Activity Binder

By

Alferid Hussin Shifa
Edwin Joseph
James Martin
Victoria Tetreault

Table of Contents

Week 7: Watch Me, Shine

Topic: Sun and Sunlight
Activity 1: Experimenting With Sunlight and Temperature Change to Cook Food, Solar Oven
Activity 2: Making Sun Print Art with Nature, Solar Art
Extra Activity: Cloud in a bottle (No Sun Activity)

Week 8: Summers Best

Topic: Joy of Summer and Teamwork
Activity 1: Repeat Favorite Team Activity
Activity 2: Experimenting and Analyzing the Reaction to make Ice cream in a bag
Extra Activity: Applying Creativity to Build the Tallest Tower

Design Worksheet

Master Materials List

Consumable: 200 girls

- 200 Pairs of Latex-Free Gloves
- 200 sheets of paper towels
- 300 paper or styrofoam plates
- 2 Big bag of Chia Seeds
- Variety of liquids
    - Such as: Coke, Gatorade, and others
- 4 bottles of plant fertilizer
- 200 craft foam sheets
- 400 ft yarn or string
- 700 pipe cleaners
- 400 Paperclips
- 4 bags of gravel or sand
- 200 skittles, 40 of each color
- 200 Cupcake paper cups
- 5 of the 240 count of Construction paper
- 200 Empty milk carton
- 200 Zip ties – 12 inch
- 20 rolls of duct tape
- 10 masking tape or scotch tape
- Stickers or decorations (optional)
- 10 Tin foil
- 2 Buckets of modeling clay
- 600 8-ounce paper cups
- 200 empty toilet paper rolls
- 100 Mylar sheets (thicker sheets, not rolls of thin paper) or mirrored sheets.
- 400 paper
- 30 cardboard (from a cereal box or back of a notepad or regular cardboard)
- 100 construction Paper
- Other craft materials
- 100 empty 2-liter coke bottles
- 20 plastic straws or skewers
- 200 Water bottle
- 150 Cardboard Boxes
- 200 popsicle sticks
    a. Different sizes
- 200 Plastic Straws & wooden sticks
    a. Different sizes
- 400 Plastic Bottle Caps
    a. Different sizes

- 50 rolls of twine
- 20 paper handouts
- At least 150 Newspapers
- 200 Mini bagels
- 30 jars of Tomato sauce
- 20-30 bags of Parmesan cheese
- 20-30 packets of Graham crackers
- 20-30 bags of Jumbo marshmallow
- 200 King-sized bars of Hershey milk chocolate
- 250, Matches
- 50 cartons of 32 fl. oz. Half & Half
    a. Optional: 1 cartons of Lactose-Free Half & Half
- 30 bags of 16 oz. Rock Salt
- 20 Large bag of Ice
    a. Recommended to have 3
- 10 bottles of 16 fl. oz. Vanilla Extract
- 10 bags of 16 oz. Sugar
- Water tight Ziploc Bags
    a. Minimum of 300 Small Bags
    b. Minimum of 300 Large bags
- Ice Cream Condiments:
    a. Melted marshmallows
    b. Strawberry sauce
    c. Chocolate fudge
    d. Melted Caramel
    e. Etc.
- Toppings:
    a. Gummies
    b. Sprinkles
    c. Skittles
    d. M&Ms
    e. Chocolate

Reusable: 40 girls

- 4 Assorted Box Sets
- 40 Insect Collection Canisters
- 40 Polaroid Cameras
- 40 Magnifying Glasses
- Flashcards with Numbers written on them
    a. Up to 20 for K-2nd grade
    b. Up to 50 for 3rd-6th graders
- Math Number Problem Cards
    a. For K-2nd:
        i. Addition
        ii. Subtraction
        iii. Counting with Fingers
    b. For 3rd-6th:
        i. Double-Digit Addition
        ii. Double-Digit Subtraction
        iii. Multiplication
        iv. Simple Division
- Marker x40
- Tape x40
- Wooden Blocks
- Cones x40
- Small ring x4
- Ruler x5
- Tape measure x5
- 15 sharpies
- 40 scissors
- 10 plain wax candles
- 20 lighters
- 40 pencils
- Minimum of 30 Spoons
- Measuring Utensils
    a. 2 Cup-measurement spoon
    b. 2 Teaspoon-measurement spoon
    c. 2 Tablespoon-measurement spoon
- Recommended 4-5 pairs of warm Gloves
- coloring pens
- 20 Eggs or small rocks that you can pretend are eggs
- 20 Bucket or other container to collect materials
- 20, 2-liter plastic bottles

- 5 Wooden spoon
- 5 Thermometer
- 2 Box cutter/knife
    a. Only instructors and volunteers can use these to help with cutting
- 2-3 boxes of Clear food wrap
- 2-3 boxes of Aluminum foil
- Acrylic or glass sheet
- Lemon juice (optional)
- Book for pressing (optional)
- Tedco Sun Art Paper Kit
- Metal Trays
- Plastic trays filled with water
- Small nets for the children x30
- A Larger better net for the counselor
- Buckets x10
- PH test kit OR Litmus paper
- Dissolved oxygen test kit (optional for the older kids)
- Nitrate test kit (optional for the older kids)
- Phosphate test kit (optional for the older kids)
- Cotton balls x40
- Activated charcoal (available at pet stores or can be bought online.)
- Mallet and a plastic bag (optional)
- “Backpack Explorer: On the Nature Trail: What Will You Find? (per counselor)
- Large Electric Floor Fan
    a. Approximately 9 inches
- 2 Gram Scales
- 10 Boxes of the same size
    a. These boxes will be used as the size requirement boxes
- 4 10-ft tape measure ropes
- Long wooden sticks
    a. For measuring traveled distance
- 4 Spray Bottles
- 2 Whistle
- 40 Film or pill bottle type of canisters
- Different things to fill up the containers, 2 of each thing per container
    a. Examples:
    b. Acorns
    c. Sticks
    d. Small Pebbles
    e. Large Pebbles
    f. Pine needles

    g. Buttons
    h. Pennies
    i. Paperclips
    j. Wood Chips
    k. Bottle caps
    l. Cork
    m. Beads
    n. Sea glass
    o. Paper
    p. Dried pasta
    q. Dried beans
- 10 Hand sanitizer bottle
- Clothespin
- Rubber Bands
- Single-hole punch
- Smooth line (4 ft. [1.2 m]) (fishing line or unwaxed dental floss)
    a. weights (10 pennies or 5 flat steel washers [1-in. (2.5 cm)])
- Cotton rolls x 4
- 2 Bottle launcher, Aqua Pod
- 2 Bike Pump
- Binder clips
- Paper clips
- 5 bin or containers of water to test models

Exploring Plant Life Cycle Using Chia Seeds

Objective: To learn about plants and what they need to grow and to run an experiment and learn from it.

Grades: K-6. The girls from grades 3-6 have less guidance to explore more options.

STE Standards:

K-LS1-1. Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants or other animals. Plants make their own food and need light to live and grow.

2-PS3-1(MA). Design and conduct an experiment to show the effects of friction on the relative temperature and speed of objects that rub against each other. (only the design and conduct of an experiment is important in this case)

Time Frame: 30-45 min

Context: You are a tree planter and want to work out the best way to grow seeds to help replenish all the trees that are being lost due to deforestation. You want to use different liquids such as water, soda, plant fertilizer, and other liquids you think of and different environments such as outside, in the dark, and in the cold to see which scenario causes the seeds to grow the best.

Materials:

For 20 girls:

- 60 sheets of paper towels
- 30 paper or styrofoam plates
- 5-10 sharpies
- Big bad of Chia Seeds
- Variety of liquids
    - Such as: Coke, Gatorade and others
- Bottle of plant fertilizer

Instructions:

Prepertations

None.

Step-By-Step

1. Introduce the experiment to the girls by asking them some questions to get them thinking about it.
    a. What do plants need to grow?
        i. Light, air, water, a source of nutrition, space to live and grow, and optimal temperature
    b. What do you think you could change to help the plant grow better?
        i. More of a discussion question.
2. Explain to the kids that they will need to have at least 3 different environments for the seeds to grow on.
3. Split the girls into teams of 2 so they can bounce ideas off each other and then let them start thinking about the liquids and environment they want to use.
4. Once the kids have decided what liquids and environment they want to use, put 2 paper towels on a plate and have the kids write their names and whatever liquid they are using on it. For the younger kids probably write it for them. Asking them thinking questions at this point.
5. Put a few paper towels on a plate with the name one on the top and pour the liquid on top of it so that it soaks into the paper towel. Do not put too much liquid on the plate so that it drowns the paper towel. See the image below for an example.
6. Sprinkle a small handful of chia seeds on each paper towel and move them to the desired locations. Make sure there is a control for the seeds so there is one that has water and gets a lot of sunlight.
7. The seeds will take 7-10 days in an ideal location, in the sun with water, to grow so the liquid should be added each day to the paper towel.
8. At the end of the week ask the girls the conclusion questions.

Guiding question: Helps the girls think more in-depth about the experiment.

- What liquid would you like to test to see how the seed will grow?
    - What do you think will happen with this liquid?
- Do you think the environment will change how the seeds grow?
    - What do you think the best environment will be?

Reflection Questions:

- What method did the chia seeds grow the best? Why?
- Why do you think some methods were not as good as others?

References:
https://www.reddit.com/r/plants/comments/f1wwqa/about_a_week_ago_i_spilled_chia_seed_while_making/

MAKING MODELS OF ADAPTATIONS

Objective:

The objective of this activity is for the girls to explore how plants and animals can have adaptations to their surrounding environment. Especially the species that live in water have some special adaptations that help them survive and grow in the water. In this activity, they will design, make, and test simple models of water plant adaptations.

Grades:

Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.

1-LS1-1. Use evidence to explain that plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

2-LS2-3(MA). Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.

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

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

Time:

This activity should take about 45 minutes to 1 hour.

Context:

You are a marine biologist and because of that you are very much fascinated by plants and love to study plant adaptation. Your boss, the chief biologist, wants you to examine plant anatomy to help the newly opened zoo aquarium. Your task is to study the structures of these three plants that are growing in a nearby pond, and design a 3D model of them to present in the aquarium.

Key Vocabulary:

Marine Biologist - the study of life in the ocean
Anatomy - the study of structures/body-part of living things
Pond - small bodies of still, or not moving, fresh water that is surrounded by land

Materials:

For a group of 20 girls:

- 20 craft foam sheets
- 40 ft yarn or string
- 30 pipe cleaners
- 40 Paperclips
- coloring pen
- Stapler
- 5 bin or containers of water to test models
- gravel or sand

Instructions:

Preparation

- Print out 20 copies of the "Build A Model Water plant" sheet that located at the button of this lesson plan. Also, have some hard copies of the three plants for the girls to look at, as they design their models.

Step by Step

1. Start by introducing the topics of this lesson plan by reading the context to the girls. Ask the girls some questions to start the activity. Ask them if they are familiar with the word "adaptation". Explain what adaptations are, and why they are important for plants and animals.
    a. "Adaptation is a special **skill or trait** which helps animals or plants to **survive** and do everything they need to do in their **environment**. Adaptations could be physical changes to the body or behavioral changes in how an individual animal or a plant does things in their daily lives."
    b. Plants like mangrove and cypress trees, kelp, and water lilies are plants that have adapted to water habitats. Their adaptations are ones the girls will feature in their models. Describe the three different plants that we will be exploring. Look at the reference image for details.

2. To begin, give each girl a “Build A Model Water plant” sheet, and let them choose a plant and draw a design for their model. With their design model, they will also label the plant parts and the adaptations they will like to show.
3. After settling on a design, everyone will need to get a craft foam sheet, pipe cleaners, and yarns.
    a. They can choose other materials that can be used to design the plant model based on their drawing. Let the girls pick the material themselves but guide them to the material they may need.
4. Afterward, they can use the craft foam sheets to cut out leaves, pipe cleaners for stems, and yarn for roots. They can staple the material together or tie the parts together.
5. If they like, the girls can get as detailed as they wish with a coloring pen.

Testing the model

6. First, we will pour about 2 inches of aquarium gravel and sand into the bottom to represent the soil at the bottom of a pond.
7. Next, they can place their plant models in the bin covering the roots with the gravel to secure them so they would stand up.
8. Next, they poured a few inches of water into their bin. At this point, the models should float, and the waxy foam repels water.

Guiding Questions

1G. What adaptations do you think will help the leaves get some sunlight?
- long roots or stems, leaves with waxy coatings to float

2G. How are you going to make sure the plant doesn't drift away?
- having long roots (yarn) and extending it to secure it better under gravel or sand.

Reflection

1R. How did you make the plant model adapt to life in the water?

2R. Why do you want the leaf above/near the surface of the water?
- To get some sunlight and make their nutrients

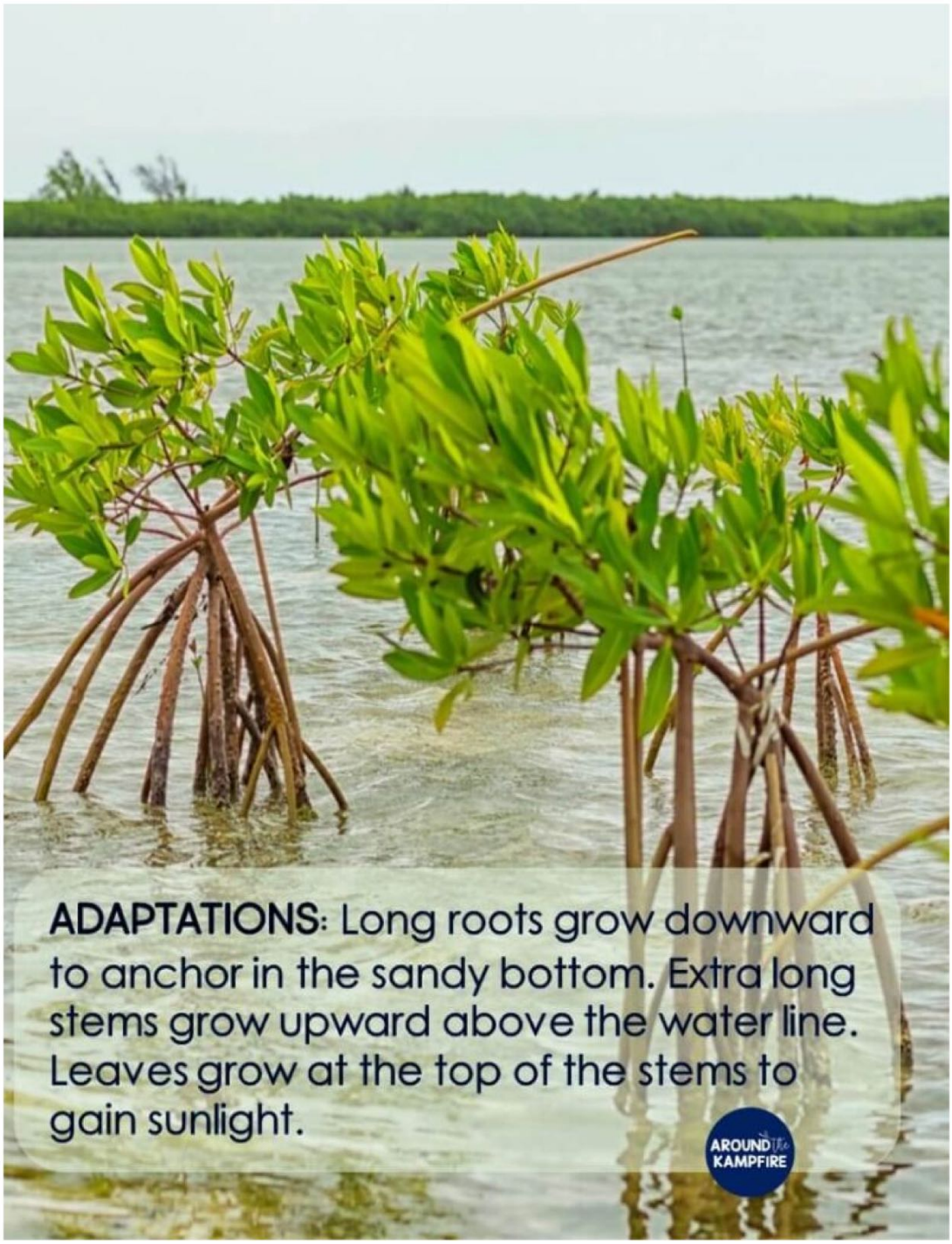
Apply for the future

- In this activity, the girls learned about three plants that have adapted to ocean water. Tell the girls that if they enjoyed this activity, they can look at other plants, animals, or even human adaptations and create a model to share with their friends and family. The adaptation does not have to be related to water; it could be anything.

