using cartography techniques common before satellite imagery was available.

MATERIALS

Ruler

Tape Measure

Paper/Pencil (size depends on scale)

Compass (1 for class at minimum for demonstration purposes)

CURRICULUM COMPONENTS

Math Standards

- “Make sense of problems and persevere in solving them.”
 - Doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it
- “Model with mathematics.”

- representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc.
- Common Core Clusters
 - 3rd grade:
 - 3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement
 - 4th grade:
 - 4.OA.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors.
 - 4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right
 - 4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.
 - 4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.
 - 4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators
 - 4.MD.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.MD.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.
 - 5th Grade:
 - 5.NBT.3 Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form
 - 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm
 - 5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
 - 5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators
 - 5.NF.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem

- 5.NF.5 Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication

ANIMAL IDENTIFICATION GAME

MAIN OBJECTIVES

- Understand how to describe different species
- Communicate and collaborate with classmates to solve a problem
- Use critical thinking to develop descriptors

ACTIVITY

Each student has an animal (or plant) on their back, typically found locally. They cannot see what animal they are and must ask classmates yes or no questions to figure out what they are. ie. “Am I a mammal?” or “Can I swim?”

*this activity can be modified to fit all grade levels from K-5 through grade 12.

- Example: for K-5 the instructor can hold up the card so only the students can see it. The instructor asks the questions and the students answer yes or no collectively
- For upper level classes, species can be more specific. Rather than accepting the answer “wolf” students must Identify the specific type of wolf such as “red wolf.” time limits and other factors can also be added.

MATERIALS

Animal cards

GAME ADAPTATIONS

Find other students with an animal that lives in the same ecosystem/community

Students put themselves in order from sound to sea

Pair with a predator/prey

CURRICULUM COMPONENTS

Science Standards

- K.L.1 Compare characteristics of animals that make them alike and different from other animals and nonliving things.
 - Compare different types of the same animal (i.e. different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal
- 5.L.2 Understand the interdependence of plants and animals with their ecosystem.
 - Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).

FOOD WEB COMPETITION

MAIN OBJECTIVES

- Understand how organisms interact in a food web
 - Visually illustrate how animals are dependent upon each other
 - Introduce the importance of biodiversity
- Communicate and collaborate with classmates to solve a problem
- Use critical thinking to win a challenge

ACTIVITY

Working in small groups, students will be instructed to build a pyramid using cups, and each rising level of the pyramid represents a trophic level-- beginning with producers consumers and so on. The students will also be told the more diverse and creative organisms they put on their cups are, the better chance of survival. After students have time to discuss and construct their pyramids we discuss what happens when a plant or animal is removed from the pyramid. (the pyramid will fully or partially collapse) Then the students discuss how this could happen ie. A logging company comes in and cuts down all the pine trees. Different Scenarios have already been written and placed in a bowl. The additional scenarios the students discuss are added. At random, scenarios are pulled out of the bowl and read aloud. If a group has that organism present in their pyramid they must remove it. (This opens up the opportunity to discuss biodiversity)The group with the most cups left standing at the end wins.

MATERIALS

Cups

Markers

GAME ADAPTATIONS

This can be modified to work as a larger group in younger grades. Students will be given a category, and write an organism on their cup. The cups will be arranged as a group to make one large pyramid, and the discussion will continue.

Science Standards

- 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats
 - Give examples of changes in an organism's environment that are beneficial to it and some that are harmful
 - Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).
 - Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.
- 5.L.2 Understand the interdependence of plants and animals with their ecosystem.
 - Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands
 - Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).
 - Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

BOARD GAME

MAIN OBJECTIVES

- Create a board game that can be used for review of materials
- Communicate and collaborate with others to create something new
- Use critical thinking to develop and implement a plan
- Incorporate material from class

ACTIVITY

Create a board game that represents a specific section of study. Students will work in small groups to create a board game to be used for review of material as a fun way to study and demonstrate their knowledge.

