Activities Master Plan: Consists of the activity name, the objectives of the activity, time required to complete the activity, the materials needed for the activity, the preparation of both the instructors and the students, the different subjects that intersect, a step-by-step on procedure on how to run the activity, type of assessment, and if applicable, a link provided for additional activity information.

Activity 1: Get to Know Your Campus

Objective: Students become familiar with the land surrounding the buildings. Outside classroom norms are established, including how to explore while respecting nature.
Time: 45 minutes
Materials: N/A
Preparation: The instructor(s) should be familiar with trails, geographical features, some species, etc to point out to students.
Interdisciplinary Aspects: Observation skills, mindfulness, self reflection
Procedure:

1. Establish some basic ground rules for learning outside
2. Begin walk with students and explain different features as you pass them
3. Continue to express the importance of good listening, etc (more classroom norms)
4. Explain expectations for the class and importance of it

Assessment: N/A
Adapted from:

Activity 2: Tree Log

Objective: Students will choose a tree in which they study the history and what type of species it is as well as documenting changes of the tree throughout the year.
Time: Year long
Materials: Tree Journal
Preparation: The instructor(s) should be familiar with the landscape around the school, scout the location and should be knowledgeable about the trees surrounding the campus and what kind of species they are to answer any questions the students may have.
Interdisciplinary Aspects: Ecology, Mindfulness, Reflection
Procedure:

1. Specify areas of campus that the students can choose their tree from and still be within line of sight
2. Check-up on students to see if they have any issues/questions
3. Once every student has identified a tree they like, tell them to record the date and draw the tree
4. Explain the importance of trees and their role in the environment

Assessment: Pass in Tree Log at end of the year, the only missing days will have valid excuses.
Adapted from:

Activity 3: Solo Nature Walk
Objective: Students will practice mindfulness and sharpen their senses as they follow cue cards on the trail to navigate alone in nature.
Time: 45 minutes
Materials: Field Journal
Preparation: The instructor(s) will put up cue cards along the trail so students will be able to navigate alone without getting lost and asking for help on where to go next to reach the next checkpoint.
Interdisciplinary Aspects: Observational skills, Mindfulness
Procedure:

1. Students will individually follow the trail of cue cards that were set up by the instructor
2. Along with walking on the trails, the student should use their senses (smell, hear, see, touch) and write down any observations in their field journal
3. Have students find or write down a piece of nature that represents them

Assessment: Not graded, but hold a class reflection at the end of the period.
Adapted from:
https://cnps.org/wp-content/uploads/2018/03/cnps_plant-solo-walk_2017-1.pdf

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Activity 4: Trail Building
Objective: Students will create pathways through the woods surrounding NEIA's campus while respecting nature and investigating the impacts the trails have on the local flora and fauna.
Time: Year Long
Materials: Rakes, branch clippers, gloves, tick spray
Preparation: Instructor(s) should be familiar with the woods around the campus so students would not go to areas that they are not supposed to when making trails.
Interdisciplinary Aspects: Building drawings, Design, Building tools
Procedure:

1. Instructor(s) will provide students with the basics of how to start making pathways and be within line of sight
2. Students should wear gloves and any other protective gear before starting the activity

Assessment: Not Graded
Adapted from:

Activity 5: Field Journaling

Objective: Students will document what they observe when they go outside to build their skills of recording and exploration.
Time: 45 minutes
Materials: Field journal
Preparation: Instructor(s) should be familiar with the surrounding areas of the campus to be able to guide students when going outside.
Interdisciplinary Aspects: Observation skills, Ecology, Mindfulness, Drawing, Photography,, Natural history
Procedure:

1. Students will dress appropriately for the weather and have their journal with them before going outside
2. Have students document what they see and what catches their interest

Assessment: Have a class discussion to share observations and ask questions.
Adapted from:

Activity 6: Native and Invasive Species

Objective: Students will learn the importance of native species, how introduction of invasive species can be harmful to the environment,identify any native species on the NEIA campus, and the importance of biodiversity.
Time: 90 minutes
Materials: Field Journal
Preparation: Instructor(s) should be familiar with the difference between native and invasive species. They should also have a few examples of invasive species to share with the students.
Interdisciplinary Aspects: Ecology, Observation skills, Drawing, Make connections to Massachusetts history, Biodiversity
Procedure:

1. Have students take their field journal and be dressed appropriately for the weather
2. Let them go around campus to identify any native and invasive species but still staying within line of sight of the instructor
3. Have them record the species in their journal
4. Connect what they wrote in their journal to how important biodiversity is

Assessment: Students will share their observations and findings in a class discussion.
Adapted from:

Activity 7: Endangered Species

Objective: Students will do prior research on endangered species that is around the Marlborough area, explore the areas surrounding the campus if there are any signs of endangered species, and find any factors that may be promoting endangerment.

Time: 90 minutes

Materials: Field Journal

Preparation: Students will do research beforehand to know more about what makes a species an endangered species and if there any around the Marlborough city.

Interdisciplinary Aspects: Endangered species, Observation skills, Drawing, History of endangered species, Communication skills, Presentation skills

Procedure:

1. Have students do prior research on endangered species and what caused them to be endangered
2. Go around the campus to find any signs of an endangered species that could be there
3. Write down observations and reasons for endangerment of certain species occurred
4. Put together a presentation (multimedia) on the topic of endangered species and to show what other students think about it.

Assessment: Students are graded based on the effort they put in the presentation.

Adapted from:

Activity 8: How Does Insects Contribute to the Ecosystem/Bug Collecting

Objective: Students will collect insects as they survey the ecosystem and learn about their role in the environment and the negative effects it will have if they were removed from the ecosystem.

Time: About 60-90 minutes

Materials: Jar, gloves, notebook

Preparation: Instructors should know how to carefully place bugs/insects into the container and reassure students to stay calm when collecting. They should also demonstrate how to release the bugs back into the environment after collecting the necessary information that they need. Be familiar with the species of insects/bugs around campus to help students better identify what they are collecting.

Interdisciplinary Aspects: Ecology, Observation and exploration skills, Outdoor education, Drawing/Photography

Procedure:

1. Instructor(s) demonstrates and explains how to gently remove a bug from their habitat
2. Students will mimic what the instructor does to not disrupt the bug
3. After placing the bug in the jar, have students identify what kind of bug/insect they collected and what their role in the environment is

4. Have students draw a picture of the bug/insect
5. Gently release the bug/insect back to their natural habitat
6. Have everyone share what they collected to the class and the information that they gathered

Assessment: Students can pass in their journal entry of the bug or insect they observed and get graded on the details they have written or drawn.