Reference Image

Mangroves

Mangroves grow in shallow ocean waters. Their adaptations include long roots to hold them in place in the soil under water. Their stems grow high above the water so the leaves can get sunlight.

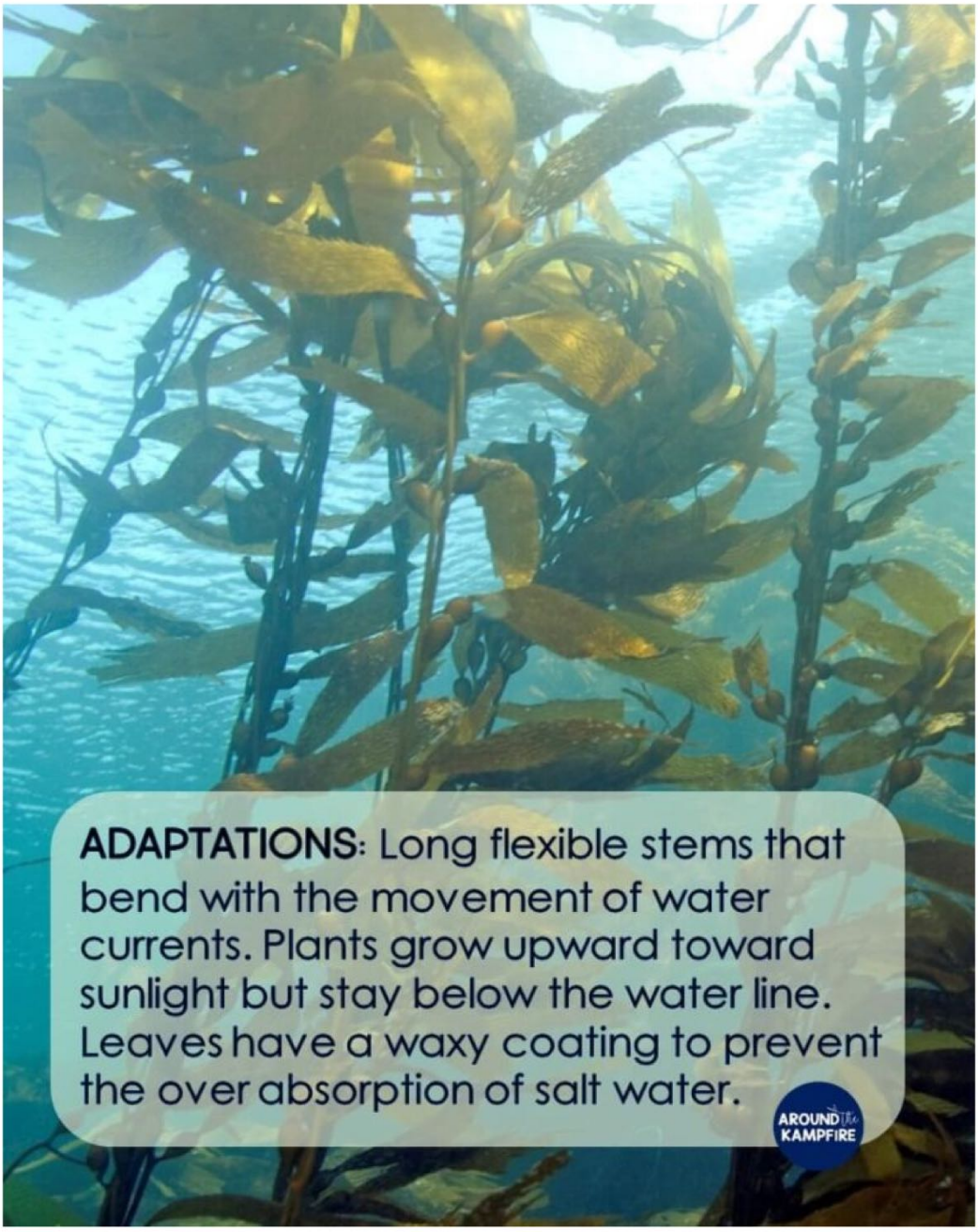


Water lilies

The Water lilies have floating leaves with waxy coatings. This prevents them from absorbing water and reflects heat from the sun away from their leaves.

lea veins

The lea veins are filled with air, which helps the leaves to float on water. Their roots are anchored in the soil below.



Reference: MAKING MODELS OF ADAPTATIONS

Build A Model

Water plant

1. ***Design***: Choose a plant and think of a design. Choose your materials.
2. ***Draw***: Draw and label your design
3. ***Explain:*** Explain your design and the adaptation you used

My Design for the Plant	Materials I Used
	_____ _____ _____ _____ _____ _____ _____

What adaptation does your model show?

_____

_____

_____

_____

NATURE WALK SCAVENGER HUNT

Objective:

The objective of these activities is for the girls to explore the local nature at Camp Kinneywood by hiking on the nature trail. They will explore what they have learned about plant growth and characteristics, as well as some exploration into the characteristics and growth of certain local animals and insects. The girls will also examine the adaptations of certain plants, animals, and insects that they come across.

Grades:

Grades K-6. Be more involved with the groups of grades K-2.

STE Standards:

1-LS1-1. Use evidence to explain that plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

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

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

4-ESS1-1. Use evidence from a given landscape that includes simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape over long periods of time.

4-ESS2-1. Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion.

Time:

30 to 60 minutes.

Context:

You are a **preservationist** examining the life of this land. You want to examine and learn about the certain characteristics and behavior of the **local plant-, insect-, and animal-life**. Your team of preservationists will trek into the woods and look for a few things to **collect**. Once we collect them, let us regroup and **examine our findings**, before we release them back into the wild.

Materials:

For a group of 20 girls:

1. 2 Assorted Box Sets
2. 6 Insect Collection Canisters
3. 2 Polaroid Cameras
4. 20 Pairs of Latex-Free Gloves
    a. For safety and cleanliness
5. 20 Magnifying Glasses

Instructions:

Preparations:

1. Prior to beginning the activity, the instructors must gather the materials, and split them in half
2. Split the girls up into 2 groups of 10
    a. One instructor per group
3. Each instructor grabs a digital camera
4. Have each group grab the following:
    a. 1 assorted box set
    b. 3 insect collection canisters
    c. 10 pairs of Latex-Free gloves
    d. 10 magnifying glasses

Activity:

1. Once all the materials are gathered, the two teams will go their separate ways
    a. Each team will enter at different ends of the nature trail
2. For thirty minutes, have the girls explore the trail with supervision looking for and collecting all that is **listed below**
    a. Make sure to stay close to the girls
    b. Make sure they do not go near any poison ivy or other poisonous creatures (i.e. spiders and snakes)
    c. Make sure they do not stray too far from the actual trail when collecting
    d. Have them group up into a minimum of pairs when going to collect the items
3. The instructors and/or girls can occasionally take pictures of the girls doing the activity and what they have collected
4. Once the thirty minutes is complete or all things listed below have been found, regroup and return to a location where the items can be analyzed

5. Spend approximately 15 or so minutes examining the items and discussing the reflection questions with the group
6. Once everything is complete, have the girls carefully release the insects back into the woods, place the rocks near the pond, and discard of the remaining items near the woods

Guiding Questions:

Ask These Questions During The Activity!

Encourage Them To Ask Questions As Well (The Answers May Be In The Reflection)

- How do you plan on most efficiently holding onto the materials?
    - Why?
- How do you plan to most efficiently gather all the items?
    - Why?
- What size insects are you looking for?
    - Why?
- Some of the items are hard to collect. How do you plan on taking record of those findings?

Reflection Questions:

- **If they collected bark….**How did you remove the piece of bark?
- Did any of you think of and successfully collect items that took care of two or more categories?
    - If so, what did you collect? What categories does it cover? How did you collect it?
- What were some colors of dirt that you found? Why do you think dirt can appear in different colors?
    - The color of dirt, or soil, depends on the minerals that are in the dirt, as well as the amount of water and organic material.
    - Examples:
        - White-ish soil appears due to a large amount of Calcium
        - Red soil appears due to a large amount of iron
        - Black or brown solid appear due to high amounts of hummus
- When looking at some of the insects you collected, what were some of the interesting characteristics or features of the bugs that you found?
    - Why do you think they have those features?
- Why do different leaves have different shapes?
    - Different shaped leaves have to do with a plant's ecosystem, and the conditions of that ecosystem, as well as its evolutionary nature
        - The plant must adapt to certain harshness in the environment so they can best collect the sunlight, water, and carbon dioxide they need to grow

- What causes a rock to have a certain color?
    - The color of rocks are determined by the minerals that make up the rock, and those minerals get their colors from the chemical elements they are made of **(similar to dirt and soil)**
    - Examples:
        - Red colored rocks are made up of a high amount of iron
        - Light-colored rocks are typically made up of light-colored minerals such as quartz
- What causes rocks to become smooth?
    - Rocks become smooth because of the weather. Rocks are typically jagged and sharp. But, due to water erosion and other elements, the sharp edges of rocks become dull, or smooth, and the shape of the rock itself changes.

Apply For The Future:

- In this activity, we used the different elements of teamwork and collaboration to effectively and efficiently collect all the items
    - Doing this by yourself would be a lot of hard work.
    - But, in teams, with a structured plan it becomes much easier to get things done
    - It is also important to come up with back-up plans and keep pushing on if certain things do not go your way
- In this activity, we explored the characteristics and properties of the nature around us
    - We focused on the how and why certain things do as they do
    - We focused on how life survives in their environment
    - We focused on how important each of these things are to our world
- It is important to learn and understand the beauty and fascinating parts of the nature around us, so we can protect and cherish it all

References:

https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/soil-color#:~:text=Soil%20color%20is%20influenced%20by,to%20appear%20black%20when%20wet.

https://www.dept.psu.edu/nkbiology/naturetrail/leaves.htm#:~:text=Why%20do%20tree%20leaves%20have,shape%20of%20a%20tree's%20leaves.

https://www.wonderopolis.org/wonder/how-do-rocks-get-their-colors#:~:text=The%20atomic%20bonds%20within%20a,absorb%20certain%20wavelengths%20of%20light.

https://www.scientificamerican.com/article/weathering-rocks/#:~:text=Weathering%2C%20or%20the%20wearing%2Daway,including%20some%20statues%20and%20buildings.

NATURE SCAVENGER HUNT

A PIECE OF BARK

3 DIFFERENT INSECTS

A COLOURFUL ROCK

3 DIFFERENT TYPES OF DIRT

SOMETHING FLUFFY

A SPIDER WEB

A FEATHER

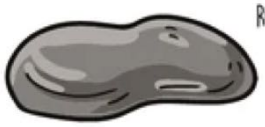
3 DIFFERENT LEAVES

SOMETHING EDIBLE

SOMETHING YELLOW

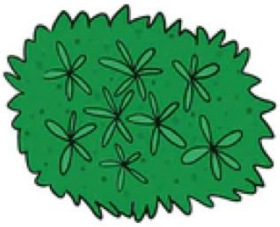
SOMETHING BLUE

A SEED POD

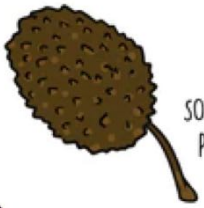


A SMOOTH ROCK

SOMETHING WET

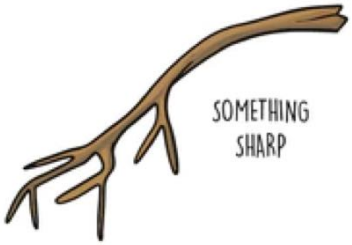


MOSS

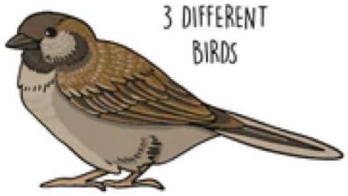


SOMETHING PRICKLY

3 DIFFERENT FLOWERS



SOMETHING SHARP



3 DIFFERENT BIRDS

CAN YOU FIND THEM ALL? SNAP AND SHARE YOUR ADVENTURES WITH US ON FACEBOOK OR INSTAGRAM!

#THERMOUTDOOR @THERMOUTDOOR

Engineers in Nature, Building a Bird Nest

Objective: Learn and understand that engineering is everywhere and that everyday animals use engineering to build.

Grades: K-6. The girls from grades 3-6 have less guidance to explore more options.

STE Standards:

PreK-ESS2-1(MA). Raise questions and engage in discussions about how different types of local environments (including water) provide homes for different kinds of living things.

3.3-5-ETS1-4(MA). Gather information using various informational resources on possible solutions to a design problem. Present different representations of a design solution.

Time: 45min - 1 hour

Context:

Different types of birds lay their eggs in different places. Some build tiny nests in bushes, some build enormous nests in tall trees. Some lay their eggs directly on the ground or on rocky ledges. Those that build nests use many different types of materials. In this project, you will try to build your own bird nest using only natural materials that you can find outside. Can you do better than a bird?

Materials:

For 20 girls:

- 20 Eggs or small rocks that you can pretend are eggs
- Assorted natural materials that you find outside such as twigs, grass, leaves, dirt, rocks, sand, etc. The materials you have available will depend on where you live.
- 20 Bucket or other container to collect materials

Instructions:

Preparations:

This activity can get messy. If possible, do your work outside. If you are working inside, build your nest on a tray to make cleanup easier.

Step-By-Step

1. First, all go outside to see if you can find any bird nests nearby. If you find one, observe it carefully from a distance—do not get too close and disturb the nesting birds! Can you tell what materials the nest is made of?
2. If you can't find any bird nests outside, search for pictures of birds nests online or use the pictures provided. How many different types of nests can you find? What are the nests made out of?
3. Now, get the kids to look around them for materials they can pick up easily, like twigs and rocks. Think about the purposes different materials could serve.
4. Using their bucket to gather a bunch of materials. Note that the bucket is a convenient time-saver for you, but birds don't have that luxury. They have to make many back-and-forth trips, often carrying one twig at a time!
5. Now, have each kid use their materials to try and build a nest that will be able to safely hold at least one egg. This is an open-ended process—there is no single "correct" procedure to follow.
6. Have each girl "Test" their nest (gently at first!).
    a. Questions: Can you blow on it (or aim a fan at it), pick it up, or place an egg inside it? Does the nest fall apart or stay together? If it falls apart, what can you change to make it sturdier?
    b. To make a nest sturdier they can use mud to hold it together and/or weave grass in between the sticks.

Reflection:

The kids might find that building a bird nest can be surprisingly difficult! If they just made a pile of dry materials like sticks or grass, their nest probably didn't stay together very well. It might fall apart if you blow on it or try to pick it up. They can make your nest much sturdier by weaving the materials together to form a basket, or using a binding material like mud as "glue" to hold the pieces together. Now the next time they see a bird nest, maybe they will be a little more impressed with these natural feats of engineering!

Applying to the future:

Everything around us is engineered to be the best thing it can be if that evolutions work or the animal's years of trial and error. In the future look around you and think about how it is connected because sometimes it's harder than you might think to build some stuff.

Resources:

https://www.sciencebuddies.org/stem-activities/build-bird-nest

https://images.creativemarket.com/0.1.0/ps/200020/1360/906/m1/fpnw/wm1/sa3fpdioqusj7rgahfiuq1pbtg5wqqoc9oa6qqt3ftqom7qrzbfdjgo5kctitpus-.jpg?1412548740&s=a92b5c69f0e36790435d9f85ed5b88cc

https://image.shutterstock.com/z/stock-photo-close-up-empty-birds-nest-in-the-tree-413238799.jpg

https://d2gg9evh47fn9z.cloudfront.net/800px_COLOURBOX15740453.jpg

https://www.researchgate.net/profile/Mostafa-Hassanalian/publication/337317898/figure/fig2/AS:826324952309760@1574022629413/Views-of-birds-nests.jpg

Build a Dam Like Nature's Engineers, the Beavers

Objective:

The objective of this activity is for the girls to create a model of a beaver dam. The girls will hypothesize about how dam structures are built, and how they can withstand the stream of water. The girls will learn some basic characteristics of the beaver and discuss ways to build a dam.