MATERIALS

Trifold poster boards (cut in half makes 2 game boards)

Cardstock

Miscellaneous supplies

GAME ADAPTATIONS

This program was requested specifically in relation to the book “hatchet” and the sound to sea field trip however it is not limited to this topic.

Digital formats can also be created to expose students to a growing job market in digital technology/programming

CURRICULUM COMPONENTS

Standards dependent upon topic

OIL SPILL CHALLENGE

MAIN OBJECTIVES

- Use critical thinking to solve a problem
- Communicate and collaborate with others to create something new
- Use critical thinking to develop and implement a plan
- Research what methods already exist and brainstorm ways to improve them

ACTIVITY

A story about an oil rig off the coast of NC will be read to the students. Students will be given a part of the “oil spill” that needs cleaning. Working in groups they will discuss ways to clean up the oil and organisms trapped in the oil.

If needed an introduction to the interactions of oil and water can be done prior to handing out the “oil spills”

It unusually is very difficult and students will predict the sponge will soak up the oil, but it actually pushes it away. Methods students use can also be discussed on a large scale and what that would mean in terms of logistics and cost (ie. A sponge the size of the Atlantic is not an option in real life.) Impacts on wildlife can also be discussed.

MATERIALS

Tray containing oil spill

Oil mixed with cocoa powder

Feathers

Absorbents: cotton balls, laundry lint, a paper towel folded into strips, and makeup remover pads or sponges.

Barrier methods: aluminum foil (contains spill)

Miscellaneous supplies

GAME ADAPTATIONS

Students can hypothesize and make predictions of what they think will happen/what methods will work the best. This can also be done as a competition where the group that is able to do the best clean up wins.

CURRICULUM COMPONENTS

Science Standards

- 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction.
 - Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire).
- 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.
- 5.P.2 Understand the interactions of matter and energy and the changes that occur.
 - Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.

CONSTRUCTING FLOOD BARRIERS

MAIN OBJECTIVES

- Create a flood barrier to protect a small scale house
- Communicate and collaborate with others to create something new
- Use critical thinking to develop and implement a plan

ACTIVITY

Create a flood barrier using materials provided to protect a model house.

Students will be given minimal instruction beyond keeping water from touching the house. They must think critically about the interaction of water and the material, the availability of supplies (which is limited), and the amount of area they need to protect.

MATERIALS

Tray (to contain water)

Model house (cardboard or paper)

Flood barrier materials:

Foil, playdough, cotton, paper towels, sponges, paper towel rolls, popsicle sticks, etc.

GAME ADAPTATIONS

Students can hypothesize and make predictions of what they think will happen/what methods will work the best

This can also be done as a competition where the group that is able to best protect their house wins.

Science Standards

- 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction.
 - Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire).
- 5.P.2 Understand the interactions of matter and energy and the changes that occur.
 - Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.

Math Standards

- “Make sense of problems and persevere in solving them.”
 - Doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it
- “Model with mathematics.”
 - representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc.
- Common Core Clusters
 - 3rd grade:
 - 3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement
 - 4th Grade:
 - 4.MD.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.
 - 5th Grade
 - 5.NF.6 Solve real world problems involving multiplication of fractions and This standard builds on all of the work done in this cluster. Students should be given ample opportunities to use various strategies to solve word problems involving the multiplication of a fraction by a mixed number.
 - 5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems

HURRICANE ENGINEERING

MAIN OBJECTIVES

- Create a model house able to withstand a “hurricane”
- Communicate and collaborate with others to create something new
- Use critical thinking to develop and implement a plan
- Understand interactions between wind forces on objects

ACTIVITY

Create a model house able to withstand a “hurricane”

After being told to construct a house (with minimum requirements based on grade level, ie. Minimum height/size etc.) able to withstand a hurricane using the materials provided, students will be given minimal instruction.