Adapted from:

https://www.calacademy.org/educators/lesson-plans/nature-play-insect-investigation

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Activity 9: Nature Photography

Objective: Students will connect with nature through meaningful observations, grasp a better understanding of photography and learn how to develop photos, and enhance mindfulness and deeper thought by taking photographs of nature around the campus.

Time: 60 - 90 minutes (either once or in each season) of capturing images and then presentation and photo development as a separate class or as homework.

Materials: Digital or disposable cameras (smartphones aren't recommended, however, they could work), computer or tablet with Google Slides or Microsoft Powerpoint, photo processing machine or access to CVS (if disposable cameras are used) (developing photos at CVS may be given as a homework assignment)

Preparation: The instructor(s) should be familiar with how to work a camera (either digital or disposable) so they can help if students have questions on how to use their camera.

Interdisciplinary Aspects: Technical skills (of operating a camera and a computer), Photography skills, Design skills

Procedure:

1. Students should come prepared with their choice of camera highly recommended to not use a smartphone camera)
2. Have the instructor(s) give general guidelines about having class outdoors
3. Students can go to areas around campus to take pictures but still staying within line of sight
    a. Students can choose what they want to take a picture of
4. After the students have finished taking the pictures that they want, have them create a presentation about what pictures they took and why
    a. Can be a multimedia presentation
    b. For disposable cameras, go to a local CVS to develop the pictures
    c. Can use programs such as Google Slides, Microsoft Powerpoint, or any other presentation programs for their presentations

Assessment: Students are graded on their ability to think deeper and their connection to the natural world through their presentation.

Adapted from: Idea presented by student from NEIA focus group

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Activity 10: Composting in Soil

Objective: Students will learn about how to compost and identify what items/materials can be composted and what cannot as well as tracking the duration it takes to compost.
Time: A couple of days or at least 2 weeks
Materials: Inorganic and organic items/materials, scissors, notebook, soil, cups (made from 2-liter soda bottles, and water
Preparation: Instructor(s) should know what items can and what cannot be composted into soil so students would know what to bring in for the activity.
Interdisciplinary Aspects: Observation skills, Science Lab skills, Making Measurements, Documentation, Ecological awareness
Procedure:

1. Create cups from the 2-liter soda bottle and add soil at the bottom but not completely to the top
2. Add in the organic material in one cup and the inorganic material in the other cup
3. After placing the materials, fill the cup with soil until the material is covered by two inches
4. Water the soil each day and make observations (smell, touch, see)

Assessment: Students turn in the journal entries that documented the decomposition of an item that was compostable and one that was not compostable and are graded on their findings.
Adapted from:
https://populationeducation.org/wp-content/uploads/2020/03/scraps-into-soil-lab.pdf

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Activity 11: Forest Fires

Objective: Students will learn how forest fires can quickly spread, what natural materials and non-natural materials can spread fire quickly, make connections to the real world (forest fires in the West Coast and Australia), and form potential solutions to reduce the occurrence of forest fires.
Time: 60 minutes
Materials: Fire Extinguisher
Preparation: The instructor(s) should know the safety protocols and basics of how to start a fire as well as how to extinguish a fire.
Interdisciplinary Aspects: Observation skills, Climate change/Global warming, Research skills
Procedure:

1. Have students find natural materials around the surrounding forests on campus (e.g., twigs, leaves, branches, pinecones, etc.)

2. Gather all the students natural materials and light a fire to it
3. Have students make observations on the speed of fire spread to the other natural materials gathered
4. Extinguish the fire
5. Have students bring in materials that are not from nature such as plastic
6. Do the same activity as with the natural materials and make observations

Assessment: Students will be graded on their paper based on their effort especially on observations and research.
Adapted from:

Activity 12: How Has This Landscape Changed?
Objective: Students will survey the land around the campus and learn how agriculture and city development changed the local landscape.
Time: 90 minutes
Materials: Field Journal
Preparation: Instructor(s) should be familiar with the surrounding areas of campus so students know which areas are off-limits when they survey the land.
Interdisciplinary Aspects: Industrial Revolution, Observation and exploration skills,
Procedure:

1. Have students dressed appropriately for the weather and have them bring their field journal with them
2. Let students walk around the campus but still being within line of sight as they make observations on any factors that may have changed the land
3. After making those observations, students can draw a topographical map of the land around the campus

Assessment: Students turn in their topographical map of the campus and hold a class discussion at the end of the period to have students share their observations and findings.
Adapted from:

Activity 13: Build a Stick Maze
Objective: Students will understand the design concept of "planning before doing", work effectively as a team/class, understand how to follow a design map, and think critically when making the maze.
Time: 45 minutes
Materials: Paper, writing utensils, sticks

Preparation: The instructor(s) should prepare all the materials and have extra supplies in case there was not enough materials to build the maze. They should also facilitate and let the students lead the activity.

Interdisciplinary Aspects: Constructing and design skills, Drawing, Communication and Leadership skills, Critical Thinking skills, Physics: Concept of Gravity, Photography

Procedure:

1. The instructor will distribute the materials and create teams of 2-3 students
2. Students will draw a design of their maze on paper
3. After finalizing their drawing of the maze they want, they will construct the maze with sticks
4. After constructing the maze, they can test their maze and let others go through the maze that they have built. Students should also draw or take a picture of the stick maze

Assessment: Students present how they first designed the maze as well as any changes that were made when in the process of constructing it. They should also share with the class the end product of their stick maze.

Adapted from:

<u>Activity 14: Explore the Impacts of Feeding the World</u>

Objective: Students should "learn more about how food sustainability and environmental issues are impacting people and habitats around the world". Additionally, students should "explore several issues surrounding our current food system, including food waste, food deserts, agricultural land use, and the environmental impacts of diet choices".