Grades:

Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment.

2-ESS2-1. Investigate and compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

3-LS4-4. Analyze and interpret given data about changes in habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce.

Time:

This activity should take about 50 minutes

Context:

You are an environmental conservationist stationed at Camp Kinneywood. The beaver The population is in danger from human and natural causes. Help the beavers by building them a dam that withstands any natural causes and tries to save them!

Key Vocabulary:

Ecosystem - All the plants and animals that live in a particular area together and their relationship with the nonliving environment.
Predators - are wild animals that hunt or prey on other animals for food.
Riparian - Habitats that are along river and stream banks and near wetlands.

Materials:

For a group of 20 girls:

- 6 Buckets or long container
- Tin foil
- Wood, sticks, and/or Wood Chips (maybe have some popsicle sticks and lumber scraps for backup)
- Sand, Rocks, modeling clay

Instructions:

Preparation

- For the girls to build up their dam, you're gonna need to build up a tin foil river. Start by digging up 6 very small narrow trenches near the lake. Make sure the trench is set up on a slight slope, and make it wide enough to build a dam. Next, carefully push the tin foil into the hole. If there is a hole, just add an extra layer of foil over the top. Test the river model by pouring some water into one end of the model and see if it flows. Finally, set up each station with a container for the girls to collect the material they need for the dam.
- For the younger kids make sure to have some wood, sticks, woodchip, rocks, and leaf litter set up to the side.

Building the dam like a beaver!

1. Start by breaking the girls into groups of 3-4. Tell the girls that they are going to try and create a mini-size version of a beaver dam.
2. Once they are in groups, have the girls choose a spot to build a beaver dam. Have them discuss a design with each other and their groups before they start building for 10 min. To start the discussion, ask them some of the guiding questions. (questions 1G-3G).
3. Once they have a design plan, let the girls walk around the camp trail for 15 min to find some wood, sticks, and/or wood chips. (In case, have some sticks, woodchips, and possibly popsicle sticks if some of the girls didn't find the material they need). Afterward, have them get some small rocks to construct their dam. To build the model, they can use mud as glue.
    a. If they don't want to use mud, they use clay instead for the construction.

    b. For the younger kids, they can pick from the material you gather beforehand.
4. At this point, they can start building their dam with the material they gathered. Have them work on the dam for 10-15.
    a. As they finish building their dam, have them test their dam by pouring water from a bucket down the river path. If their design fails, ask them some of the guiding questions (questions 4G-5G) to help them with making changes. Have students make changes to their dams and conduct a second test.
5. Finally, dedicate the last few min for reflection. Have each group present their model to the rest of the group, and ask them what they learned. You can ask them some of the reflection questions.
    a. Make sure to reassure the girls that it's okay if there are still unbuilt or failing dams. This is a chance to reflect on the engineering skills of beavers. Inform the girls that beaver dams are not completely perfect and may not be able to contain all of the water. Some water will flow downstream from the dam.

Guiding Questions

1G. Do you know what a beaver is?
- A beaver is a rodent. Other rodents include mice, rats, chipmunks, squirrels, pikas, and more. But unlike most other rodents, beavers are semi-aquatic, meaning they also live in water.

2G. What is a beaver dam?
- Beavers use things in their environment to build dams in streams and rivers. They use mud-like glue to hold everything together. When the water flows up to the dam it slows down and could even stop flowing. Beavers change their environment by flooding it. They do this to protect themselves from predators.

3G. What do you think is the best material for building your dam? What would a beaver use?

4G. How did your dam work?

5G. What adjustments to your design do you need to make?

Reflection

1R. Why do beavers build dams? Why are beaver dams important to the ecosystem?

2R. How is a beaver dam different from a human dam?
- Would a human dam have the same effect or impact on the ecosystem?

BEAVERS

These overgrown rodents are extraordinary engineers: Beavers alter their environment for protection and comfort like few other species in the entire world. The "busy beaver" is often synonymous with industriousness and is also the national animal of Canada. Let's hear it for beavers!

Kingdom	**Animalia**	Order	**Rodentia**
Phylum	**Chordata**	Family	**Castoridae**
Class	**Mammalia**	Genus	**Castor**

Transparent eyelids aid in underwater navigation

Beavers have poor eyesight, but strong senses of smell, touch and hearing & are particularly attuned to the sound of running water as an indicator of breaches in dams

A beaver's teeth grow continuously so they will not be worn down from regular wood-chewing

Beaver fur is naturally thick and oily, making it waterproof

Beaver tooth enamel contains so much fortifying iron, the teeth appear orange

Beavers never completely stop growing and adults can often weigh 55 pounds

Large, webbed feet and paddle-shaped tails assist in swimming

Beaver paddle-like tails can also signal danger when slapped on water surfaces

WHERE DO THE BEAVERS LIVE?

● NORTH AMERICAN BEAVERS ● EURASIAN BEAVERS

North American beavers live in Canada, large portions of the United States & Northern Mexico.

Eurasian beavers can be found in Czech Republic, Germany, Poland, Slovakia and parts of Scandinavia.

THE VEGETARIAN LIFESTYLE

Beavers are herbivores and enjoy leaves, twigs, bark and aquatic vegetation.

GO SPEED RACER, GO!

Beavers can swim at speeds of up to **five miles per hour** and can remain underwater for **15 minutes.**


picklebums.com


kitchenfloorcrafts.blogspot.com


kitchenfloorcrafts.blogspot.com

Reference: Think Like a Beaver, Beavers, Nature's Engineers, Build a Beaver Dam, Make A River!

Building a beehive

Objective:

The objective of this activity is for the girls to explore how beehive structure is made, and learn a few different things that bees make in their hives. They'll also learn about how bees use those products themselves, and how humans collect and use those products outside of the hive.

Grades:

Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

1-LS1-1. Use evidence to explain that different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air.

3-LS4-4. Analyze and interpret given data about changes in a habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce.

Time:

This activity should take about 30 minutes

Context:

You are an expert in entomology and wish to design a project that will benefit the native bees. We want to help the native bees do their hard work of pollinating our gardens by giving them a place to build their nests. If the new bee colony decides to live in the new beehive, they will be good neighbors.

Key Vocabulary:

Entomology - the study of insects

Pollination - the transfer of pollen from the anther to the stigma

Pollinator - an organism that transfers pollen to other organisms

Brood - immature honey bees: eggs, larva, pupa

Cell - the hexagonal compartment made of beeswax used to store honey, pollen, and nectar and to raise the brood

Colony - all the individual members of a beehive

Comb - a mass of cells, usually formed in two layers with the cells fusing at the bases

Drone - the male honey bee, usually hundreds per colony

Larva (plural, larvae) - the second stage of bee brood development; a white, legless, grub-like insect

Nectar - a sugary liquid secreted by plants to attract pollinators

Pollen - the fine, powder-like vessel housing a plant's male gamete

Queen bee - a female adult bee that is reproductive, usually one per colony

Ecosystem - All the plants and animals that live in a particular area together and their relationship with the nonliving environment.

Materials:

For a group of 20 girls:

- Construction paper or pre-made cardboard bee tubes (or a combination of both)
- Empty milk carton
- Zip ties – 12 inch
- duct tape
- masking tape or scotch tape
- scissors
- pencil (used to roll construction paper around to make tube)
- Markers
- stickers or decorations (optional)

Instructions:

1. Begin by introducing the topics and reading the context to the girls. Ask a few questions if they've ever seen a wild beehive. Where did you see it? Explain that they will be building their own beehive to take home with them.
2. To make the tubes, fold a piece of construction paper in half and roll it tightly around a pencil. Then, apply masking tape and remove the pencil. Allow the girls to use different colors of construction paper to make the tube for added flair.
3. After preparing the tubes, cut the ends of the milk carton and insert the tubes. Fold the carton tightly, pushing the tubes all the way to the back and securing it with duct tape. To make it a little more difficult, have the girls try to secure the tube in a hexagon shape (look at the image for example).

4. Next, let the girls decorate the outside of the carton by color it with markers, and add a few stickers.
5. As they decorate the beehive, ask the girls some of the reflection questions.

Reflection

1. Why Do Bees Build Hives?
    - Regardless of the type of hive that is built, they all serve the same purpose: They exist as the bees' home and to protect the queen bee and larvae. There are three common types of beehives, which are underground hives, exposed hives, and tree hives.
2. Why are bees so important in natural ecosystems?
    - Bees might seem like something to be avoided because they can sting, but they are an important part of our world. Without bees, we might not have flowers, fruits, vegetables, and other plants. Aside from pollinating plants and helping them to grow, bees create honey.
3. What is Pollination?
    - Pollination is the process that allows plants to reproduce. In some cases, the wind and rain blows pollen between plants, which causes pollen to transfer to the female reproductive part of the plant. However, most plants need bees and other insects to pollinate from one plant to the next.
4. What is a native bee? Aren't all bees native?
    - A native bee is a species that is indigenous (originating or occurring naturally) to an area. These are bee populations that have always lived in North America.
    - Honeybees are actually not native to North America. The European honey bee originated in Europe — or some say northern Africa — and was only brought to North America by settlers for honey production. The vast

majority of these bees are still domestic, although some have escaped and established wild colonies, called feral colonies.

5. Guess how many types of bees are there?
    - Of the approximately 4,000 native bee species in the United States, almost 300 species are native to Iowa.
6. Why are bees dying?
    - Honeybee and native populations have been dwindling in the past couple of decades due to a lack of native habitat, food sources, and other issues.
7. Why are the cells (Honeycombs) inside the beehive hexagonal in shape?
    - Using hexagons enables bees to make very efficient use of space whilst using as little wax as possible. As they can see in their beehive model, the circle tube has some holes that take up space.
    - They hold the maximum amount of honey, whilst ensuring no space is wasted, because the hexagons fit tight, and side by side together, in a compact fashion.

Reference: [DIY Bee House STEM Project for Kids], [The Honey Bee's Home], [MAKING A BEE HOUSE TO HELP YOUR GARDEN], [Bees Hatch Before Your Eyes],

Animal Senses

Objective: Learn how animals' senses work differently from ours.

Grades: K-6. The girls from grades 3-6 have less guidance to explore more options.

STE Standards:

1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

Time: 45min - 1 hour

Context:

Most animals have all of the same senses as our sight, hearing, touch, smell, and taste but some animals have stronger senses than others and some animals have completely new senses that we don't even have and had to develop technology to mimic them.

Materials:

For 20 girls:
Activity 1: Bats and Bugs

1. 40 8-ounce paper cups
2. 20 scissors
3. 20 pipe cleaners

Activity 2: Kaleidoscope

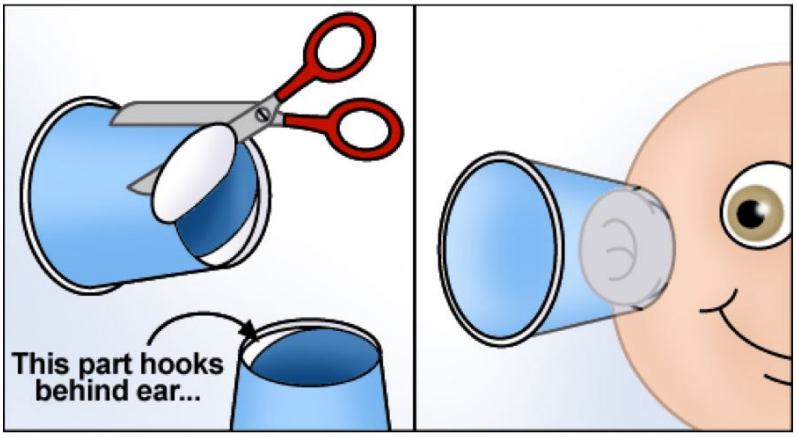
1. 20 empty toilet paper rolls
2. 10 Mylar sheets (thicker sheets, not rolls of thin paper) or mirrored sheets.
3. 20 scissors and or paper cutter.
4. 5 rolls of tape

Instructions:

Activity 1

Preparations:
Make sure it is in an open area and know the boundaries the kids can run in.

Step-By-Step

1. Before the activity ask the girls some questions to introduce the activity.
    a. Can anyone tell me what our senses are?
    b. Do all animals have the same senses as us?
        i. No. Examples: Turtles have a magnetic field sensor, sharks can detect electrical fields, white-crowned sparrows sense what nutrients are in their food, and more.
    c. How are some animal senses different from ours?
        i. Dogs have a much better sense of smell and hearing.
    d. Can anyone tell me how bats use their sense of hearing?
        i. They produce sound waves at frequencies above human hearing, called ultrasound. The sound waves emitted by bats bounce off objects in their environment. Then, the sounds return to the bats' ears, which are finely tuned to recognize their own unique calls.
    e. What do bats eat?
        i. Mostly insects and some specific bats eat fruit
2. Each kid has to build bat ears first.
    a. Cut the bottom out of the cup but leave a small piece to hook behind the ear, then cut an angled scoop off the front of the cup to make it look like ears.
    b. 

    c. Make a small hole at the base of the cup on the side so that the pipe cleaner can go in and over the head to attach to the cup on the other ear.
    d. With all the cups made, explain the activity to the kids.
3. The game is very similar to Marco polo but its bats and insects. Where the bats will say “Bat” as if they are sending out their echolocation and the insects will say a type of insect back to the bats to mimic the echolocation coming back to the bats.

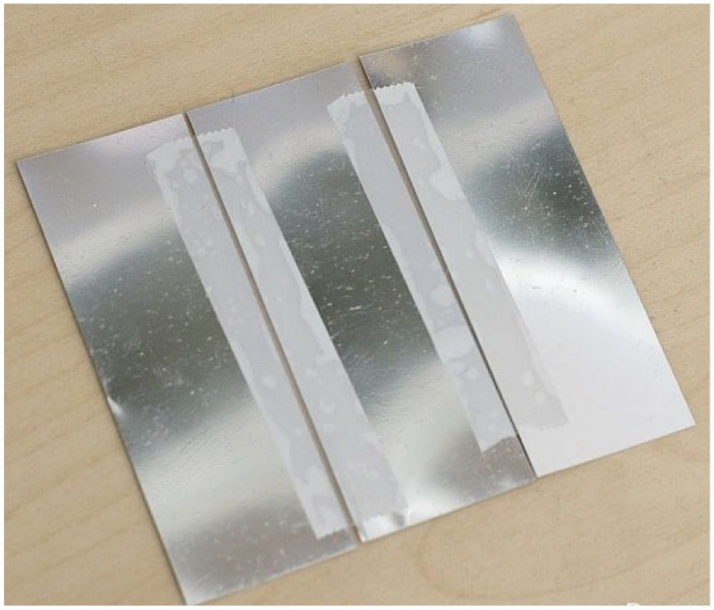
4. The bats will have a blindfold on and try to tag the insects. When the insect gets tagged the bat hands the blindfold to the insect and they switch roles.
5. Do this for 30 min.