MATERIALS

Tray (to contain water)

Box fan or larger/ Blow dryer

Model house Materials:

Paper (highest difficulty level), precut cardboard squares, popsicle sticks, paper towel rolls, masking tape, scissors

Waterproofing materials:

Foil, playdough, cotton, paper towels, sponges, paper towel rolls, cling wrap, etc.

GAME ADAPTATIONS

Students can hypothesize and make predictions of what they think will happen/what methods will work the best

This can also be done as a competition where the group that is able to best protect their house wins

Additional factors beyond wind can be added to create a more realistic and challenging project such as water proofing the house (building on the flood barrier project but also waterproofing the roof)

Materials can also be limited (ie. Each group only receives 1 foot of tape)

This also allows the option to discuss weather patterns and what makes a hurricane compared to a thunderstorm or tropical storm.

Science Standards

- 3rd Grade:
 - 3.P.1 Understand motion and factors that affect motion.
 - 3.P.1.1 Infer changes in speed or direction resulting from forces acting on an object
- 5th Grade
 - 5.P.1 Understand force, motion and the relationship between them.
 - 5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel.
 - 5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time.
 - 5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object.
 - 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time.
 - 5.E.1.1 Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.
 - 5.E.1.2 Predict upcoming weather events from weather data collected through observation and measurements.
 - 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.

WATER CYCLE BRACELET

MAIN OBJECTIVES

- Understand how water moves through the water cycle
- Visually illustrate how water moves through the water cycle
- Introduce the concept of pollution entering the water cycle at various stages
- Work harmoniously in a group
- Use critical thinking to interpret the meaning of the bracelet

ACTIVITY

6 or more tables each with a tray of beads will be placed around the room. Students begin with a bracelet and roll dice to see where they move next. Table labels include: rivers, estuary, ocean, groundwater, clouds, etc. can be adjusted based on group. Students continue rolling dice and adding new beads based on the instruction on the card at their table associated with the number they rolled until the bracelet is full or time runs out.

Each table has a different color bead to represent that area. Mixed in are “sparkly” beads which represent pollution. Students often pick these because they are considered pretty. The discussion continues about how water travels through the cycle while opening up the opportunity to talk about different forms of pollution and their impacts.

MATERIALS

String, beads, and dice

GAME ADAPTATIONS

This can be modified to work as a larger group in younger grade, but works best with older grades who better understand what the bracelet represents.

CURRICULUM COMPONENTS

Science Standards:

- 5th grade
 - 5.P.2 Understand the interactions of matter and energy and the changes that occur.
 - 5.P.2.1 Explain how the sun’s energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).

SOUND WAVES - SHOEBOX GUITAR

MAIN OBJECTIVES

- learn how sound is made
- learn what affects pitch, volume, and direction of sounds
- critical thinking

ACTIVITY

Students review materials explaining the basic concepts of sound. They will build their own shoebox guitar which they can decorate and experiment with to explore how sounds are made and can be manipulated.

MATERIALS

- Sound Video
- Internet access
- Print resources about sound
- Various sizes of rubber bands
- Tape and glue
- Shoebox
- Pencil
- Markers, crayons
- Construction paper for cut out designs

CURRICULUM COMPONENTS

2.P.1.1 Illustrate how sound is produced by vibrating objects and columns of air.

2.P.1.2 Summarize the relationship between sound and objects of the body that vibrate – eardrum and vocal cords.

Vocabulary: sound, vibrate. columns of air, eardrum, vocal chords, pitch, frequency, force, volume, sound waves.

ECOSYSTEMS

MAIN OBJECTIVES

- Gain an understanding of how an ecosystem works
- Use of critical thinking
- Collaboration and Communication
- Discuss various ecosystems

ACTIVITY

Build a self contained Biosphere, observe water cycle principles, understand interactions between all plants, organisms, elements contained within the “mini-world”, and compare their observations with real world ecosystems.

MATERIALS

2-liter bottle, salad container, other clear container

Soil, sand, small pebbles

Water

Small organisms (worms, insects, snails, etc.)