Time: 120 - 180 min (two class periods)

Materials:

Computer with Internet access
Projector
Flipside Science video: The Environmental Impact of Feeding the World
The Environmental Impact of Feeding the World Journal (1 per student, also available in Spanish, Simplified Chinese, and Traditional Chinese)
A few (2-3) very misshapen fruits or vegetables (e.g., from a local farmer's market)
A few (2-3) empty restaurant take-out containers
A few (2-3) packaged food items with 'expired' sell-by dates (but that are not spoiled)
Examples of processed and packaged convenience store food items (like cheese puffs, candy, bottle of soda)

Preparation:

1. Print out one The Environmental Impact of Feeding the World Journal per student
2. Set up stations around your classroom with the following materials:

- Food Waste Station: Misshapen fruits/vegetables, empty take-out containers, packaged food items with expired sell-by dates
- Food Deserts Station: Examples of processed and packaged convenience store food items

Interdisciplinary Aspects: History & current events/global problems, Topics revolving on Sustainability

Procedure (from the link below):

Introduction (Day 1)

1. Introduce your students to food sustainability and environmental issues by showing them the ***Flipside Science*: The Environmental Impact of Feeding the World** video.
2. Ask for volunteers to talk about one or two things they learned from the video, and make a list of these things on the board. Explain that the youth in the video are talking about some important environmental and sustainability issues related to food. Check that students have an understanding of what 'sustainability' means.
3. Replay the video for students a second time.
4. Working in pairs, students will dive deeper into two of the food sustainability and environmental issues introduced in the video (they will explore the other two issues during the following class period or hour).

Part 2

1. Divide students as appropriate among the stations so small groups can explore the materials up close. It may be best to have students pair up with a single thinking buddy as they complete their journal.
2. Give students 15 minutes at each station, and then have them switch.
3. After students have completed the two activities, bring everyone back together as a class.

Part 3

1. Ask students to share some of their thoughts from the food waste station activity. After you have heard from several students, tell the class that all of the food items at that station are edible and unspoiled.

- *Why do you think people don't like to eat produce that isn't perfectly shaped? How could you inspire or encourage people to embrace misshapen fruits and vegetables?*
- *What do you think the 'sell by' date on a food package actually means if it isn't the date the food is no longer edible? Why do the producers put this date on there?*

2. Ask students to share some of their thoughts from the food deserts station activity.

- *How do you think we could help people who live in food deserts to have better access to fresh, healthy, and affordable foods?*

Part 4 (Day 2)

1. Students should complete the rest of their worksheet
2. Ask students to discuss some of their thoughts from the two web activities in small groups, then discuss as a class:

- *How can the choices you make about what you eat impact the environment?*
- *Why is the land footprint of meat larger than it is for vegetables and grains?*
- *What influences the choices people make in the foods they eat? Are people's diets controlled solely by their likes and dislikes, or do other factors play a key role?*
- *How could we grow more food with less land?*

3. Individual quiet writing reflection: Have students consider all four of the food sustainability and environmental issues that they explored over the past two days: food waste, food deserts, agricultural land use, and the environmental impacts of diet choices. Ask them to consider if they feel impacted by any of these issues. If so, which ones? How are they impacted? Do they know anyone else directly impacted by the same or different issues? Are there any easy solutions to these kinds of issues?

Assessment: Students write a reflection that is evaluated based on their critical thinking and empathy.
Adapted from:
https://www.sciencebuddies.org/teacher-resources/lesson-plans/exploring-the-impacts-of-feeding-the-world#lesson

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Activity 15: Snowshoeing in the Winter
Objective: Students will have an appreciation from Native Americans who snowshoed in the winter and learn how to track and do map making.
Time: 90 minutes
Materials: Winter clothing (jackets, gloves, boots, hats, etc.)
Preparation: The instructor(s) should be familiar with the trail that they would bring the students to and have them stick together. If there was a big snowstorm in the middle of the activity, lead the students back to campus.
Interdisciplinary Aspects: Native American history, Design skills, Observation skills, Drawing
Procedure:

1. Both students and instructor(s) should be dressed appropriately for the weather
2. Have students make and write down any observations they see
3. Draw the map based on the observations that they made

Assessment: Students are graded on their participation as they hand in their map.
Adapted from:

Activity 16: Understanding Greenhouse Effects

Objective: Students will learn about what are the factors that contribute to greenhouse effects, the impacts it has on the planet, and the potential solutions to reduce it.

Time: 90 minutes

Materials: Three thermometers, two clear glass jars that fit the thermometers, sun lamp/sunny windowsill, paper towels, scientific notebook/journal, graph paper

Preparation: Students should have computer access to look up any terms relating to global warming and climate change so they can understand why they are global issues.

Interdisciplinary Aspects: Global warming/Climate change, Science Lab skills, Observation skills, Data analysis

Procedure:

1. Distribute the materials to each group of students (groups of 2-3 students)
2. Set up the three thermometers to be inches away from each other but they should receive the same amount of sunlight from the sun lamp or from the sunny windowsill
3. Check up on the three thermometers until they all reach the same temperature. Record the temperature.
4. Cover two thermometers with the two glass jars and the remaining one left uncovered
5. Students would then place a wet paper towel inside one of the two jars. Record the temperature after some time has passed.
    a. Use room temperature water to wet the paper towel
6. After some time has passed, take the final temperatures of all three thermometers and compare the results
    a. Temperature from the "dry jar
    b. Temperature from the "moist" jar
    c. Temperature from outside of these jars

Assessment: Students pass in their lab report of the documentation of the results and outcomes of the experiment.

Adapted from:

https://mass.pbslearningmedia.org/resource/ess05.sci.ess.watcyc.lp_global1/global-climate-change-understanding-the-greenhouse-effect/

Activity 17: Art Project with UV Beads

Objective: Students will learn how UV rays work and the effects it has on the environment.

Time: 60-90 minutes

Materials: Watercolor paint, paintbrushes, crayons/color pencils, UV beads, canvas/paper, glue/sewing material

Preparation: The instructor(s) should be familiar with the effects of UV rays to be able to answer any questions that students may have regarding the topic.