Activity 2

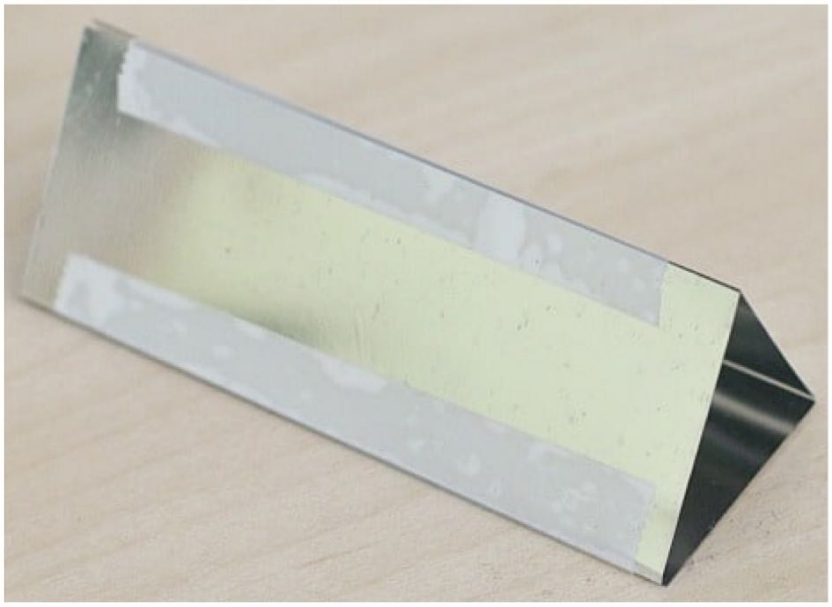
Preparations:
Have a place to do some arts and crafts area and a premade kaleidoscope.

Step-By-Step

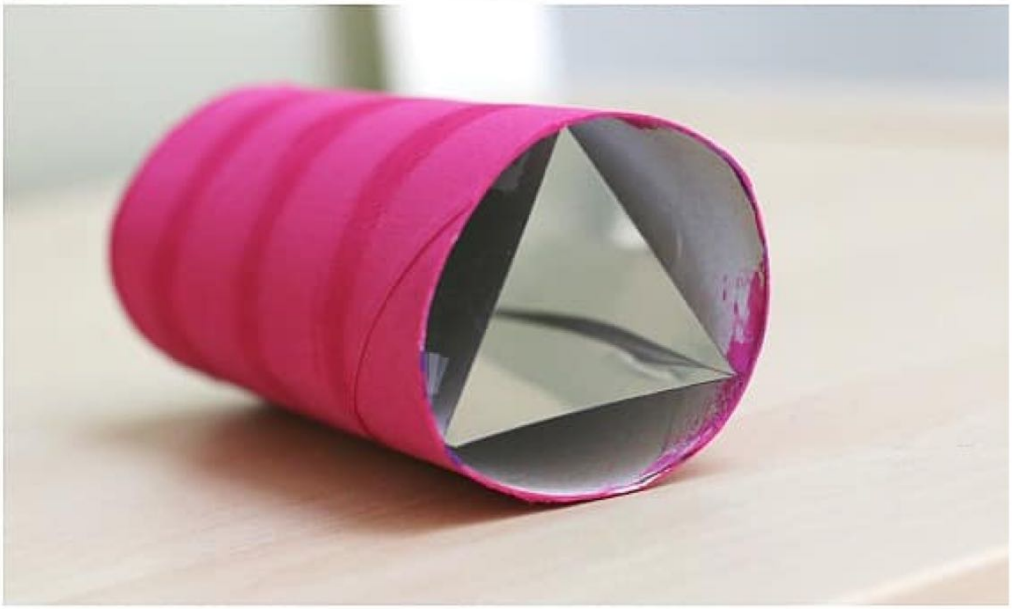
1. Before the activity ask the girls some questions to introduce the activity.
    a. The next sense we are going to talk about is our eyes. Can anyone tell me what group of animals have the most eyes?
        i. Insects with dragonflies having the most at 28,000.
2. Building the kaleidoscope to see like an insect.
3. Cut the mylar sheet into three equal strips so that the finished one fits snuggly in the cardboard and won't fall out. Practice with cardboard to get the dimensions to tell the girls what size to cut it.
4. Line up the mylar strips and leave a tiny space between each then tape them together.



5. Fold it into a triangular prison and tape the last corner.



6. Slide it into the toilet paper roll and it should be a snug fit.



7. With the kaleidoscopes, the kids can go around and look at different things through them.

Reflection:

1. What did you realize when you put the bat ears on? Why?
    a. Better directional hearing and loader, this is because the ears are larger and act as a funnel for the sound in front.
2. What can you tell me about our senses compared to animals?
    a. Animals have a lot better senses.
3. Why do you think they have evolved to have better senses but we haven't?
    a. Humans' brains evolved while animals' senses evolved, we don't need good senses, we are already at the top of the food chain.

Resources:

https://www.educationworld.com/a_lesson/showbiz_science/showbiz_science009.shtml

https://buggyandbuddy.com/science-for-kids-how-to-make-a-kaleidoscope/

THE NATURES OF PREDATORS & PREY

Objective:

The objective of these activities is for the girls to explore the local predator, the Eastern Coyote, of the Central Massachusetts and Worcester Area. They will explore the predatory natures of these animals, their characteristics, their nocturnal hunting, and the prey they consume: mice, voles, rabbits, woodchucks, deer, deer fawn, and skunks (specifically will focus on skunks). The girls will also explore the prey of those predators and how they walk and run, and any tactics they use to avoid those predators.

Grades:

Grades K-6.

STE Standards:

1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

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

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

Time:

This activity should take between 30 to 45 minutes

Context:

It's hunting season. The Eastern Coyotes are prowling the woods, **at night**, looking for prey. The woods are littered with mice, rabbits, woodchucks, voles, skunks, and deer.**The coyotes need to eat all of the animals** in this side of the woods to make sure their pack do not go hungry. **The prey have to stay alive.** The prey can use their evasion tactics to steer off the coyotes and **survive until dawn**. **It is time to SURVIVE!….Let's see who is the fittest.**

Materials:

For a group of 20 girls:

1. Cones
    a. At least 6 cones to set up boundaries
2. 4 Spray Bottles
    a. Filled with water
    b. Must be able to hold with one hand
3. 2 Timer
    a. 1 timer per instructor
4. 1 Whistle
    a. 1 whistle for one instructor to start and end each round of the activity

Instructions:

Preparations:

1. Prior to beginning the activity, the instructors must section off the field of play:
    a. Have the cones set up as the perimeter of the "woods"
    b. Must use a majority of the field as the "woods"
2. Fill each of the spray bottles with cool water

Role Assignment:

1. Have the girls form one large circle
    a. Have them close their eyes and **KEEP THEM CLOSED**
2. Conduct **2 rounds** of role selection
    a. Round 1 (Coyotes):
        i. Have an instructor walk around the circle and tap **five** girls to be the coyotes
            1. For groups of 20, there will be 5 coyotes
        ii. Once the instructor has picked those coyotes, have those who were tapped open their eyes and see their fellow coyotes
    b. Round 2 (Skunks):
        i. Have everyone close their eyes again
        ii. Have an instructor collect the spray bottles and walked around the circle
            1. Tap **4** girls who were not tapped before to be the skunks
            2. After tapping a girl, place a bottle behind them
            3. For groups of 20, there will be 4 coyotes
        iii. Once the instructor has picked the skunks, have those who were tapped open their eyes and see their fellow coyotes
            1. Also have them grab and try to hide the spray bottles

Game Play:

1. Once everyone is assigned, have them enter the "woods" (or inside the cones)

2. No one is allowed to go outside of the cones, or else **they die**
    a. Unless it is an emergency
    b. **If they die**, they will stay outside of the cones and become fungi
        i. The **fungi** must stand still but can move their arms and tag other animals, who will then stay in place and become fungi
3. Set the timer for **8 minutes** and blow the whistle to **begin play**
4. To eat, the **coyotes must tag the prey**
    a. Once the prey is tagged they become still and turn into **fungi**
        i. The **fungi** can eat any animal by **tagging** them
5. To prevent getting tagged, **skunks** can spray the coyotes in the face
    a. If sprayed, coyotes must stand still and close their eyes and count up to 15
    b. They cannot move or do anything when sprayed
    c. Once done counting, they can open their eyes and resume play
6. Once the **eight minutes** are done, whoever has the most remaining players (coyotes or prey) **wins**
7. Once the game is over, have everyone come back into a circle and reassign roles
    a. This will be done a **total of 3 times**

Guiding Questions:

Ask These Questions During The Activity!

- **If dead….**You are still in play, even after death. How do you plan on helping your team (coyotes or prey)?
    - Why?
- **As a coyote**, how do you plan on "hunting" without everyone finding you out?
    - Why?
- **As a skunk**, how do you plan on identifying who is a coyote?
    - Why?

Reflection Questions:

- From the activity, what did you notice about the activeness of the coyotes?
    - Coyotes are nocturnal, meaning they are awake and active during the night and typically asleep during the day. Which is why we had the activity take place during the "night".
- Do you guys think coyotes eat humans? Why?
    - No they do not eat humans. From the objectives, we mentioned that they only eat medium sized animals, and occasionally adult deer. In the activity, all the prey were either skunks or small/medium sized creatures. Coyotes are, actually, shy towards humans and try to avoid them and cars. In fact, there have only been 4-5 humans bitten by coyotes in Massachussettes' history, of which 2-3 were rabid.
- Were the skunks successful in getting away from the coyotes, during our activity? What do they do to avoid predators?

    - When skunks are threatened, they stamp their front feet, lift their tail, lift their tail, and growl before potentially spraying their assailant. Here's an interesting fact: sometimes, skunks will do a handstand before spraying the threat. If the threat is still present after being sprayed, skunks will spray at the eyes of the threat, immobilizing them, and allowing for the skunks to get away.
- During the activity, what strategies did you use to succeed?
- What does survival of the fittest mean?
    - It means who "fits" their environment the best, this includes strategies like you may have implemented! It doesn't mean who is the strongest or best, just that you got to eat and not get eaten yourself! Many things can fit too! More than one strategy may work!

Apply For The Future:

- It is important to come up with strategies, and back plans, for every day activities
    - Planning and adapting are essential for success
    - In this activity, the coyotes, skunks, and prey groups had to come up with strategies and back up plans to win the game for yourself and your team
- It is important recognize your weaknesses and strengths and try your best to use your strengths to succeed
    - In this activity, everyone had to use their speed, agility, and wits to survive to eat in order to win the game
    - These things are essential in our daily-lives whether it's in sports, school, or other activities
        - Keeping in mind your weaknesses to improve upon and using and improving your strengths are essential to become the best you, you can be

References:

http://www.carnivoreconservationact.com/fact-checklists-for-wild-carnivores/living-with-carnivores/

https://kids.nationalgeographic.com/animals/mammals/facts/skunk#:~:text=If%20threatened%2C%20skunks%20stamp%20their,allowing%20the%20skunk%20to%20escape.

Senses Activity

Objective:

To explore how their senses work and to realize that our senses are able to do different things and some change what our other senses are.

Grades: Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

Time: 45 Min-1 Hour

Context:

You are training to be a physical therapist and to help people you'll need to understand the human body

Materials:

Per 20 kids

Sound

- 20 Film or pill bottle type of canisters
- Different things to fill up the containers, 2 of each thing per container
    - Examples:
    - Acorns
    - Sticks
    - Small Pebbles
    - Large Pebbles
    - Pine needles
    - Buttons
    - Pennies
    - Paperclips
    - Wood Chips
    - Bottle caps
    - Cork
    - Beads
    - Sea glass
    - Paper

- Dried pasta
- Dried beans

Heart rate

- 10 Stopwatch

Taste/Smell

- 200 skittles, 40 of each color
- 20 Cupcake paper cups
- 1 Hand sanitizer bottle

Instructions:

Sound

Preparations

1. In 2 containers put 2 of the same thing. 2 of the same thing will cause a sound when the container is shaken. Prepare enough so that each kid has their own container. This is to randomly assign the kids into groups of 2 for the next activity.

Step-by-step

1. Introduce the topic to the girls by asking them some questions.
    a. Does anyone know about our senses?
        i. What are they?
    b. Do you think you will be able to identify things just from the noise they make?
2. Give each kid a random canister or have a table with all of them and have each kid take one.
3. Get the kids to shake the canisters and try to find someone with the same sound as theirs and then guess what is inside.
4. They open their container and see if their guess was correct and if both of them have the same thing in their container.
5. If they have different things in their container, have them go and find the person with the same thing, to keep it fair. These teams will be for the next activity

Heart Rate

Preparations

1. Make sure that you have enough stopwatches so that there are enough for half the number of kids

Introduction questions

1.

Step-by-step

1. Introduce the topic to the girls by asking them some questions.
    a. What are we able to do with our sense of touch?
    b. What would we not be able to do?
    c. What senses can we use to measure our heart rate?
        i. Sound using a stethoscope and touch using our fingers.
    d. Where can we feel our heart rate?
        i. See images below.
2. Show the kids where they can feel their heart rate, on their wrist and their neck but their neck is easier. Explain to them that it is where their veins are close to the surface and the vein in your neck is larger so it's easier to feel the pulse. The diagram below shows locations.
    a. Walk around and see if the kids need help finding their pulse.
3. Explain to the kids that to work out their heart rate they need to find their heart rate in beats per minute so they will count the number of beats they feel in 10 seconds and then multiply by 6.
4. Have one kid in the group keep track of the time and the other count the number of pulses they feel in 10 seconds and record it on paper. Have each kid find their own heart rate.
5. Multiply the number of pulses they have in 10 seconds by 6 to get beats per minute for their resting heart rate.
6. Have the kids run around for a few minutes to get their heart rate up.
7. Repeat steps 3 and 4 again to find their active heart rate but don't tell them their heart rate will increase.
8. Walk around and ask the kids that finished what the difference in their heart rate was from before and after. Also, why did it change? Having the kids come up with their own conclusion would be the best.

Taste/Smell

Preparations

1. In the cupcake, paper cups put one of each skittle in it so you don't have to do this during the activity. Prepare this for double the number of kids.

Introduction questions

1. e?

Step-by-step

1. Introduce the topic to the girls by asking them some questions.
    a. How good is everyone's taste?
    b. What affects what we taste?
        i. Other things we taste and things we smell.
    c. Have any of you smelt something bad while eating and it affects what you taste?
2. Have each camper use hand sanitizer before beginning
3. Give each kid 1 of each flavor of skittle and tell them not to eat them yet until they finish explaining the instructions.
4. In their duo groups, one kid closes their eyes and the other kid gives them a random color skittle for them to guess what flavor it is and record if they got the guess correct or wrong.
5. Repeat step 2 with all the skittles so the kids have a number for how many skittles they got the flavor correct. Then repeat so that each kid has the chance to guess the skittle taste.
6. Repeat steps 1 to 3 but now the kids will pinch their nose and close their eyes while they eat the skittle. The emphasis is that they have to cover their nose the entire time they are eating.
7. The kids should notice it is harder to tell the skittles apart than before and ask them why that might happen.
8. The kids should come to the conclusion that a lot of their taste comes from the smell.

Reflection Questions:

Sound

1. What material do you think is in your container from the sound? Why?

Based on the material, what could it be?

Heart Rate

1. Why do you think you can feel your pulse?
    a. Probe: What do you think you are feeling with the pulse?
    b. Answer: blood being pumped by the heart
2. What was the difference in your heart rate before and after you exercised? Why?
    a. Answer: It increased because blood carries oxygen to your muscles and when exercising your muscles need more oxygen so your heart beats faster.

Taste/Smell

1. Was there any difference when you held your nose?
2. Why do you think you got less correct the second time you did it? What changed?
    a. Answer: They covered their nose
3. What does this show you?
    a. Answer: Actually, all Skittles are the same flavor, which is a generic “fruit” taste. We think it has different tests because our brains associate their colors with certain tastes, and their scent is different. So when you bite that yellow Skittle, your brain sees the color, smells the smell, and you believe you’re eating a lemon flavor.

Applied in the future

Being able to know how to find someone's heart rate is very useful in emergency situations. People's heart rate shows how well that person is feeling and a weak or no heart rate is bad.
Heart Beat Locations Diagrams:

Bottle Rockets

Objective: For the kids to enjoy science and go through the engineering and design process.

Grades: K-6. The girls from grades 3-6 will be provided with a larger variety of materials and complex materials.

STE Standards:

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tool.

1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.

Time: 1 hour

Context:

You are a rocket scientist and want to help humankind by exploring alternative planets to live on because we are losing our own. Your mission is to design and build a rocket that will be sent into the sky.