Plants, vegetation

Tape, glue, foil, plastic wrap

String, wire

Scissors

CURRICULUM COMPONENTS

- 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow.
- 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.

Vocabulary:

Seed, Seedling, Roots, Stem, Leaves, Flowers, Environment, Life cycle, Soil, Sand, Humus, Survive, Texture, Capacity, Retention, Drought, Stages, Conditions, Components, Synthesize, Environmental Conditions

- 5.L.2.1 Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands
- 5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).
- 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem
- 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).

Vocabulary:

water cycle, evaporation, condensation, precipitation, runoff, weight, transpiration, biotic, abiotic, oceans, lakes, ponds, ecosystems, terrestrial, aquatic, estuary, salt marsh, grasslands, food chain, food web, producers, consumers, decomposers, fertile, species, deciduous forest,

SCIENTIFIC FIELD JOURNAL

MAIN OBJECTIVES

- Critical Thinking
- Communication
- Learn Observation Skills
- Development of Language Arts Skills

ACTIVITY

“How can I observe the world around me?”

Students assemble and design their very own Scientific Field Journal. In the Field Journal, they will write observations that they make in room activities, on the playground, on field trips, and anywhere they are outside of school.

Students can present their observations with other classes as well as compile their best work into one school field journal as a grade level.

MATERIALS

Field Journal and basic art supplies:

- Binder
- Paper
- Crayons, markers, pencils
- Decorative materials

Field journal has multiple entry types to be adapted for each grade level. Including but not limited to:

K.CC.1: Count to 100 by ones and tens. K.CC.3: Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20.

K.P.2.1: Classify objects by observable physical properties (including size, color, shape, texture, weight, and flexibility).

K.E.1.1: Infer that change is something that happens to many things in the environment based on observations made using one or more of their senses.

K.E.1.2: Summarize daily weather conditions, noting changes that occur from day

K.L.1.1: Compare different types of the same animal (i.e., different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal

K.L.1.2: Compare characteristics of animals in terms of their structure, growth, changes, movement, and basic needs.

1.E.1.1: Recognize differences in the features of the day and night sky and apparent movement of objects across the sky as observed from Earth.

1.E.1.2: Recognize patterns of observable changes in the Moon's appearance from day to day

1.E.2.1: Summarize the physical properties of earth materials, including rocks, minerals, soils, and water, that make them useful in different ways

1.E.2.2: Compare the properties of soil samples from different places, relating their capacity to retain water, nourish, and support the growth of certain plants.

1.L.1.2: Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places through the world.

1.L.2.1: Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth.

1.L.2.2: Summarize the basic needs of a variety of different animals (including air, water, and food) for energy and growth.

2.E.1.1: Summarize how energy from the sun serves as a source of light that warms the land, air, and water.

2.E.1.4: Recognize the tools that scientists use for observing, recording, and predicting weather changes from day to day and during the season.

2.L.2.1: Summarize the life cycle of animals including birth, developing into an adult, reproducing, aging, and death.

2.L.1.2: Compare life cycles of other animals such as, but not limited to, mealworms, ladybugs, crickets, guppies, or frogs.

2.L.2.1: Identify ways in which plants and animals closely resemble their parents in observed appearance and ways they are different

2.L.2.2: Recognize that there is variation among individuals that are related.

3.P.2.3: Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water.

3.E.1.2: Recognize that changes in the length and direction of an object's shadow indicate the apparent changing position of the Sun during the day

3.E.2.1: Compare Earth's saltwater and freshwater features (including oceans, seas, rivers, lakes,

3.E.2.2: Compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands)

by using models, pictures, diagrams, and maps.

3.L.2.1: Remember the function of the following structures as it relates to the survival of plants in their environments: roots, stems, leaves, and flowers.

3.L.2.2: Explain how environmental conditions determine how well plants survive and grow.

3.L.2.3: Summarize the distinct stages of the life cycle of seed plants.

3.L.2.4: Explain how the basic properties and components of soil determine the ability of soil to support the growth/survival of many plants

4.P.2.2: Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage, and streak.