Interdisciplinary Aspects: Energy, Observation skills, Drawing
Procedure:

1. Draw or paint a picture (ex. Flowers, animals, etc.), one for daytime and one for night time
2. Put in the UV beads either by glueing onto the drawing or sewing it on the paper
3. After putting in the UV beads, place the drawing outside or a space where there is direct sunlight
4. Make observations on the lights

Assessment: Students will pass in their written reflection on the observations they made about the UV beads changing over time.
Adapted from:
https://igamemom.com/diy-art-project-with-uv-beads-led/

Activity 18: Sunscreen Print Art Project
Objective: Students will understand the effects of UV rays on the environment as well as on their skin and the importance of putting on sunscreen.
Time: 30 minutes (~3 hours to dry)
Materials: Construction paper, sunscreen, paintbrush, palette/plastic plate
Preparation: The instructor(s) should be familiar with the topic of UV rays to help and guide students if they have any trouble understanding.
Interdisciplinary Aspects: Energy, Observation skills, Drawing
Procedure:

1. Have a piece of construction paper ready
2. Pour out sunscreen onto a palette or plastic plate (similar to pouring paint out onto a palette)
3. Get a paintbrush and start drawing on the construction paper with the sunscreen
4. After finishing the drawing, place it in a space or area that receives a lot of sunlight
5. Make observations and connections after the drawing has dried

Assessment: Students pass in their written reflection based on the observations they made throughout the activity.
Adapted from:

Activity 19: Build a Dirt Battery
Objective: Students will understand electric currents and wiring as they build a battery out of dirt.
Time: 60-90 minutes

Materials: Ice cube tray, galvanized steel screws, copper wire, dirt, wire stripping tool, ruler, LED pin lights, digital multimeter
Preparation: Instructor(s) should be familiar with how to wire and provide safety instructions for students when handling electricity.
Interdisciplinary Aspects: Energy, Observation skills, Topics on Electricity transfer
Procedure:

1. Fill the ice cube tray with moist dirt
2. Cut the copper wire into strips of 3 inches long and twist the strands together
3. Wrap the copper wire to one end of the screw and the the other into the dirt that is in the cell next to it
4. Go all the way around the circle of the ice cube tray connecting all of the cells except the last two
5. At the ends, leave the last screw without wire wrapped around it and give the other one an extra piece of copper wire coming out of the final one
6. The LED lights will be placed into the dirt at the end and will light up from the charge created with the nails and wire

Assessment: Not graded, students will pass in their lab report on the observations and findings that they made.
Adapted from:
https://teachbesideme.com/dirt-battery-experiment/

Activity 20: Transportation Log
Objective: Students will keep a log on the types of transportation they use to and from school for a week and how that affects the environment.
Time: 45 minutes
Materials: Notebook
Preparation: The instructor(s) will give an example on how they go to and from school and ways they can track/document it
Interdisciplinary Aspects: Data analysis, Observation skills, Global warming/Climate change
Procedure:

1. Write down the start time and end when going to school, the type of transportation, and the time it took to get there
2. Write down the start time and end when going home, the type of transportation, and the time it took to get there
3. Have a class discussion on how everyone gets to and from school and the impacts it has on the environment

Assessment: Students will pass in their journal entry of how they get to and from school over the past week.

Adapted from:

Activity 21: Phases of the Moon (At Home Activity)

Objective: Students will spend class time learning about the names for phases of the Moon and which order these phases go in. Each night (either at home or on campus depending on whether or not they are a commuter), the students are to draw or take a picture of the Moon (provide a choice!) each night of the cycle and name the type of Moon it is.

Time: 60 min of class time to learn about the phases of the Moon. Moon observations and drawings or pictures will be assigned for homework for as many nights as the teacher desires.

Materials: Drawing book, colored pencils/crayons/paint/colored pens, Digital Camera

Preparation: The instructor(s) should prepare a lesson on Moon cycles to provide the students with the necessary information for their observations

Interdisciplinary Aspects: Drawing, Data collection, Observation skills, Research skills

Procedure:

1. Students should capture the Moon on a given night either through a drawing or a picture
2. Students should attempt to identify where the Moon is in it's cycle and name the type of Moon they observed.
3. These steps should be repeated multiple times (teacher's decision).
4. Once the students have observed the Moon on multiple nights they should finalize their drawing book and turn it in.
5. If a student decides to use a camera to capture the Moon they should be given the option to hand in a digital drawing book complete with their own photos.

Assessment: Students are graded based on their effort put into the drawings and accuracy of naming the different phases.

Adapted from: https://study.com/academy/popular/phases-of-the-moon-lesson-plan.html

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Activity 22: How Our Actions Affect the Environment

Objective: Students will evaluate their own environmental footprint and determine simple ways to reduce this footprint as either an individual or as a community, understand the factors that impact the environment as a whole, and mildly alter their lifestyles to make a difference by using the online resource "Your Plan, Your Planet".

Time: 60-90 minutes (This activity can be done in one class period depending on what is assigned for homework. If the presentation is to be made in class this activity might require class sessions.)

Materials: Electronic device with access to the internet (Tablet, Chromebook, Computer, Mobile Phone, etc.)

Preparation: The instructor(s) should run through the "Your Plan, Your Planet" application to give the students an example of their environmental footprint and provide some ways to improve it.

Interdisciplinary Aspects: Sustainability principles, Environmental footprint, Climate change, Mindfulness, Technical skills

Procedure:

1. Have students take out their electronic device and navigate to the "Your Plan, Your Planet" website
    a. If no website was given in advance, have them Google "Your Plan, Your Planet" and click on the first search result
2. Have the students complete each category (Stuff, Water, Energy, and Food) and record their choices
3. After completing the activity, have a class discussion and share results of the questions they answered in the application

Assessment: Student presentation evaluated based on self reflection, passion, empathy, and viewing the bigger picture.

Adapted from:

Website: https://yourplanyourplanet.sustainability.google/

Activity 23: Creating Sinkholes

Objective: Students will understand the impacts sinkholes have on the environment and investigate if there are any sinkholes that are present in Marlborough.

Time: 60 minutes

Materials: 8 oz. foam cup, scouring pad or thin sponge, empty 2-liter soda bottle, sugar, sand, scissors, piece of paper

Preparation: The instructor should be familiar with how to run the experiment so they know how to answer and guide students if they need help on a particular step.