Materials:

For 20 girls:

1. 10 paper
2. 10 cardboard
3. 10 construction Paper
4. 10 scissors
5. Tape and Duct tape
6. Other craft materials
7. 10 empty 2-liter coke bottles
8. 2 Bottle launcher, Aqua Pod
1. 2 Bike Pump

Instructions:

Preparations:

1. Make a bottle rocket.
2. Set up the bottle rocket launcher away from the craft tables.

Safety Instructions

1. Do not pick up the bottle rocket launcher at any time.
2. Always stand behind the line when letting a bottle go into the air.

Step-By-Step

1. Before the activity ask the girls some questions to introduce the activity.
    a. Have any of you wanted to go to space?
    b. What could we use to go to space?
        i. Once they say rocket, introduce the context.
2. Sit all the girls down and show them a demonstration of how the bottle flies without anything on it then show them using your premade bottle to show them the difference. This will also excite them into the activity. Then give a brief safety talk about the bottle rockets.
3. Split the group of girls into teams of 2-3 and give each team an empty 2-liter bottle, paper, and drawing materials.
4. Have the kids draw what they would like their rocket to look like before they are given their materials to build, and go around talking to them and asking them some guiding questions.
5. Once the group decides on what they would like their bottle to look like they are able to come and collect the materials they want.
6. The kids should be able to test their bottle whenever they want to see how the changes affect how the bottle rocket flies.
7. Follow launching instructions to know how to launch it safely.

Launching Instructions

1. Fill the bottle half full with water and turn the Aqua Pod over and place it on the bottle. Then set it on the ground.
2. Make sure the latch is on the bottle before starting to pump.
3. Pump the bottle until you hear the release valve go off. This signifies that it is ready.
4. Make sure everyone is behind the line, line distance is the length of the rope to set off the bottle which is 15 feet long.

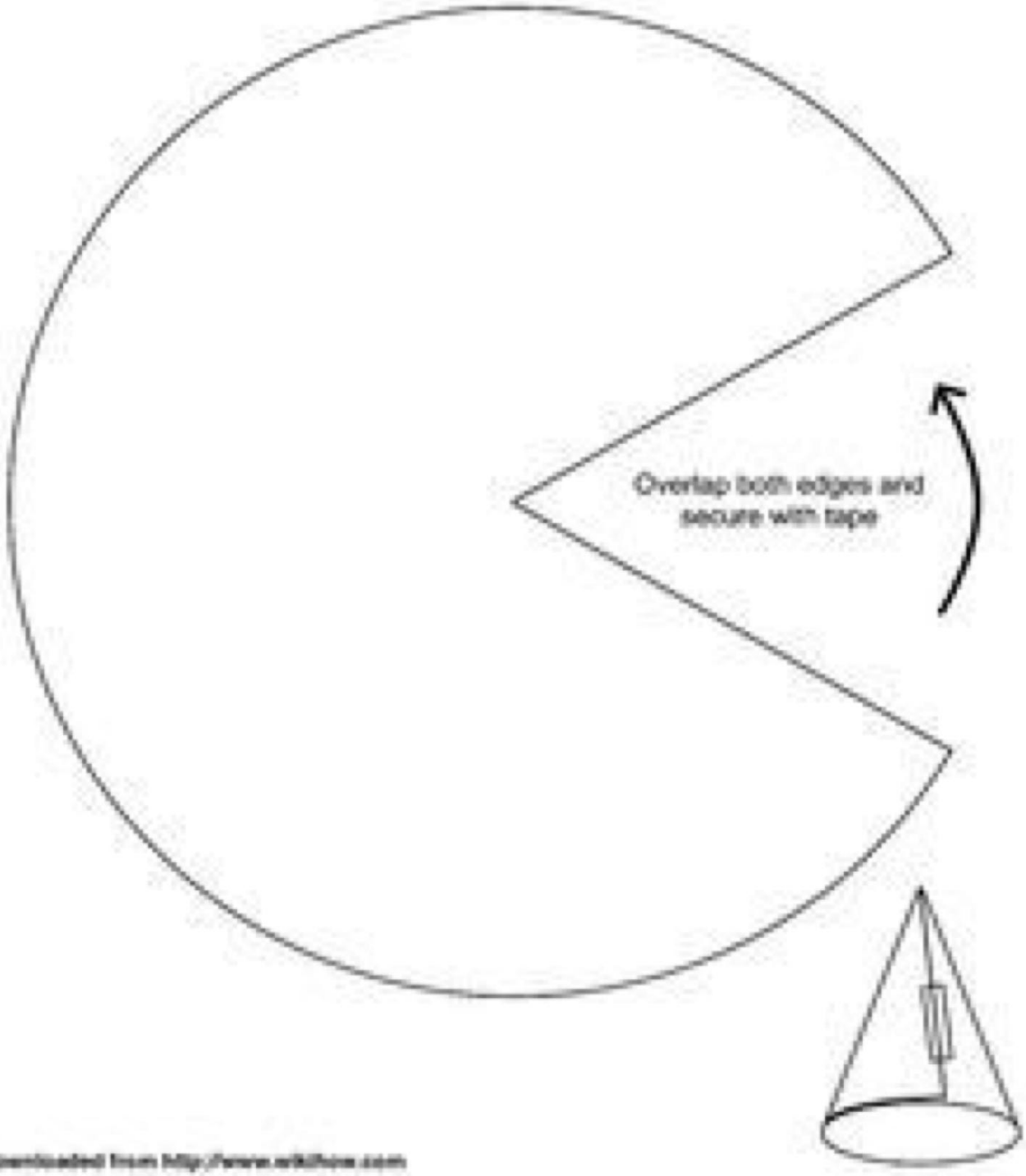
5. Let the kids pull the string to release the bottle and watch it fly.

Guiding questions:

- Why did you decide to put a cone on the top of the bottle?
    - It minimizes the pushback force of the air while the bottle is moving, also known as aerodynamic.
- Why did you decide to put fins on the side of the bottle?
    - To help stabilize the rocket while it moves through the air so that other factors such as wind don't affect it as much.

Reflection Questions:

- Which bottle went the highest?
    - Why do you think that?
- What did you change on your bottle as you kept testing?
- What could they do in the future to improve your rocket design? Why?
    - Add a parachute, and straighten the cone and fins.



Engineering Design Challenge: Zipline Challenge

Objective:

The objective of this activity is for the girls to explore the engineering design process by building a harness device that can carry a toy animal across a zipline in the shortest possible time. After completing this activity, the girls should be able to use force, friction, motion, and gravity to explain a zip line.

Grades:

Grades K-6. Be more hands-on with the groups of grades K-2.

Time:

This activity should take about an hour

STE Standards:

K-PS2-1. Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tool.

3.3-5-ETS1-1. Define a simple design problem that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost that a potential solution must meet.

2-PS1-2. Test different materials and analyze the data obtained to determine which materials have the properties that are best suited for an intended purpose.*

3-PS2-1. Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object

4.3-5-ETS1-3. Plan and carry out tests of one or more design features of a given model or prototype in which variables are controlled and failure points are considered to identify which features need to be improved. Apply the results of tests to redesign a model or prototype

Context:

Animal Rescuers are looking for a solution to transport some animals out of a mountain in less than 6 seconds because of the winds. They are running out of time, and they need your help to design a harness device that will safely bring down the animals.

Key Vocabulary

Force – a push or pull
Friction – a force that goes against the motion
Motion – when an object is moving
Gravity – a force that exists between any two objects that have mass

Materials:

For a group of 20 girls:

- Plastic straws or skewers
- Binder clips
- Paper clips
- Tape (invisible tape if possible)
- Pipe cleaner
- Small paper cups
- Water bottle
- Cardboard (from a cereal box or back of a notepad)
- Scissors
- Cotton rolls
- Papers
- clothespin
- Rubber Bands
- Single-hole punch
- smooth line (4 ft. [1.2 m]) (fishing line or unwaxed dental floss)
- weights (10 pennies or 5 flat steel washers [1-in. (2.5 cm)])

Instructions:

Preparation

- Make sure to set up a location where there is paper and a pencil ready for the girls to write down ideas and sketches.
- Before beginning the activity, set up the zip line station. For a class of 20, you might want to include two to four stations for students to test their designs. Run a 4-foot (1.2 m) length of fishing line between two objects, such as the back of a chair and a stack of books on the floor. Be sure the zip line is about 2 feet (0.6 m) higher at one end than the other. Make sure a zip line is set up on a cable that starts at a higher point and ends at a slightly lower point. We want the zipline to be on an angle, but not a sharp angle to make the activity a bit challenging.

Step by step

1. Start by introducing the topics of this activity and reading out the context to the girls.
    a. Explain why people use zip lines?
        - To move between steep points, to carry supplies across dangerous areas, for fun
    b. How does the zip line work?
        - Zip lines need to be at a slope. Gravity will pull a person's mass down and accelerate until the opposing force of friction slows them down. At the end of the zip line, the line will point slightly uphill to help slow them down.
        - Zip lines can be used to access remote outdoor areas such as jungles and rainforest canopies. Some playgrounds and camps have smaller zip lines to travel down for recreation.
        - Historically zip lines have been used to transport food, mail, and goods. They have also been used to travel across rivers or travel down mountains to access more populated towns and cities.
2. Explain to the girls that they are going to create a smaller version of a zipline harness/holder. They will be challenged to use the provided materials to build a device that can carry a toy animal down 1.5 meters of zipline in six seconds.
3. Review the materials that students will have available and ask the girls to brainstorm possible solutions to this problem in groups of 2-3. They can sketch down some ideas if they want.
    a. If you see the girls struggling you can ask them some of the guiding questions. You could also show them some of the design examples below.
4. Once the groups have constructed their designs, they can start building and testing them using one of the zip line stations.
5. Remind students that the challenge asks them to carry a toy from one end to the other in less than six seconds. They will need to record times, and make observations. This includes things like if the toy drops or if a part of their design prevents the carrier from moving down the line.

6. Remind the girls that inventors' and engineers' first ideas rarely solve a problem. They brainstorm ideas, try different ideas, learn from mistakes, and try again—this is part of the design process.
7. Dedicate the last 10 minutes to asking the girls some of the reflection questions.

Guiding Questions

1G. How will you keep the toy animal inside the carrier as it speeds down the zip line?
- They will need to consider adding some type of cover or using cotton as a cushion.

2G. How will you help the carrier stay balanced on the line?
- You can use weights to balance your carrier. The weights will pull the carrier down and keep it firmly on the line. They can also adjust how hard the carrier will press on the zipline by designing it to hook on the zipline at two or more points.

3G. What materials will you use to make the toy carrier?
- They can use the plastic cubs or they can cut the water bottle in half.

4G. How will you attach your carrier to the zip line so it's easy to put on and take off?
- They can use the binder clips, Paper clips, or Pipe cleaner to attach to the zipline. They can even cut the straw through the hole, and attach it to the zipline with tapes.

5G. What will you use to weigh your carrier down?
- If there is too little weight holding the carrier down, it can be hard to keep the carrier balanced once the ball is inside. Try adding the weight a little at a time.

6G. What materials will you use to be in contact with the zip line so the carrier slides quickly?
- If they need to reduce the friction to allow the carrier to travel smoothly, let them try making the part of the carrier touching the line as slippery as possible by using a smooth, hard material like plastic.

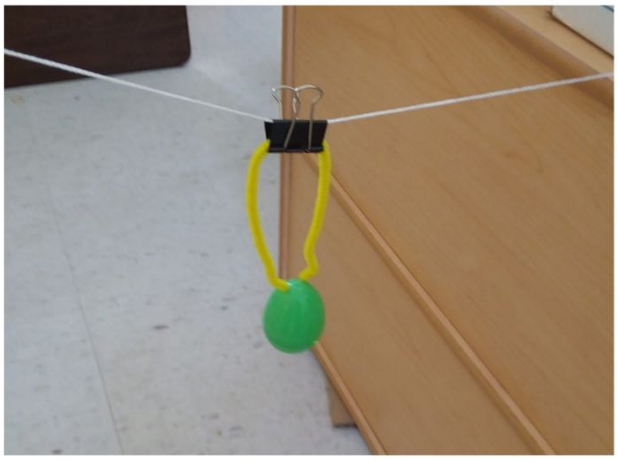
8G. How will you make the carrier travel quickly down the zip line?
- When two things rub together, it causes friction, which is the force that resists motion. You will need to find ways to reduce the friction so your toy carrier can speed up.

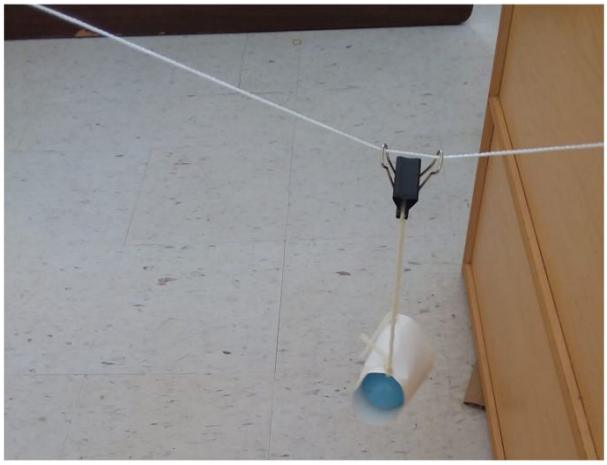
Reflection

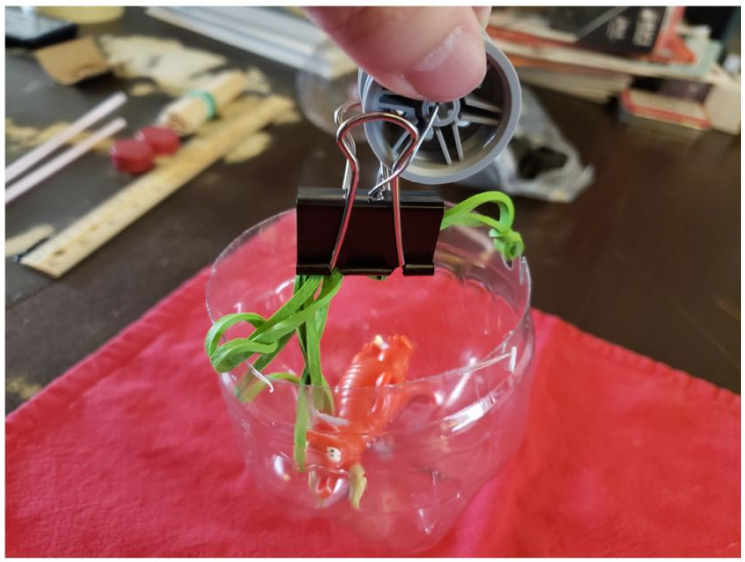
1R. How well did you design and solve the problem?
- Share with students that there were multiple solutions to their problem and that not all designs met the requirements of the challenge. Engineers are constantly redesigning and testing to find the best solution to a problem.

2R. Ask the girls to consider how they would redesign their solution. Could fewer materials be used to cut costs?

3R. Ask the girls what they have learned? What did they enjoy most about this activity?







Reference: Zipline , STEM Zip Line Challenge, TRANSPORT AN EGG DOWN THE ZIP WIRE, ZIP TO IT!

CREATING A WIND-PROPELLED CAR

Objective:

The objective of this activity is for the girls to explore the engineering design process and use this project-based activity as a way of implementing this process. The girls will explore the basics of certain physics concepts: such as mass, forces, friction, and energy. They will explore the processes of building and reiterating designs for the best possible outcome, by which their vehicle will be propelled forward by a fan. The goal is to see which group can create a car that travels the farthest distance.

Grades:

Grades K-6. Be more hands on with the groups of grades K-2.

STE Standards:

K-PS2-1. Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tools.

1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.

3-PS2-1. Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object

3.3-5-ETS1-4(MA). Gather information using various informational resources on possible solutions to a design problem. Present different representations of a design solution.

4.3-5-ETS1-3. Plan and carry out tests of one or more design features of a given model or prototype in which variables are controlled and failure points are considered to identify which features need to be improved. Apply the results of tests to redesign a model or prototype.

Time:

This activity will take approximately 60 minutes.