4.P.2.3: Classify rocks as metamorphic, sedimentary, or igneous based on their composition, how they are formed, and the processes that create them.

4.E.2.1: Compare fossils (molds, casts, preserved parts) to one another and to living organisms.

4.E.2.2: Infer ideas about Earth's early environments from fossils to plants and animals that lived long ago.

4.E.2.3: Give examples of how the surface of the Earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.

4.L.1.1: Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.

4.L.1.2: Explain how animals meet their needs by using behaviors in response to information received from the environment

4.L.1.3: Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling waste, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).

4.L.1.4: Explain how differences among animals of the same population sometimes give individuals an advantage in surviving

5.P.2.1: Explain how the Sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation, and runoff).

5.L.2.1: Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.

5.L.2.2: Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).

5.L.2.3: Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

5.E.1.1: Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.

5.E.1.2: Predict upcoming weather events from weather data collected through observation and measurements.

5.L.3.1: Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.

5.L.3.2: Give examples of likenesses that are inherited and some that are not.

WEATHER MAPS

MAIN OBJECTIVES

- learn the differences in types of weather patterns
- learn different types of precipitation
- learn to interpret weather maps
- collaboration
- work together in a group
- communication

ACTIVITY

Pose weather related questions to students and formulate a class definition for “Weather.” Ask what different elements make up the weather. Discuss with the class what a meteorologist does and how they interpret and predict weather.

Divide the class into six groups and assign each one a different type of weather map. Provide the links and questions for each group. Students will research their assigned map and create their own based on their research and present conditions of that day. Each group will present their weather map to the rest of the class and explain how they came to their own interpretation of the map.

A school visit from a local meteorologist would make a nice addition to this activity. Another idea is to set up a Facetime Live or other Telecommunication Question and Answer with a Meteorologist.

MATERIALS

- Internet access
- Print resources about weather
- Five pieces of poster board, each with an outline of the United States; markers; stickers; scissors
- Weather and Climate video

https://www.youtube.com/watch?v=XirAUvS_29I

<http://www.watchknowlearn.org/Video.aspx?VideoID=3929&CategoryID=2671>

<https://video.nationalgeographic.com/video/00000144-0a30-d3cb-a96c-7b3df4ed0000>

CURRICULUM COMPONENTS

- Understand patterns of weather and factors that affect weather.
- 2.E.1.2 Summarize weather conditions using qualitative and quantitative measures to describe:
 - Temperature
 - Wind direction
 - Wind speed
 - Precipitation
- 2.E.1.3 Compare weather patterns that occur over time and relate observable patterns to time of day and time of year.
- 2.E.1.4 Recognize the tools that scientists use for observing, recording, and predicting weather changes from day to day and during the seasons.

Vocabulary:

weather, seasons, absorb, reflect, thermometer, air temperature, wind speed, weather vane, rain gauge, water cycle, North, South, East, West, precipitation, freezing point of water, anemometer, wind sock, sensors, cardinal/ordinal directions, evaporation, solar energy

- 5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).
- 5.E.1.1 Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.
- 5.E.1.2 Predict upcoming weather events from weather data collected through observation and measurements.
- 5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.

Vocabulary:

wind speed, wind direction, temperature, latitude, hemisphere, barometer, air pressure, anemometer, wind vane, atmosphere, jet stream, water currents, rain gauge, thermometer, cirrus, stratus, cumulus, fronts, global patterns

ANIMAL ADAPTATIONS

MAIN OBJECTIVES

- Gain an understanding of how animals survive in a changing environment.
- Use of critical thinking
- Collaboration and Communication

ACTIVITY

Students will investigate how animals change their behaviors to adjust to a shift in their surroundings. By researching abandoned or stray animals in an animal shelter, students will work together to discuss how the shelter animals may have changed from sheltered in a home, lost to the owner, or simply born without a home. They will answer questions in their own words and as a group: 1) What changes in behaviour do the animals make? 2) How are the shelter and stray animals lives different from animals that live in a home? That live in the wild? 3) What can be done to reduce the number of domesticated stray animals?