Interdisciplinary Aspects: Science Lab skills, Drawing, Safety Protocols

Procedure:

1. Make a small hole (thumb size) at the bottom of the foam cup
2. Place the scouring pad/thin sponge at the bottom of the cup
3. Place a column of sugar in the middle of the cup surrounded by sand
    a. To do this: roll the paper and place it in the middle of the cup and fill the cup up with sand. Once the cup is filled with sand, pour in sugar inside the paper. Once the sugar reaches the same level of the sand, gently take out the paper and add a thin layer of sand at the top.
4. Cut the bottom of the 2-liter soda bottle until it is the same height as the foam cup. Fill one-third of it with water (represented as ground water)
5. Place the foam cup in the water and make observations of how the sinkhole is formed

Assessment: Students will pass in a notebook entry of the documentation of the process of the sinkhole in the cup.
Adapted from:
http://www.earthsciweek.org/classroom-activities/sinkholes-cup

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Activity 24: Learning the Scientific Method with Paper Rockets
Objective: Students will learn the steps in the scientific process and the importance of following these steps while conducting an experiment and creating a measuring system by constructing paper rockets powered by blowing into a straw.
Time: 120 minutes (This activity will take 1-2 class periods depending on what is assigned for homework)
Materials: Paper, Scissors, Tape, Drinking straws, Tape measure, Notebook
Preparation: The instructor should have a good understanding of the scientific method and prepare enough materials for the students to build their rockets.
Interdisciplinary Aspects: Scientific method, Forces, Measurement, Constructing skills, Teamwork/Communication skills
Procedure:

1. The instructor(s) will put the students into groups of 1-4 and distribute the materials to each group
2. Take the paper and fold it into fourths horizontally (Hamburger style)
3. Cut along the folds
4. Roll the paper around the straw but not too tight
5. Remove the straw and tape the rolled up paper to hold it in place
6. Pinch one end of the rolled paper to make the nose of the rocket
7. Tape the pinch area shut
8. Take another piece of paper and cut out triangles to make the fins of the rocket
9. Tape the triangles to the back end of the rolled paper
10. Place the rocket onto the straw and blow
11. Repeat steps 2-10 but make the rocket a different length. Record observations
12. Repeat steps 2-10 but change the number of fins taped to the rocket. Record observations.

Assessment: Students will complete a worksheet that demonstrates their ability to understand and follow the scientific process (worksheet included in link).
Adapted from:
https://www.sciencebuddies.org/teacher-resources/lesson-plans/scientific-method-rockets#summary

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Activity 25: How Filtering Can Clean Water

Objective: Students will learn about the UN's Millennium Development Goals, understand different filtration methods, understand the health effects of drinking contaminated water, learn how to follow scientific procedure and draw conclusions based on experimentation, and connect water filtration to real world problems by exploring the effectiveness of filtration systems on various types of liquids and learn about clean water issues across the globe.
Time: 180 minutes (Students should spend one class period constructing the filter and 1-2 class periods testing the filter, collecting data, and analyzing their results.)
Materials:
Green Science Clean Water Science Kit (available from Home Science Tools)
Bowls (3)
Plastic spoons (1 box)
Liquid measuring cup
Teaspoon (¼ measure)
Small bowl of garden dirt
Vegetable oil (¼ cup)
Medicine dropper
Plastic cups, clear (9; 2 for each of the 4 liquids and 1 for a comparison water sample)
Permanent marker
Plastic wrap (1 roll)
Sports drink, red-colored (1 cup)
Tea kettle/small pot/or liquid measuring cup
Mug (1)
Tea bag (a bagged black orange pekoe tea (1 tea bag))
Kitchen timer
Cola/soda pop (1 cup)
Lab notebook
Graph paper
Preparation: the instructor(s) should be familiar with the UN's Millennium Development Goals, different filtration methods, and countries that have contaminated water and the effects of drinking it.
Interdisciplinary Aspects: Science Lab skills, Unit about Water, Calculation of average, constructing skills, Photography
Procedure:

1. Open the clean water science kit and read the enclosed instruction booklet completely.
2. First, open a packet of gravel and put it in a bowl. Rinse the gravel in water carefully three times to remove any dust.
    a. Open a packet of sand and put it into another bowl. Rinse the sand in water carefully three times. Swish the sand in the water and then let it settle before you carefully drain off the water.

   b. Open a packet of active carbon and put it into a clean bowl. Rinse the active carbon in water carefully three times. Clean the active carbon the same way as you cleaned the sand.
3. Put the filter column together, as described in the instruction book.
4. Prepare two filter plugs with wax, as instructed in the instructions, and insert them into two filter sections. Insert the other two plain filter plugs into two filter sections.
5. Put the wet sand in one of the two filter sections with the waxed plug. Use a plastic spoon to scoop the clean sand from the bowl into the filter section. The sand will be wet, but try to scoop only the sand and not any extra water.
6. Put the active carbon in the other filter section with the waxed plug. Use another plastic spoon to scoop the clean carbon from the bowl into the filter section. Avoid scooping any water into the filter section with the carbon.
7. Put the gravel into one of the plain plug filter sections.
8. Fold a filter paper in half and then in half again. Open the filter paper so that you have a cone or a funnel shape. Insert the cone into the last filter section.
9. Construct the filter column, as shown in the diagram in the instruction booklet. Make sure that the bottom of the top filter section doesn't touch the material in the section below it.

<u>Testing the Filter:</u>

1. Make a contaminated water sample. Add 1/3 cup of water to the measuring cup. Add ½ teaspoon (tsp.) of garden dirt to the water and stir it with a clean plastic spoon. Using the medicine dropper, add a little vegetable oil to the water, approximately 4–6 drops. Mix the oil and the dirt completely into the water. Pour the contaminated water into a clear plastic cup.
2. Place the filter column carefully on top of another clear plastic cup. Slowly pour a small amount of the contaminated water into the filter. The water should move between the filter sections drop by drop. Slowly filter about half of the contaminated sample. Continue to mix the contaminated water with the spoon so that the dirt doesn't settle.
3. Now compare the filtered sample of water to plain water and to the sample of contaminated water. Fill another clear plastic cup with plain water. Compare the **clarity** of the filtered sample to the clarity of plain water. Rank the clarity of the filtered water on a scale of 1 to 5, where 5 is very clear (as clear as the plain water) and 1 is **murky,** where the sample is not clear at all and looks identical to the original contaminated sample. Record this **data** in your lab notebook in a data table like the one shown below. You should also record any other observations that you make about the filtered water. For example, if the filtered water has grit in it, then record that in the table.
   a. **Caution:** This filtering device is not intended as a filtering device to make clean drinking water, only as a representation of more-advanced filters. Do *not* drink the filtered water.