Context:

Welcome….to Girls Inc.'s first ever Race Wars! You and your partner will design and create a car that you will race against the other teams. Your team must create a car in the allotted time that must meet a **weight & size requirement** and must go **at least 3 feet**, to qualify for the tournament. Once you qualify, you continue to improve your car and compete for the **trophy**. **May the best team win!**

Materials:

For a group of 20 girls:

1. Minimum of 5 Cardboard Boxes
2. Minimum of 3 packages of assorted Construction Paper
3. Minimum of 20 popsicle sticks
    a. Different sizes
4. Minimum of 20 Plastic Straws & wooden sticks
    a. Different sizes
5. Minimum of 40 Plastic Bottle Caps
    a. Different sizes
6. 3 rolls of Masking Tape
7. 20 Scissors
    a. One pair per person
8. Markers
9. Colored pencils
10. Large Electric Floor Fan
    a. Approximately 9 inches
11. 2 Gram Scales
12. 2 Boxes of the same size
    a. These boxes will be used as the size requirement boxes
13. 2 10-ft tape measure ropes
14. Long wooden sticks
    a. For measuring traveled distance
15. Assortment of candy
    a. Small candies
    b. At least 20 King Size bars
16. Timer

Instructions:

Preparations:

1. Prior to beginning the activity, set up the materials on a table
    a. Must be the exact order as listed in the **materials list**

i. Cardboard Boxes
ii. Construction Paper
iii. Popsicle Sticks
iv. Wooden sticks
v. Plastic Straws
vi. Plastic Bottle Caps
vii. Masking Tape
viii. Scissors
ix. Markers
x. Colored Pencils

2. Layout examples of complete car designs on a separate table
3. Play the scales and size-requirement box
4. Layout the fan and tape measure along an even-ground area

The Engineering Design Process:

1. When the girls arrive for the activity, briefly explain what the engineering design process:
    a. The engineering design process is a process that engineers use to create products
    b. In this process they brainstorm ideas, select the best ideas, and they use those ideas to create blueprints and prototypes that they test and rebuild, until it meets their goals/requirements
    c. The engineering design process consists of:
        i. Asking Questions
            1. What do we need to accomplish?
            2. What materials do we have?
            3. What requirements should we meet?
        ii. Research
            1. Look at the completed designs and use those designs as inspiration
        iii. Imagine
            1. Using that "research" and your knowledge of the needs, start brainstorming ideas in your head
        iv. Plan
            1. Start writing down those brainstorms
            2. Use process of elimination to narrow down on select choices
        v. Create
            1. Create your first prototype out of the plan and design you came up with
        vi. Test

1. Once you come with said prototype, begin testing and taking notes of those results

vii. Improve

1. From those test results, see what went good and what went bad and use that to improve your design

d. Repeat those steps until you are satisfied with your design and it meets your goals

e. Give them the paper with the Engineering design process, where each team jot down ideas

i. One paper per group (approximately 10 papers), once the groups are assembled

Qualification Round, Game Play:

1. Have the girls pair off into teams of 2
2. Have three teams come up at a time to grab all the materials that they want
    a. They cannot start until everyone has gotten their materials
3. Set a timer for **15 minutes** of build time
    a. By the end of this time, each team must have a completed design for their qualification race, and they must meet the following requirements:
        i. Must be below 120 grams
        ii. Must fit inside the size box
            1. Can be any height
    b. During this time, you will have unlimited opportunities to reiterate, test, and customize your design
        i. Feel free to ask the instructors their thoughts
4. Once the time is done, there will be a Qualifying Round
    a. Each race will be **10 seconds**
        i. In that time, the cars will be placed in front of the fan and the fan will be turned on at the maximum speed for 10 seconds before being turned off
        ii. Once the fan stops blowing, the distance traveled will be measured by aligning the metal stick at the back of the car and the tape measure
        iii. The number it lies on will be recorded, and **if the team's car goes past 3 feet: they get into the playoffs**
    b. If a team does not make it, they can assist teams that did make it by **offering their car up as materials**

Playoff, Game Play:

1. **In the first round…**
    a. Those who qualify will get **10 minutes** to go back to their cars to test and make any changes to their design
    b. In this round, the car must be able to travel a minimum of **4 feet** in **10 seconds** time

c. At the end of the race, those who meet that distance will move onto the second round
d. The **original** teams who made it into the **First round**, but not the **Second round** will be awarded a consolation prize: **a King Size candy bar**

2. **In the second round…**
    a. Those who qualify will get **10 minutes** to go back to their cars to test and make any changes to their design
    b. In this round, the car must be able to travel a minimum of **6 feet** in **15 seconds** time
    c. At the end of the race, those who meet that distance will move onto the final round
    d. If a team does not make it, they can assist teams that did make it by **offering their car up as materials**
    e. The **original** teams who made it into the **Second round**, but not the **Final mround** will be awarded a consolation prize: **1 King Size candy bar** and **2 small candies**
3. **In the Final round…**
    a. Those who qualify will get **15 minutes** to go back to their cars to test and make any changes to their design
    b. In this round, the car must be able to travel a minimum of **10 feet** in **20 seconds** time
    c. At the end of the race, those who meet that distance will will get a **"trophy"** at the end of the activity
    d. The **original** teams who made it into the **Second round**, but not the **Third round** will be awarded a consolation prize: **2 King Size candy bars**
4. **The trophy…**
    a. Those who won will receive a **victory patch**
    b. They will also receive a goody-bag that has a **2 Kings Size candy bars** and a small assortment of **small candies**

Guiding Questions:

Ask These Questions During The Activity!

- What size sail are you planning on making?
    - Why?
- Do you plan on using multiple sails?
    - Why?
- Are you going to use different size wheels?
    - Why?
    - How many?
- When making the axles from the straws, where do you plan on making the cuts?

    - Why?
- What shape do you plan on making the base of the car? What about the shape of the sail(s)?
    - Why?
- Are you worried about the size? How heavy do you want the car to be? How tall?
    - Why?
- How many design iterations, or redesigns, do you plan on making?
    - Why?

Reflection Questions:

The Science Behind It:

- What is energy?....Can anyone tell me where we saw energy in this activity?
    - *What is energy?* Energy is the ability to make something happen.
- Can anyone give examples of energy? What types of energy did we use here?
- One specific type of energy that we saw in today's activity is **Kinetic Energy**. Can anyone tell me what kinetic energy is?
    - Kinetic Energy is the energy of moving objects.
- Another specific type of energy we saw in today's activity is **Wind Energy**. Can anyone tell me what wind energy is?
    - Wind Energy is the energy in moving air. Wind energy is basically kinetic energy of the air.
- In this activity, where do we see kinetic energy? Where do we see wind energy?
    - When the car is moving, the sail has kinetic energy
    - We see the "wind energy" from the fan.
- Which "energy" comes first?...How does wind energy convert into kinetic energy?
    - The energy is converted by a process of **energy transfer**. This process is defined as the process by which from one form to another (wind to kinetic) or from object to object.

Activity Questions:

- What happens if you make the sail a different size or change its shape?
    - A bigger sail will catch more moving air, which exerts a bigger push (force) on the car.
- How many people ended up using more than one set of wheels? Did anyone use one set?
    - Was it effective?
- What weight did you guys end up with in your cars? Did any of you guys try getting heavier? Lighter? Did it help you succeed?
- What methods did you use to succeed? How did you change your car?
- How different was your final design from the drawn out prototype?
    - Why did you make those changes?
- If you did this activity again, what would you have done differently?

- Why?

Engineering Design Process:

- Can someone tell me the steps of the design process and what they mean?
  - Refer above to the steps
- What was your most favorite step? What was your least favorite step?
  - Why?
- What step took your team the shortest? What step took the longest?
  - Why?
- Did this process help you in making your design?
  - How did it help?

Apply For The Future:

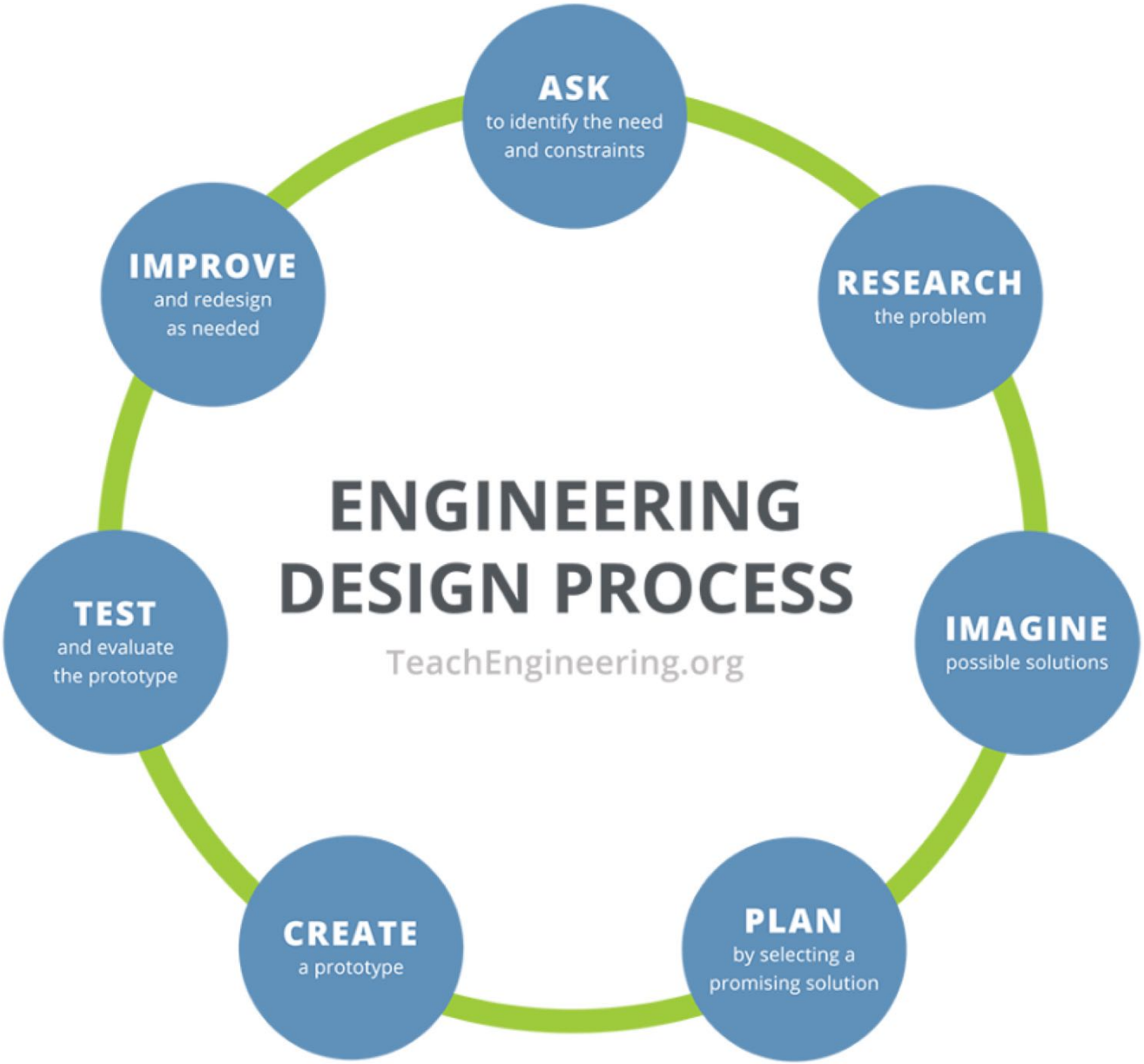
- It is important to come up with strategies, and back plans, for every day activities
  - Planning and adapting are essential for success
  - In this activity, the coyotes, skunks, and prey groups had to come up with strategies and back up plans to win the game for yourself and your team
- It is important recognize your weaknesses and strengths and try your best to use your strengths to succeed
  - In this activity, everyone had to use their speed, agility, and wits to survive to eat in order to win the game
  - These things are essential in our daily-lives whether it's in sports, school, or other activities
    - Keeping in mind your weaknesses to improve upon and using and improving your strengths are essential to become the best you, you can be

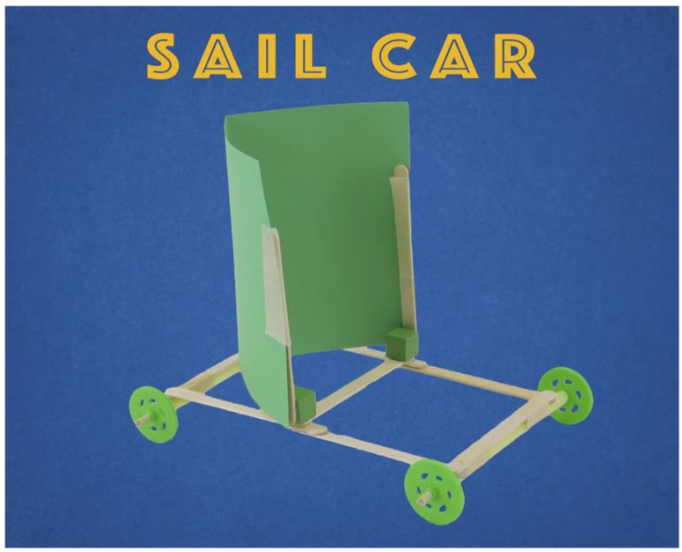
References:

https://www.teachengineering.org/content/ucd_/activities/ucd_sailcars/ucd_sailcars_activity1_pre_quizas_v3_new.pdf

https://www.teachengineering.org/content/ucd_/activities/ucd_sailcars/ucd_sailcars_activity1_post_quizas_v3_new.pdf

https://www.teachengineering.org/activities/view/ucd_sailcars_activity1


ASK
to identify the need and constraints
RESEARCH
the problem
IMAGINE
possible solutions
PLAN
by selecting a promising solution
CREATE
a prototype
TEST
and evaluate the prototype
IMPROVE
and redesign as needed
ENGINEERING DESIGN PROCESS
TeachEngineering.org


SAIL CAR

Invasives & Nature Identification

Objective

To notice the small differences and uniqueness of all the plants around them, while also learning how to take care of the spaces they visit. This is also to show them all the great things perhaps underappreciated plants do for us!

Materials

- "Backpack Explorer: On the Nature Trail: What Will You Find?"
    - Enough for counselors and/or small groups of children

Grade K-6

Instructions

This is an activity that the students really guide, but there are two main parts to it. Both parts are to be done on the trails surrounding the camp.

Invasive Section: ~ 15-20 minutes

1. To start with, Start the hike on the trail by talking about **Invasive Species**, connecting to the common ones listed below, and how they affect the environment.
    a. They harm the plants we have by taking their resources away
    b. Most things here can't eat them
    c. Lowers biodiversity
        i. **Biodiversity** is the variety of life in an ecosystem, when there is less biodiversity, food, animals, and plants are all more vulnerable
    d. Removing them is extremely important (But that we can't right now)
2. If you find any invasives on the trail, take the moment to show the kids what they look like up close, and all the unique features of it.

Nature Identification Section: ~45+ minutes

1. Let the kids explore, ask them what they see/found, and then use the opportunity to say "Well I don't know what that is! What can you notice about it?" to then go through your field guide together and identify the plant.
2. Make sure that they notice what makes each plant unique
    a. Leaves, Stem, Flower, etc
3. Engage the children's curiosity by probing them with questions like:

a. “Do you think these two plants are the same? Why?”
b. “How many different types of trees do you see?”

Reflection Questions

1. Have you ever seen an invasive plant or animal?
2. What did you hear while we were out on the walk?
3. Did you see anything really cool or that you didn’t expect?
4. Was there anything you could smell? What were you able to smell?
5. Did you touch anything? What did it feel like?
6. What impact did you have while exploring?
7. What drew you in to explore?

Resources

Mass Audobon, MassNRC.org, https://www.mass.gov/service-details/invasive-plants,

https://kids.britannica.com/students/article/invasive-species/631812, https://nature-mentor.com

Common Invasives:

a. Japanese knotweed: In wetter areas

b. Phragmites: Outcompete cattails in ponds

c. Norway Maples: outcompetes our local maples

d. Garlic Mustard: very common

e. Japanese Barberry

Bug Hunt

Objectives

The goal is to have the children notice all the different and wonderful things around them, particularly some they may not otherwise notice like insects. Insects are often seen as pests, by showing how many different ones there are, and the different things they do, we can begin to change that outlook.