Each group will develop a community plan to improve the local shelters and rescues reduce the number of lost and stray pets.

MATERIALS

Projector or TV for document presentation

Student devices Chromebook, computer, iPad

Paper, pencils, crayons, markers, poster board

CURRICULUM COMPONENTS

- 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.
- 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).
- 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.
- 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.

Vocabulary:

Harmful, Community, Survival, Waste, Adaptation, Beneficial, Habitat, Instinct, Population, Environment, Learned Behavior, Inherited Behavior, Recycling, Flooding, Reproduce, Advantage, Animal, Plant, Disease, Behavior, Ecological Systems, Preserve, Conserve, Variation, Survival Advantage

TESTING DIRT

MAIN OBJECTIVES

- determine a method for testing soil and rock sample
- hands-on experiences with various soils
- determine the texture, color, of various soil
- Observe soils ability to absorb water
- Discuss plant growth and conditions supporting various types of plans
- Work together in a group
- Communicate findings to others

ACTIVITY

Groups of students will determine porosity and permeability of various soils to determine which soil will be best for their greenhouse of orchids. They will need to collaborate with their team to research orchids and the best growing medium for healthy plants. By setting up the soil test, they will time the length of time for soil drainage for the 3 soils they selected based on their research.

Students will be asked to record their findings. They will also be asked to keep an ongoing journal of the classroom's orchid, logging observations in growth, health, and improving conditions if needed.

MATERIALS

- Water
- Gravel, sand, potting soil, perlite, orchid medium, violet medium (about 6 cups each)
- 6 Funnel or clear 2 liter bottle turned upside down
- 3 coffee filters
- Ring stand
- Stopwatch or watch with a second hand
- 1 planter suitable for an orchid
- 1 small orchid for the classroom for students to maintain.

CURRICULUM COMPONENTS

- 1.E.2.1 Summarize the physical properties of Earth materials, including rocks, minerals, soils and water that make them useful in different ways.
- 1.E.2.2 Compare the properties of soil samples from different places relating their capacity to retain water, nourish and support the growth of certain plants.

Vocabulary:

color, size, shape, texture, minerals, soil, sand, clay, top soil, physical property, recognize, nourish, observations

- 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow.
- 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival

Vocabulary:

Seed, Seedling, Roots, Stem, Leaves, Flowers, Environment, Life cycle, Soil, Sand, Humus, Survive, Texture, Capacity, Retention, Drought, Stages, Conditions, Components, Synthesize, Environmental Conditions

MISSING INFORMATION PROBLEM - "WHAT ON EARTH?" (SCIENCE)

MAIN OBJECTIVES

- Compare the observable physical properties of different kinds of materials, what textures, hardness, softness, flexibility they have, and why some objects are made with certain materials with specific characteristics.
- Use critical thinking skills
- Work together as a group
- Communicate findings to others

ACTIVITY

Question: The boss has assigned groups of employees to make an assigned product. They will make observations of several materials and determine which materials will be best suited for certain jobs. Given examples of products, students start to use critical thinking skills from thinking about efficiencies and inefficiencies of some designs to produce that product. As a group, students are assigned products to make with their choose of several materials. They will collaborate to solve the problem, communicate their ideas and demonstrate their findings to classmates. Group discussion, review, and revision follows.

MATERIALS

Warm up:

Gravel
Sand
Sage or other herb
Cotton
Saw dust
Nickels
Fishing weights
Water

Activity:

Clay (soup bowl)
Wooden rectangles (Spoons)
Card stock paper (Business Cards)
Cloth (gloves)
Parchment Paper (Alternate/less suitable)
Sheet Metal - taped edges (Alternate/less suitable)
Sheet Plastic (Alternate/less suitable)
Cheese Cloth (Alternate/less suitable)

CURRICULUM COMPONENTS

- K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc) from which objects are made and how they are used.