4. Boil 1 cup of water in a teakettle or small pot on the stove, or in the microwave. Place the tea bag in the mug and pour the cup of boiling water into the mug over the tea bag. Set the timer for 15 minutes and let the tea bag sit undisturbed for 15 minutes. Remove and discard the tea bag and let the tea cool down as you proceed with the following steps.
5. Now take the filter apart and pour the gravel, the sand, and the active carbon into three separate bowls. Wash the three materials according to the instructions in the instruction booklet. Carefully unfold the paper filter and rinse it in water. Rinse the filter sections out in water. Refill the filter sections, remembering to fill one of the filter sections that has a waxed plug with sand and the other filter section that has a waxed plug with active carbon. Put the filter back together.
6. Place 1/3 cup of sports drink in a clear plastic cup. Carefully place the filter on top of a clean clear plastic cup. Slowly pour half of the sports drink into the filter. The sports drink should move between the filter sections drop by drop. Slowly filter about half of the sports drink.
7. Now compare the filtered sample of sports drink to plain water. Compare the clarity of the filtered sports drink to the clarity of the plain water in the cup from step 3 and to the original sports drink. Rank the clarity of the filtered sports drink on a scale of 1 to 5, where 5 is very clear (as clear as the plain water) and 1 is still colored and not clear at all (like the original sports drink). Record this data in your lab notebook. You should also record any other observations that you make about the filtered sports drink.
8. Repeat steps 5–7 using 1/3 cup of tea. Record all data in your lab notebook.
9. Repeat steps 5–7 using 1/3 cup of cola. Record all data in your lab notebook. Is the filtered cola just as fizzy and bubbly as the original cola?
10. Repeat steps 1–9 two more times with clean materials (you can wash and reuse the plastic cups and use the remaining liquids you've already prepared). It is important to do the experiment at least three times so that you are sure that your results are repeatable and reproducible.

Assessment: Students will pass in their lab notebook containing pictures or illustrations, collection of data, and personal conclusions and/or a personal writing assignment connecting lab findings to the real world problem of access to clean water.
Adapted from:
https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvEng_p030/environmental-engineering/how-filtering-can-clean-water#procedure

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Activity 26: Watershed
Objective: Students will learn what factors make up a watershed, connect the watershed to the water cycle, the effects of watersheds to the environment, and investigate if Marlborough have any local watersheds by working in groups of 2-3 to construct a modeled watershed
Time: 90 minutes

Materials: Laminated topographic maps of local area; topographic maps can be ordered from the U.S. Geological Survey, dry-erase markers, aluminum foil, crumpled newspapers, plastic cups, droppers, paper towels, spray bottle
Preparation: The instructor(s) should have prepared maps from a secured source and have them laminated. Also have students discuss what they have learned already about the water cycle and topographical maps.
Interdisciplinary Aspects: Observation skills, Concepts of Water Cycle, Reading a Topographical map, Construction/Design skills
Procedure:

Introductory Activity:

1. Divide class into groups of three or four students per group.
2. Each group is given a large piece of aluminum foil.
3. Each group is to create a watershed by placing the foil over crumpled up newspapers to create a simulated landscape with mountains, valleys, and a lowland area.
    a. All parts of the foil should drain into the single low area. The outer edges should be turned upward to keep the water on the surface of the foil.
4. Fill a plastic cup halfway with water and mark the water level on the outside of the cup with a marker.
5. Each group is to then put the half-cup of water into a spray bottle and use the sprayer to make it "rain" on the watershed. Be sure to spray all of the water.
6. Observe how the water moves in the watershed. Catch all the runoff water in the cup at the low area.
    a. Note how much water moved through the watershed. Was some water retained in/on the watershed? What do these bodies of water represent?
7. Remove all the water from the watershed, using a medicine dropper if necessary, and place all the water back in the cup. When you have removed as much water as possible, make a mark on the cup to indicate the new water level.
8. Put pieces of paper towel on the high parts of the model watershed. This imitates the effect of the ground storing some of the water.
9. Just like in Step 5, use the spray bottles to make it "rain" on the watersheds. Observe.
10. Return as much standing water as possible to the cup. Compare the water levels. What does this tell you about groundwater?
11. Ask students to explain how what was just demonstrated represents the water cycle.

Follow-up Activity:

1. Divide class into three groups (appx. six students per group).
2. Each group is given a topographic map of the local area of the county in which the school is located.

3. Ask the students to identify/describe what they are looking at.
4. See if anyone can locate the school's specific location on the maps.
5. After ascertaining the extent of the class's knowledge, ask the students to recall the concept of a topographic map (how it is a two-dimensional representation of the three dimensions of the surface of the land).
6. Referring to the topographic maps, have each group identify the following:
    a. a mountain top
    b. a mountain ridge
    c. a steep mountain slope
    d. a gentle slope
    e. a stream
    f. the confluence of two streams
    g. a field or lowland area
    h. cities or towns
7. Have the groups focus on the specific section of the map that represents the location of the school. Have them locate the stream that flows by the school's property. Trace the stream upstream to determine its origin and also downstream to where it meets up with a larger stream.
8. Challenge the groups to mark the surrounding area that delineates the stream's watershed. Have them mark the laminated maps with dry erase markers to indicate the watershed boundaries.
9. Have the groups share their mappings.
10. Ask for someone to explain the connection between the two activities (the activity involving the foil models of a watershed and the activity of analyzing the topographic maps).

Assessment: Students will Present their findings from the activity with how much water was collected, what environments are suited for watersheds, and where most watersheds are located.
Adapted from:
https://ecosystems.psu.edu/outreach/youth/sftrc/lesson-plans/earth-sciences/6-8/identifying-watersheds

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Activity 27: How Does Soil Affect the pH of Water?

Objective: Students will understand the meaning of pH and the effects it has on plants, understand the effects runoff has on the environment, and learn how to follow scientific procedure and draw conclusions based on experimentation by measuring the pH level of water in the different types of soil around the NEIA campus and the Howe Pond Land.
Time: 180 minutes (The procedure for this activity is relatively long and more complex than the other activities. We recommend conducting the activity in-class and assigning the conclusions and analysis of data as homework.)