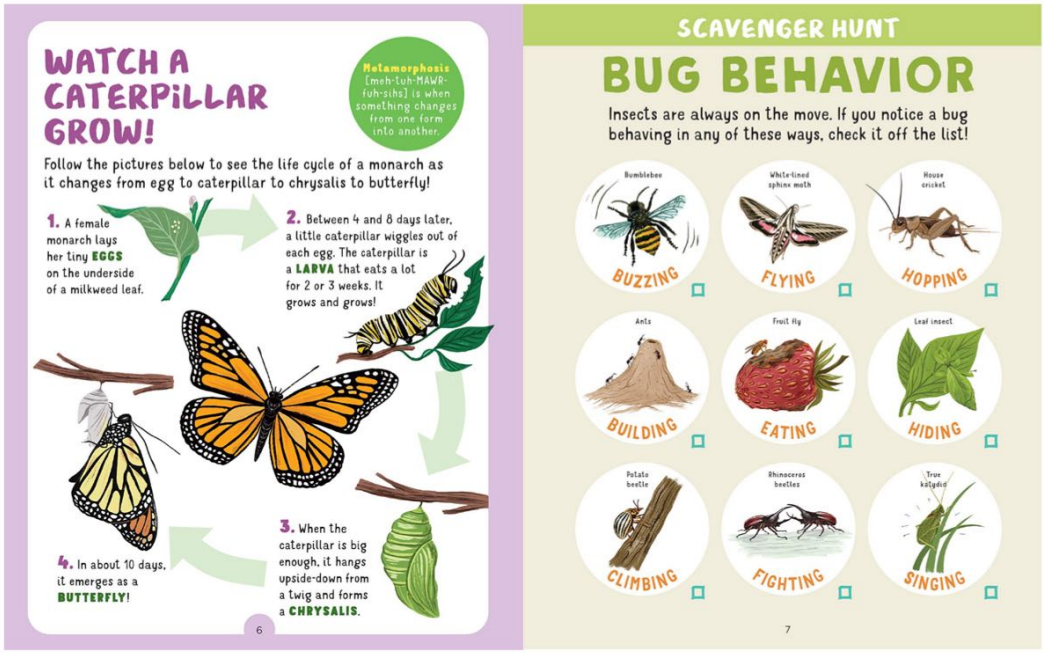
Grade K-6

Materials

- Polaroid Cameras
- Backpack Explorer: Bug Hunt: What Will You Find?

Instructions: ~ 1 hour

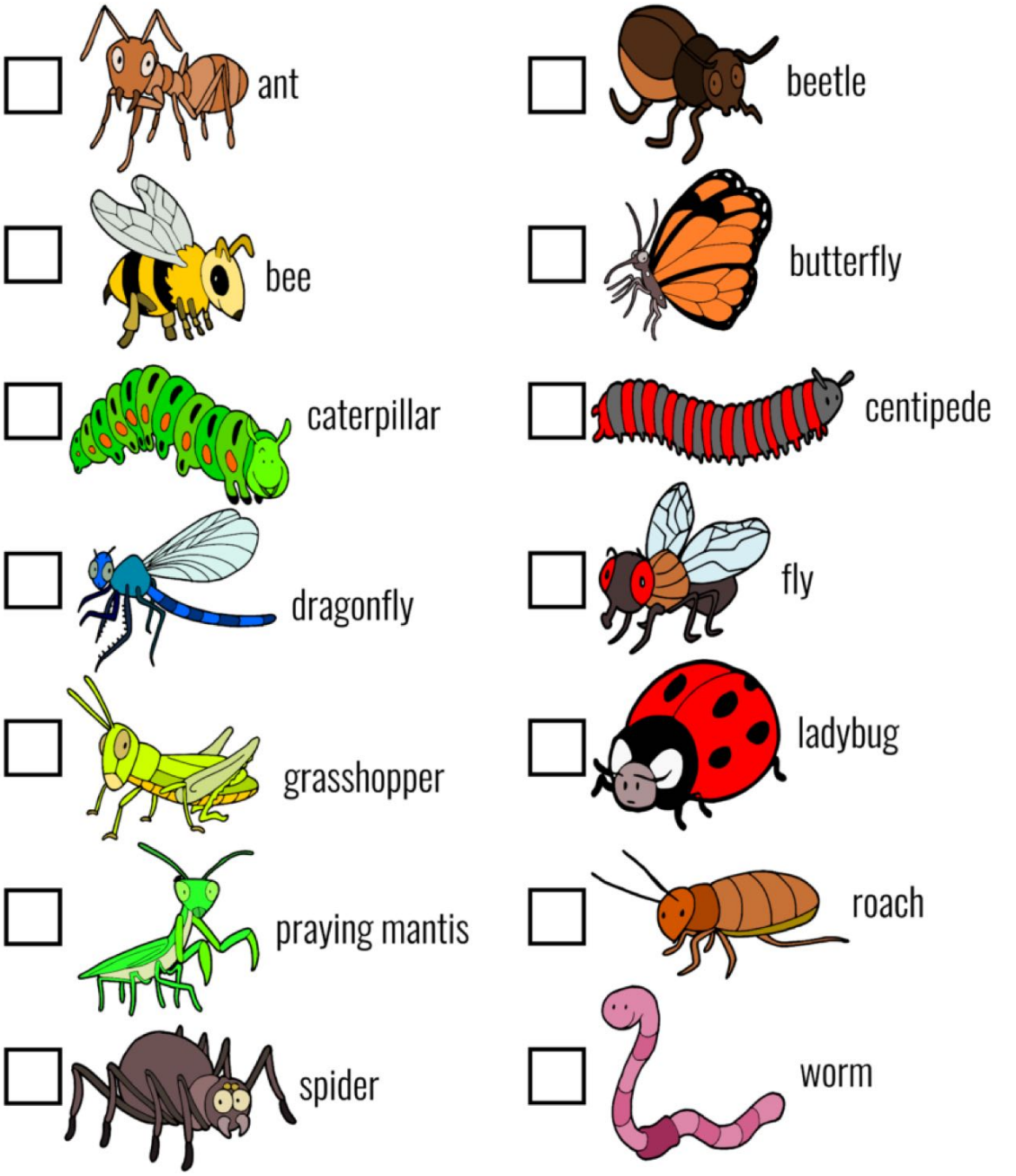
1. Start by explaining that around each day, 25 new species of insects are found (The equivalent of seven thousand each year) and that today they are gonna go on a bug/creature hunt!
2. Give each of the children a polaroid camera
3. Each of the children is gonna try to find and document as many insects, or any other creatures they find, as possible, they could very well find something new!
    a. Show them how to look under rocks, and then explain to put the rock back exactly where it was, cause that is the insects/creatures' home!
4. During the hunt, ask what they found and if they/you don't know, probe them about what different aspects the creature has!
    a. This can be a great time to go through all the great things insects do for us
        i. Pollinate flowers
        ii. Clean up debris, waste, and get rid of unsanitary things
        iii. Keep pests in check
    b. Ask what they see the insect doing?



Reflection Questions

1. What was your favorite bug you found? Why?
2. What did you see bugs doing?
3. What do you think about bugs?
4. Why do Spiders build webs?
5. Why do some bugs buzz?
6. Are bugs dangerous?
    a. For the most part, no, they're actually quite helpful, but they are best left alone as some if bothered can hurt!
    b. Most of the time bugs cause problems because of poor management on humans' part, like bringing them where they're not meant to be, or failing to maintain their own spaces!
7. Have you seen any of the insects you saw today at home?
    a. If not, what have you seen at home?

BUG HUNT CHECKLIST



Resources

Mass Audobon, Backpack Explorer: Bug Hunt: What Will You Find? (book)

Boat out of Nature

Objective:

Let the kids go through the engineering and design process by themselves and learn what floats in nature.

Grade: Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tool.

1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.

Time: 45min-1 hour

Context:

You are an engineer and want to help (input a small water-resistant fake animal that is available) across the pond and the only available materials are string and nature. Your job is to design and build a boat to help (animal) cross the pond.

Materials:

For 20 girls:

- 5 rolls of twine
- Access to nature
- 20 scissors
- 10 plain wax candles
- 10 lighters
- 10 pencils
- 20 paper handouts

Instructions:

<u>Preparations</u>

1. An example boat so the kids can use as a reference
2. Print the paper below, one per kid

Step-By-Step

This activity has minimal instructions as it lets the girls come up with a solution themselves.

1. Talk with the girls over the context so that they know what the challenge is.
2. Give the girls the sheet below to allow them to design and know what they want before they start building and explain to them the materials you have that they can use such as the twine and candle wax.
3. Once the girls show you their design let them go into the woods to collect their materials. Make sure that you are very clear about the boundary they are allowed to walk in.
4. For the younger ages keep the wax with you, the instructor, and help the girls use it so they don't burn themselves and walk around asking the guiding questions.
5. Let the girls test their boats out on the pond to see if they float and can improve on their design. Explaining that all of the materials are natural so it's okay if they are unable to retrieve the boat as they won't be polluting the environment.
6. At the end of the time frame go over the conclusion questions.

Guiding Questions:

1. What do you plan to use as the base of your boat? Will it float?
    a. Try to guide them to test if it floats before they use it so they learn from their experience.
2. Do you think that can hold the weight of the animal?
    a. Emphasis the testing it themselves.

Reflection Question:

1. What materials did you use? Why?
    a. Wood because it floats.
2. How did you connect your sticks together?
    a. Having them describe what they did might open up some doors for the other kids to something they might not have thought of.

Applying to the Future:

In the future being able to learn from self-experiences will make them very adaptable and always improving.

Build A Boat Out Of Nature

1. ***Design***: Think how you would like your boat to look, thinking about connections and balance.
2. ***Draw***: Draw and label your design
3. ***Review:*** Show your instructor your design.

My Boat Design	Materials I Used
	_____ _____ _____ _____ _____ _____ _____

Resources:
https://beafunmum.com/wp-content/uploads/2014/01/dreamstime_m_25255686.jpg
https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQwVq3P0Tmjptj-4-Nb_RMpM9dVYFXXvdiHCA&usqp=CAU

Animal Catch

Objectives

To explore and learn about animals that inhabit the water, and safe ways of interacting with them

Materials

- Small nets for the children
- A Larger better net for the counselor
- Buckets filled with water from lake

Grade K-6

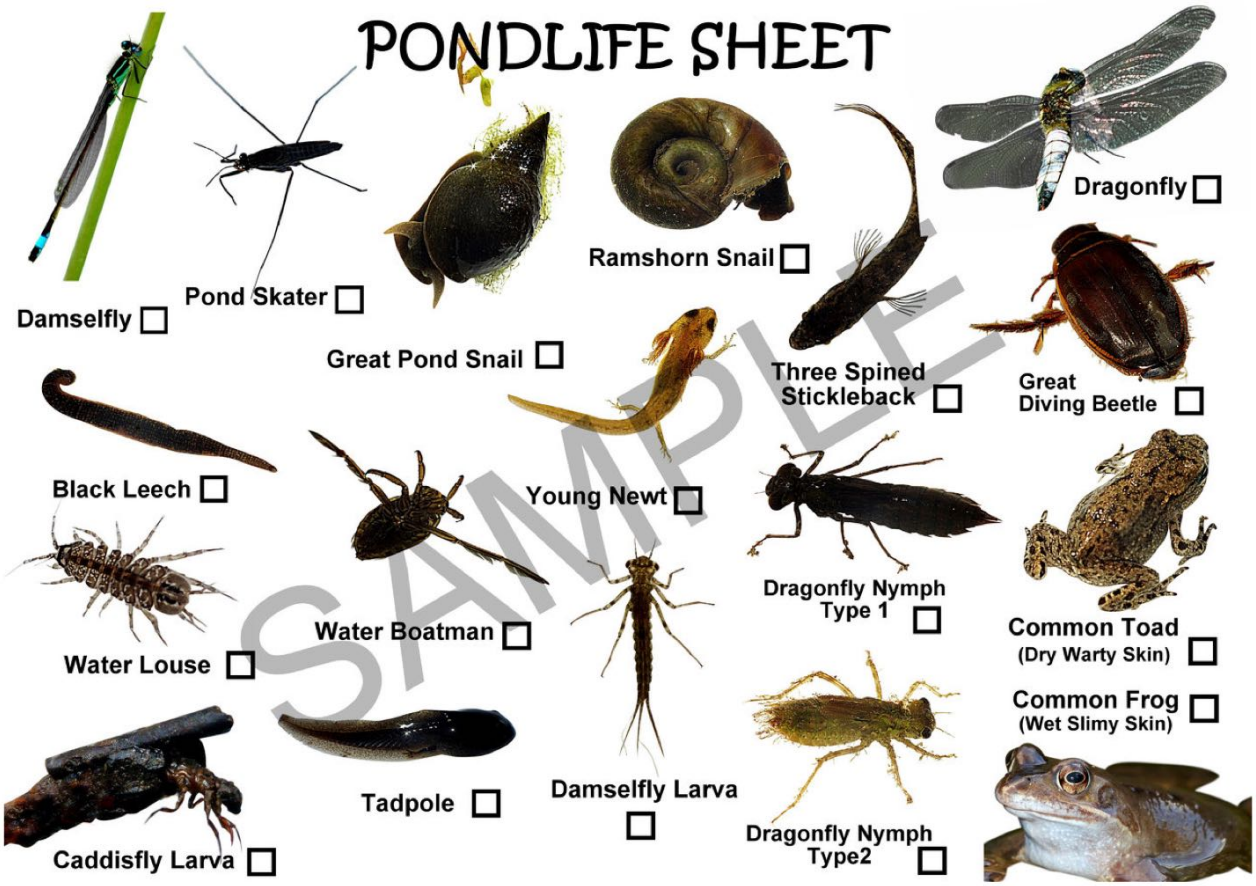
Instructions

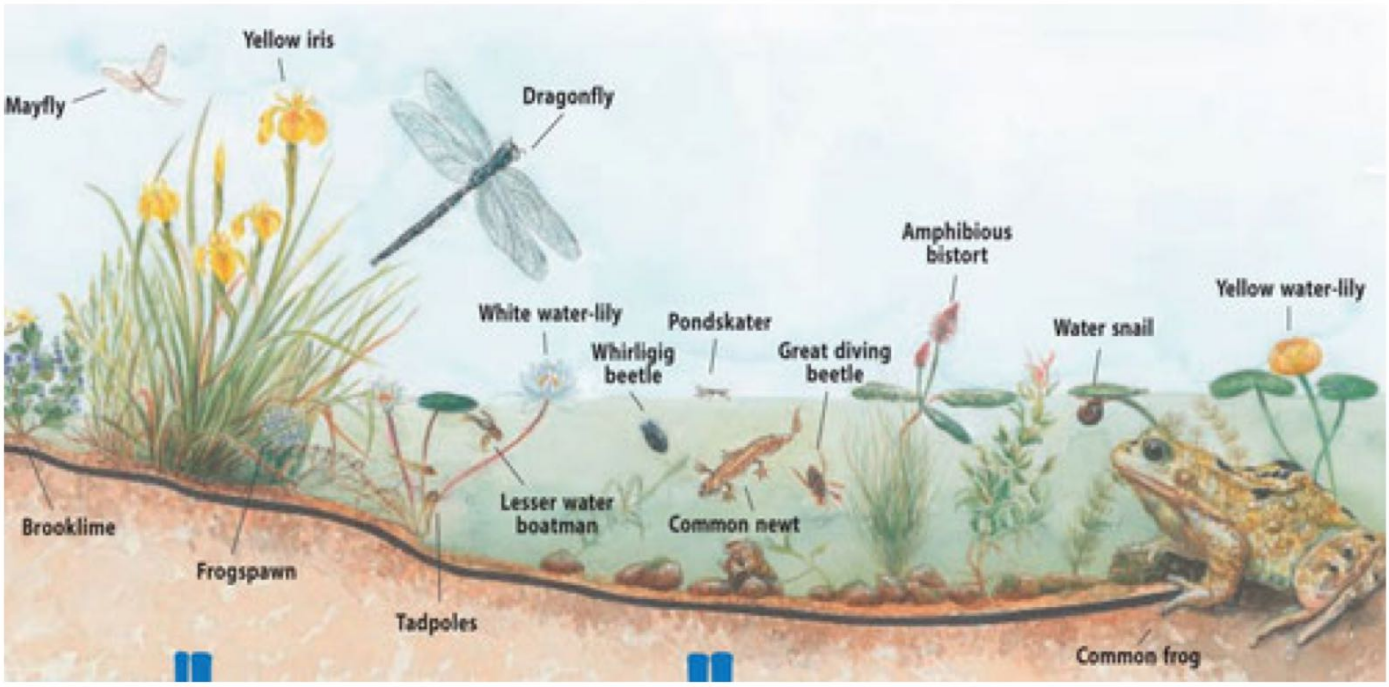
1. Explain to the kids that today they will be going to the pond and using some nets to inspect what sort of animals live in and around the water
    a. Make sure the kids know not to grab anything by their hands unless a counselor says it's safe to
2. If a creature is too big for their nets, the counselor will have a larger net to catch things with
3. Once caught, place anything into a bucket with water so as not to stress the animal too much, while also allowing you and the children to inspect it.
    a. Ask questions like "What can you notice about this animal?"
    b. "Does it have fins, tail, or legs?"
    c. "Does it have scales or skin? If so, what's the pattern of the scales/skin?"
    d. etc
4. Once you're done looking at the animals, safely release them by placing the bucket in the water, tilting sideways so that it can swim out, or with the nets to place in the water gently. Make sure no one just tosses them back in, as that causes undue stress.