Vocabulary:

size, rough, smooth, shiny, property, texture, weight

SCIENTIFIC OBSERVATIONS

MAIN OBJECTIVES

- Distinguish Physical Properties of Objects
- Nature observation
- Distinguishing between living and nonliving things
- Compare young and adult animals
- Identify seasons
- Identify soil types
- Observe sound waves
- Change of location

ACTIVITY

STUDENTS WORK WITH HANDOUTS TO MAKE BASIC SCIENTIFIC OBSERVATIONS IN EVERYDAY LIFE. DISTINGUISHING BETWEEN TEXTURES OF EXAMPLE OBJECTS, OBSERVING SURROUNDINGS AND ENVIRONMENTAL CHARACTERISTICS. STUDENTS WILL COLLABORATE, REVIEW THEIR FINDINGS, AND DISCUSS THOSE FINDINGS FOR EVIDENCE AND ACCURACY.

MATERIALS

Scissors - Instructor may choose to pre cut or allow students to cut images.

Worksheets

Pencil

Crayons

- K.P.1.1 Students use their senses to observe and learn about their environment (e.g. familiarizing themselves with their classroom environment, watching the movement of ants and other organisms outside). Teacher Observation
- K.P.1.1 Ask students to use their senses to observe and learn about their environment (e.g., familiarizing themselves with their classroom environment and outside).
Describe whether a desk is in front of, at the side, or in the back of another student's desk or some other reference point; or, whether the top of the school's flagpole is higher or lower than the roof of the school.
Continue the assessment to ensure that students use oral language to describe the relative location of various objects in the classroom and outside using position words such as: (in front of, behind, between, on top of, under, above, below, beside)
- K.P.2.2 Compare the observable physical properties of different kinds of materials (clay, wood, cloth, paper, etc) from which objects are made and how they are used.

Vocabulary:

under, fast, over, slow, top, bend, behind, straight, zig-zag, color, above, below, shape, size, between, bottom, front, classify, sort, beneath

LIGHTING OPTIONS

MAIN OBJECTIVES

- Observation of electricity transfer from various production plants to our homes and work spaces
- Gain an understanding of electrical power efficiency
- Research and discuss different energy sources - advantages and disadvantages (Instructor will demonstrate sources of energy with their choice of video, slides, websites, etc.
- Learn to read comparison charts
- Learn about efficiencies and inefficiencies of consumer products
- Learn how these efficiencies translate to energy conservation and the benefits of conservation

ACTIVITY

STUDENTS WORK IN SMALL GROUPS TO RESEARCH AND DESIGN NEW LIGHTING FOR THEIR SCHOOL. DETERMINE ULTIMATELY, WHAT TYPES OF LIGHT SHOULD BE USED FOR VARYING EFFECTS SUCH AS ENERGY USAGE, SUFFICIENT LIGHTING, AND ENVIRONMENTAL EFFECTS.

THEY WILL OBSERVE DIFFERENT SOURCES OF ELECTRICITY, HOW ENERGY IS TRANSFERRED - EXAMPLE: HOW ENERGY IS TRANSFERRED FROM WIND, A RENEWABLE RESOURCE IS TRANSFERRED THROUGH A WIND TURBINE THAT GENERATES ELECTRICITY TO CONSUMERS.

MATERIALS

Demonstration Lamp

LED light bulb

CFL light bulb

Incandescent light bulb

Various colors of paper

Paper

Pencils

CURRICULUM COMPONENTS

- Recognize how energy can be transferred from one object to another.
- 3.P.1.1 Infer changes in speed or direction resulting from forces acting on an object.

Vocabulary:

Transfer, Energy, Convection, Conduction

- 4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.
- 4.P.3.1 Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.
- 4.P.3.2 Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.

Vocabulary:

Energy, magnet, attract, magnetism, electricity, repel, charge, north-south poles, reflect, absorb conduct, conductivity, light, heat, thermal energy, medium, refract, , electricity, electrical circuit