Materials:
Places to gather different types of soil (3)
Small shovel or trowel for gathering soil sample
Ruler/ metric
Sediment tubes with lids (25 cm tall and 5 cm in diameter (9), small deli containers could also work)
Permanent marker
Small containers or cups, at least 3-oz. (3)
Tap water (or the procedure can be adapted to use pond water)
pH paper (with resolution of at least ±0.3 pH units and a range from 3 to 8 or a pH meter for liquids. You may need more than one set of pH paper to cover this range of pH values at ±0.3 pH unit resolution)
Soil pH meter (with a pH range of at least 3.5 to 9 and a resolution of ±0.1 pH units)
Facial tissues or cotton balls (10)
Clock/timer/stopwatch
Duct tape
Coffee filters (18)
Lab notebook
Preparation: The instructor(s) should have background knowledge about pH levels and the quality of soil before starting this activity. They could also do a test run by themselves so when students do the activity and get stuck on a particular step, they can help guide them.
Interdisciplinary Aspects: Concept of pH levels, Photography, Calculate pH levels, Photography
Procedure:

1. Choose three different places/environments to collect soil samples (such as floodplain, beach, man-made garden, forest, or desert)
    a. Look for soils with different colors and textures
    b. Look for differences in the kinds of plants growing in a place
2. Record observations and where each type of soil is collected from as well as taking pictures of the soil samples
3. Collect three samples from each location
    a. Remove the top 5 centimeters of the soil before collecting samples so there are no plants or surface roots
    b. Also remove any stones or other objects in the sample
    c. Put each sample in a separate sediment tube. Will need 2 to 3 cups of soil for each sample depending on the size of your containers. Add soil to the containers until the soil is 15 to 20 cm deep
    d. Label each tube using permanent marker (e.g., “Soil from the riverbank, sample 1”)

4. When students are ready to test their samples, fill one of the small containers or cups with about 4 cm of tap water. Use pH paper to measure the pH of the tap water, and record that value in the lab notebook. Then discard the water.
    a. Follow the directions listed on the pH paper
        i. Dip the piece of pH paper in the water and then compare the color of the pH paper with the color scale on the packaging. Find the closest match to the color of the pH paper; the pH value associated with that color is the pH of your water sample
5. Read the instructions for the soil pH meter and learn how to use it properly
6. Use the soil pH meter to measure the pH of each of the nine soil samples. Create a data table in the lab notebook to record the data
7. Clean the soil pH meter
8. Investigate how the pH of water changes after it interacts with the soil samples for one hour.
    a. First, add more water to one of the sediment tubes from each site, until the soil is completely saturated and a layer of water about 1 cm deep forms above the surface of the soil.
9. Cap each of the tubes, and secure seal the cap with a piece of duct tape. Mix each of the tubes thoroughly by covering the cap with your hand and then vigorously shaking the tube for one minute
    a. **Warning:** Make sure the cap is securely sealed with duct tape and that your hand covers the cap as you shake the tube. The muddy mixture of soil and water will make a big mess if it escapes the sediment tube. So, shake the tubes vigorously, but cautiously. It may be best to do this step outside.
10. Write the time on the sediment tube using a permanent marker. Make sure the outside of the tube is dry before writing on it. Come back to these samples in one hour.
11. During this time, prepare three runoff-filtering containers.
    a. Put a coffee filter on top of each of the three, empty small containers or cups.
    b. For each container, fold the edges of the coffee filter over the edges of the container and tape the folded-over edges to the container with duct tape. Make sure to leave the top surface of the filter un-taped.
12. After the sediment tubes have sat for one hour, remove the duct tape and cap slowly from the tubes. Slowly and carefully pour the water from the tubes onto the filters over the runoff-filtering containers. The water from each sediment tube should go into its own container, and you should keep track of which runoff samples are in which runoff-filtering containers. Let the water percolate through the filter.
13. Once most of the water from the soil in the sediment tubes has been filtered, re-cap the sediment tubes.

14. Carefully remove the filter paper from the runoff-filtering containers by removing the tape and holding the filter by its edges, being careful not to allow soil or unfiltered water to fall into the filtered water.
15. Use pH paper to measure and record the pH of the filtered run-off water. Record the pH values in your lab notebook, adding the data to your data table and being sure to note which values correspond to which soil samples. Rinse out the containers when you are done.
16. Calculate the difference in the pH of the tap water you measured in step 5 and the pH of each runoff you measured in the previous step. This is how much the pH of the water changed after mixing with the soil for one hour. Record the difference in the data table in your lab notebook.
17. Repeat steps 8–17, but let the soil and water mix for one day and then two days, instead of one hour. You will need to vigorously shake the sediment tubes every few hours to re-mix the soil and water.

Assessment: Students will pass in their lab notebook containing their observations, collection of data, analysis, and personal conclusions.
Adapted from:
https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvSci_p013/environmental-science/how-does-soil-affect-the-ph-of-water#procedure

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Activity 28: Measuring Pond Water Salinity

Objective: Students will go to the neighboring pond to collect water samples to find the amount of salt in the body of water and come up with solutions for desalination.
Time: Year long
Materials: Jar/test tube, measuring cup, litmus paper, scale, microscope, augar [for the Winter Season]
Preparation: Instructor(s) should be familiar with the equipment they are going to use to be able answer any questions that the students may come across when doing this activity.
Interdisciplinary Aspects: Collection techniques, Science Lab skills, Experiment design, Pollution (highway runoff), Identifying pH levels
Procedure:

1. Have students dressed appropriately for the weather
2. Explain each material and how they would help the students collect the data that they need
3. Specify the amount of pond water the student should collect
4. Demonstrate the process of removing the salt from the water sample by boiling the water
5. After removing all the salt, weigh the salt and have students record the amount

Assessment: Students will pass in their Lab report and make a (multimedia) presentation of their findings.

Adapted from:

Activity 29: Pond Ecology

Objective: Students will construct drawings of the macroinvertebrate organisms they find in the stream, investigate a stream using sampling techniques and science skills, and identify several aquatic organisms and assess the environmental quality of a stream based on the presence of a diversity of organisms by observing pond life at Howe Pond.

Time: 90 minutes (two class periods)

Materials: Field Journal, Sieve, Tweezers, Net to capture organisms, Hand lens (used for magnification), White trays or pans

Preparation: The instructor(s) should be familiar with pond ecology and potential organisms that could be inhabiting Howe Pond.

Interdisciplinary Aspects: Pond Ecology, Observation skills, Drawing, Biodiversity, Science Lab skills

Procedure:

1. Instructor(s) should tell students about safety protocols when collecting and observing pond organisms
2. Pick a sampling area and start collecting samples
    a. Sweep the area with the net
    b. Use tweezers to remove macroinvertebrates from the net
3. Place the macroinvertebrate in the white trays for observation
4. Use the sieve to collect samples along the stream
5. Place these samples in the white trays to look later
6. Draw the organisms in the field journal
7. After drawing, return the organisms where they were found and collected
8. Identify what the organism is

Assessment: Students will fill out and pass in the worksheet provided and/or the notebook entries that contains their data.

Adapted from: Lesson plan from Laura Twohig

Activity 30: Nature Tower Building Challenge

Objective: Students will understand the power of gravity, use effective teamwork (delegation of tasks), learn structural support and design concepts (importance of foundations), and be creative.

Time: 60 - 90 min (can be done anytime when the ground is soft)

Materials: Basket to collect items

Preparation: The instructor(s) should create small teams beforehand and ensure their are enough objects (anything from sticks to bricks) in the surrounding area to create multiple towers

Interdisciplinary Aspects: Construction and Design skills, Measurements, Concept of Gravity: Physics

Procedure:

1. The instructor will assign teams and designate a space for each team.
2. The teams will spend 20 - 30 min gathering objects they find in nature (the teacher can set boundaries if they desire).
3. Students will spend the next 30 min constructing their tower and competing to see which team can create the tallest structure. They should use trial and error strategies.
4. Finally, the instructor should announce the winner (and provide a small prize if deemed appropriate) and ensure that each team has taken a photo of their final product.

Assessment: Not graded OR personal reflection discussing how they went about constructing the tower as a team (methodology) OR not graded but the winning team gets extra credit or a small prize.

Adapted from:

http://preschoolpowolpackets.blogspot.com/2016/02/inspired-by-dr-seuss-turtle-science.html

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Activity 31: Experimenting with Dew Traps

Objective: Students will understand what are dew points and how people living in dry climates collect water through constructing dew traps.

Time: 180 minutes (One class period constructing the dew trap, and 1-2 class periods testing the dew traps)

Materials: Trenching shovel, Two Collectors (The collectors can be aluminum pie plates, pans, or food storage containers that cover the majority of the area at the bottom of the hole. Both collectors must be identical), Plastic drop cloth (clear, 2-millimeters thick, 9 X 12 feet (ft.), Scissors, Ruler, 10- 15 Bricks, Two Rocks (egg-size), Six Disposable cups, Cheesecloth (1 pkg.), One Graduated cylinder (50 milliliters (mL)), Lab notebook, Graph paper

Preparation: The instructor(s) should be familiar with how the activity is run so they can help or guide students who may have trouble. They should also make sure that students know safety protocols when shoveling outside.

Interdisciplinary Aspects: Constructing and Design skills, Data collection and analysis, Science Lab skills

Procedure:

1. Students and instructor(s) should be dressed appropriately for working outdoors and have safety gear on (e.g., goggles, gloves, etc.)
2. Find an area around campus to dig two small, round holes
    a. The area should be in a sunny location away from foot traffic
3. The first hole should have a diameter of 1 foot and a depth of 1 foot
4. The second hole should have diameter of 2 feet and a depth of 1 foot

5. When digging, put the excess dirt to the side
    a. Make the bottom of the holes flat so the collector can be placed easily at the bottom
    b. Confirm both holes measurements with the ruler
6. Once the holes are done, center the collectors at the bottom
    a. The collectors must be identical
7. Use scissors to cut two circles from the plastic drop cloth, one for each hole
    a. The plastic should be larger than the hole. The diameter of the plastic for the small hole should be 4 feet and the diameter for the larger hole should be 5 feet
8. Carefully center the plastic over its hole
    a. Avoid getting dirt in the collectors
    b. Hold each plastic in place with two or three bricks along the circumference of the hole or by piling excess dirt
9. Gently push each cover down into a cone so that the tip of the plastic is a few inches above the collector at the bottom of the hole.
    a. Remove any excess dirt that falls on top of the cover
    b. Place an egg-sized rock in the tip of the cone
    c. Completely seal the edges of the plastic cover with more dirt
    d. Make sure that the insides of the plastic cover are not touching any part of the rim of the container
10. Write down the size of each trap and the start dates and times in the lab notebook

<u>Testing the Dew Trap:</u>

1. Have the dew traps collect water for three to four days
    a. Monitor the traps so that not too much dirt falls on the cover, the traps stays in a conical shape, and the rock is in the proper position in the tip of the cone
    b. If it rains, remove excess water on the cover with a disposable cup
2. After three to four days, take the plastic cover off at approximately the same time of day that the experiment started for each hole
    a. Remove the rock from the tip of the cover's cone
    b. Carefully push excess dirt away from the edges of half of the plastic cover. If bricks were used, move them off the edges. (Get the instructor's help if student can't do it)
    c. Lift half of the plastic away, overlapping it with the free half on the other half that is still in place
3. Remove the collector form each hole and set them aside to keep track of which hole they came from
    a. Avoid dumping any excess dirt into the collector
4. Use disposable cups to measure the water in each collector
    a. Label the cups by writing "large" and "small" corresponding to the hole the water came from

    b. Cut two pieces of cheesecloth, fold them in half, and cover the top of each disposable cup with the folded cloth
    c. Put a rubberband around the rim of each disposable cup to keep the cheesecloth in place
    d. Slowly pour the water from each collector in its corresponding cup
    e. Remove the cheesecloth and set the cup aside for an hour
5. After setting aside for an hour, measure the water in each cup
    a. Pour the water into the graduated cylinder and avoid spilling
    b. Record the data in the lab notebook

Assessment: Students will hand in their lab notebook and/or write a personal report of how dew traps are used by communities in dry parts of the world.

Adapted from:

https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvEng_p034/environmental-engineering/experimenting-with-dew-traps#procedure

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Activity 32: Solar Oven

Objective: Students will learn and understand about solar energy and how to harness that energy by constructing.

Time: 1-2 hours

Materials: Flat cardboard box, glue, aluminum foil, duct tape, black paper, thermometer, glass bowl, crayons

Preparation: The instructor(s) should have protective and safety gear for the students to wear such as gloves or oven cloth when handling hot objects.

Interdisciplinary Aspects: Constructing skills, Energy

Procedure:

1. Open the cardboard box and use duct tape to keep it open
2. Also use duct tape to cover the inside with aluminum foil
3. Add the black paper inside the cardboard box and place objects such as crayons in a container and a thermometer on top of it
4. Place the glass bowl over the objects and make observations

Assessment: Students will pass in their lab Report (time and temperature chart) including the piece of art and potentially digital pictures of the process.

Adapted from:

https://www.thecrafttrain.com/diy-solar-oven/