Reflection Questions

1. What was the favorite thing you caught?
2. What common things did you see from what you caught?
3. Was everything you found fish? If not, what else did you find?
4. Did everything you find breathe water? If not, why do you think that is?

Common Pond Creatures





Resources

https://www.flowerpotman.com, Mass Audobon, https://bugzarre.co.uk

Water Quality Testing, and Filtration

Objective:

The objective of this activity is for the girls to learn about water quality and how to test for several parameters associated with water quality. Also, they will investigate ways to filter/remove pollutants from water

Grades:

Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

5-ESS3-2(MA). Test a simple system designed to filter particulates out of the water and propose one change to the design to improve it.

Time:

This activity should take about 30-50 minutes

Materials:

For a group of 20 girls:

For testing

- PH test kit OR Litmus paper
- Dissolved oxygen test kit (optional for the older kids)
- Nitrate test kit (optional for the older kids)
- Phosphate test kit (optional for the older kids)
- Some wastewater

For filtration

- Large plastic soda bottle
- Cotton balls
- sand
- rock/gravel
- Activated charcoal (available at pet stores or can be bought online.)
- scissors
- Plastic cup
- Mallet and a plastic bag (optional)
- Some wastewater or muddy water

Instructions:

Preparation

- Scout out a sampling location that is safe for campers. This sampling location should have a spot for the girls to sit and listen to instructions and perform tests. The camp instructor should practice conducting each test with the provided instructions and should become familiar with the water quality information provided in the background section for this day. Also, set up a waste container for them to dump their test tubes and other materials into after the activity is over.
- For the filtering activity, be sure to use clean aquarium gravel and play sand (not yard gravel or beach sand, as these, may add to the pollutants in the water)

Water testing activity (optional for the younger kids)

1. Take the girls to the lake to collect some wastewater samples.
2. Discuss water quality with the girls.
    a. What is water quality? Ask the students what "good" water looks like, tastes like, and smells like. How about "bad" water?
        - Usually, the students will say that "bad" water is brown and dirty.
    b. Ask them if they can tell just by looking at water if it has chemicals in it.
        - The answer will be No.
    c. Discuss the different parameters you might measure if you were testing water quality, what each parameter is, why it is important, and how you measure it. Let the campers try to think of the parameters as you list them on a board or paper.
    d. Ask the girls why water quality is important.
        - Water quality relates to how polluted or unpolluted the water is. It is important to know water quality to ensure the water is healthy for the plants and animals that rely on it in the wild, and also to ensure the water we use in our homes is safe for us to drink.
    e. Ask the campers why we should measure water quality
3. Discuss safety issues with them before completing water quality tests. Do not put tablets or water in your mouth. You don't know what is in the water, and the tablets have chemicals in them that are not healthy for human ingestion.

    a. Let the younger kids only use the Ph strips
4. Tell the girls that they are going to be divided into groups of 2-3 and give each group a different water quality test kit to use. Each kit has instructions on how to use it.
    a. Explain to the girls the instructions of each kit to complete their test.
    b. Divide the campers into groups and give each group a test kit.
    c. Consider assigning roles to team members, such as materials manager, science recorder, engineering recorder, and engineering builder.
5. Give them time about 10 min to complete their tests.
6. Once all the tests have been completed, gather the campers together and talk about the results

Water Filtration Activity

7. Within the same assigned groups, give them each a bottle and scissors. Let the girls cut off the bottom of the plastic bottle (keep the cap on).
8. Let them fill the top bottle with filter media of various types and layers. They can start by stuffing two to three cotton balls into the neck of the bottle. Next, they can crush the activated charcoal (optional, but it will work best this way), and pour it into the bottle. Next, let them add the sand to the bottle, then add the gravel. The amount of each is not specified, and you should let the kids decide for themselves.
    a. Let girls know that it's important for them to document the amounts and sequence of filter media they used.
9. At this point, they can loosen the cap and set your water filtration system on top of the plastic cup. Then Gently add the wastewater to the top.
10. Finally, let the girls observe what happens as the wastewater is filtered.
11. Discuss safety issues with them, as they should not drink this water. The water is not completely filtered enough for that.

Guiding Questions

They are within the text!

Reflection

1R. Have each group report their findings. Discuss as a group what "normal" conditions for each parameter are and if their test results fell within those normal parameters. If they did not, have the students hypothesize as to why their results might have been "abnormal."

2R. Discuss with students ways that pollution can enter our waterways and ways in which we can prevent that from happening

3R. Which filter media were most effective at filtering the water?

4R. How might you further improve upon the water filter design?

Apply for the future

- Because wetlands filter water for free, how can you protect wetlands?
- Tell the girls they can visit a wetland area with their family/friends and find all the wildlife and plants that they can. These organisms all play a part in recycling nutrients and cleaning water.

Reference: Water Filtration DIY, Water Quality Testing (Pg. 104-105), Water Filtration Challenge

EXPERIMENTING WITH SUNLIGHT & TEMPERATURE CHANGE TO COOK FOOD

Objective:

The objective of this activity is for the girls to explore temperatures and the different methods of temperature change. Using specific materials and methods of heating, they will construct a simple solar oven, and use that oven to cook a snack. The girls will be using their knowledge of heating and applying it to a daily-life experience, all the while improving their culinary skills.

Grades:

Grades K-6. Be more hands on with the groups of grades K-2.

STE Standards:

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tools.

1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.

K-PS3-1. Make observations to determine that sunlight warms materials on Earth's surface.

3.3-5-ETS1-4(MA). Gather information using various informational resources on possible solutions to a design problem. Present different representations of a design solution.

Time:

Minimum of 1 hour. It will take about 45 minutes for the food to properly cook.

Context:

Hello everyone and thank you for joining me on today's game show: Cook With What Ya Got! And, hello to our fellow contestants. Today's challenge will be baking a pizza bagel and s'more using

Materials:

For 20 girls:

1. At least 10 Cardboard Boxes of Different Sizes
2. 10 pairs of Scissors
3. 2 Box cutter/knife
    a. Only instructors and volunteers can use these to help with cutting
4. 2-3 boxes of Clear food wrap
5. 2-3 boxes of Aluminum foil
6. 3-4 rolls of Clear tape
7. 3-4 packages of Construction paper of assorted colors
8. At least 15 Newspapers
9. 5 Ruler
10. 5 Wooden spoon
11. 5 Thermometer
12. 20 Mini bagels
13. 3 jars of Tomato sauce
14. 2-3 bags of Parmesan cheese
15. 2-3 packets of Graham crackers
16. 2-3 bags of Jumbo marshmallow
17. 20 King-sized bars of Hershey milk chocolate

Instructions:

Preparation:

1. Collect all materials and place them in the order shown in the **Materials List**
2. Have each instructor hold onto 1 box cutter, for emergency usage
3. Display pre-made ovens for girls to see

Activity Instructions:

1. Have the girls assemble into groups of 4
    a. Should be around 5 groups total
2. Give the girls about 5 minutes to discuss what materials they want to use
3. Have 2 girls from each team grab the materials to build the oven
    a. Each team should have:
        - One cardboard box
        - Two pairs of scissors
        - Ruler
        - 12-inches of clear food wrap
        - 12-inches of aluminum foil
        - Up to 4 sheets of construction paper
        - Clear tape
        - Up to 5 newspapers
        - Wooden spoon

4. With the scissors, cut a square or rectangular flap on the top of the box
    a. If the girls need help with cutting, instructors can use the box cutter to assist
5. Lifting up the flap, cover the bottom of the flap with aluminum foil
    a. Use the clear tape to secure it
6. Keep the flap lifted and cover the opening with the clear wrap
    a. Use the clear tape to secure it
    b. Make sure it is airtight
7. Turn the box over and cover it with construction paper
    a. Use the clear tape to secure it
8. Roll up the newspapers and tape them to the bottom of the box
    a. Should follow the perimeter of the box
9. Steps 1-7 should take 10 to 15 minutes
10. Once they are done creating the oven, have two girls grab the food ingredients
    a. One bagel per person in team
    b. Instructor will come around and give the tomato sauce and cheese to everyone in the done groups
    c. Two king-sized Hershey's milk chocolate bars
    d. One jumbo marshmallow per person in team
    e. One graham cracker per person in team
11. Place the assembled pizza bagels in the oven
12. Assemble the s'mores:
    a. Split the graham cracker in half
    b. Grab a piece of the milk chocolate bar and place it on top of one of the graham crackers
    c. Place the jumbo marshmallow on top of the chocolate
    d. Place the second half of the gram cracker on top
13. Place the s'mores inside the oven
14. Gently lower the flap a bit and place ruler between the bottom of the flap and the box
15. **Wait 45 minutes until you take it out to eat**

Guiding Questions:

Ask These Questions During The Activity!

- What color construction paper do you plan to use?
    - Why?
- How much are you going to tilt the flap?
    - Why?

Reflection Questions:

- What was the purpose of the aluminum foil?
    - It reflects the sun rays, so those rays can be directed at the food.
- When lining the bottom with construction paper, what was the best color? Why?

    - Black construction paper was the best because it absorbs the most sunlight
- What was the purpose of the newspaper?
    - It traps the heat in the “oven”.
- Why did you use a flat shaped rubber band over a tube-shaped rubber band?
    - It is more flexible and has a higher tension, which would create more powerful shots.
- Why were the newspapers important?
    - Using the newspapers helped insulate the oven. Insulating means capturing and holding heat. So, the newspapers were used to help trap heat in the oven.
- Did any group have to adjust the flap tilt at the end? Why is it important to get the right tilt?
    - It is important to get the right tilt, so the reflected rays from the aluminum foil can contact the construction paper surface and food, thus causing the food to heat up.

Apply For The Future:

- When you made the solar oven, it was best to use darker colored construction paper.
    - That was because the darker colors absorb more light than the lighter colors.
    - A little tip: on the next hot day, remember to wear light colored clothes so they do not absorb so much heat and make you sweat.
- There are different ways to get to your goals, as we saw today with the solar oven activity
    - You can use different size boxes, but just have to account for that difference and plan for any setbacks
    - In everyday life, use this. You do not have to do things like everyone does. Just remember that when you do it differently, you will face a different set of problems. **Always hope for the best and prepare for the worst!**
- Now whenever you are feeling hungry and want to make some food, you can use what you learned from this activity and recreate it making the best food

References:

Similar Instructions:

https://www.homesciencetools.com/article/how-to-build-a-solar-oven-project/

Other Solar Oven Food Ideas:

https://www.homesciencetools.com/content/reference/SolarOvenRecipes.pdf


1
2
3
4
5
6
7

Making Sun Print Art with Nature

Objective:

The objective of this activity is for the girls to create a cyanotype print by arranging found objects onto photosensitive paper. They will discuss how the cyanotype process worked and how various factors such as exposure time, the brightness of the sun, and the arrangement of their objects, affected their results. By the end, they should be able to use the principles of design to create an interesting composition with their chosen found objects from nature.

Grades:

Grades K-6. Be more hands-on with the groups of grades K-2.

STE Standards:

K-PS3-1. Make observations to determine that sunlight warms materials on Earth's surface

Time:

This activity should take about 30 minutes

Materials:

For a group of 20 girls:

- Tedco Sun Art Paper Kit
- Metal Trays
- plastic trays filled with water
- Some objects from the campground (such as leaves, flowers, etc)
- Piece of 4"x5" drawing paper per student
- acrylic or glass sheet
- Lemon juice (optional)
- Book for pressing (optional)

Instructions:

Preparation

- The Sun Art Paper kit contains 12 8"x10" sheets which should be cut in half so that each student will have 1 4"x5" piece of photosensitive paper. Also, add a few

drops of lemon juice to the trays of water, to help turn the images a deeper shade of blue.

- Additionally, making some examples of sun print designs to show the girls, and to see how long it will take for it to be ready.

Step by step

1. Begin by introducing the lesson with a pre-made example of sun print designs, as well as reading the context to get the girls engaged.
2. Ask the girls if they are familiar with cyanotype print or if they have done any Sun Print DIY.
    a. Cyanotype is a photographic printing process, which produces blue prints. Engineers used the process well back in the old-time (into the 20th century) as a simple and low-cost process to produce copies of drawings, referred to as blueprints.
3. Next, have each girl walk around the camp, and gather around 3 objects (such as buttons, grass, and leaves) they want to use to sun print.
4. After they have their object in hand, let the girls gather around behind a shaded area. Have the girls place the sun print paper on a tray with the blue emulsion side facing up. Explain that before printing anything on the paper, they will need to practice arranging their objects on a piece of drawing paper.
5. Let them arrange the objects on top of the paper, and then place the acrylic or glass sheet on top to keep the objects in place.
6. Press the clear acrylic sheet that comes with the paper kit on top of the objects before taking them into the sun. Ask the girls why we need the clear acrylic sheet?
    a. The sheet will hold the objects in place while allowing the sun to expose the paper. It will hold it in place, so they don't blow away or move around during the exposure time.
7. Carefully but quickly carry your tray to a sunny spot, and let the sunlight expose the paper for one to five minutes, until the paper turns mostly white. The longer you leave the paper exposed to light, the darker blue your print will be (just don't overexpose).

    a. If you're working indoors where there's no wind, you can even remove the clear sheet during the exposure to produce the deepest indigo blue.
    b. As they wait for the paper, you can ask them some of the reflection questions (1R-4R).
8. When you think the paper is ready, have the girls remove the acrylic or glass sheet, along with your items, and submerge it in the plastic trays filled with water. Rinse for approximately one minute or so.
    a. This is what is known in the film photography world as "fixing," which stops the chemicals in the paper from reacting to sunlight.
9. Finally, allow the paper to dry by either laying your sun print flat on a paper towel to dry, or hanging it up with a clothespin.
    a. As they wait for the paper to dry, you can ask them the remaining reflection questions, and see what they have learned.

Guiding Questions

- They are within the text!

Reflection

1R. How Do Sun Prints Work?
    - When sunlight interacts with our bodies, it warms us. When sunlight interacts with light-sensitive paper, it changes the color of the exposed paper and leaves a silhouette (like a shadow) of any object placed on top of the paper.

2R. Does the exposure time make a difference in the final blue color of the paper?
3R. Why do we want to avoid overexposing paper in the sun?
4R. Does the sun print paperwork in different light sources? (LED, fluorescent, etc.)
5R. How could you make the printing sharper?
    - If you're working with leaves and flowers and prefer sharper prints, you can press your plants under heavy books (preferably overnight) to flatten them first. This will produce crisper lines around your subject. For more ethereal images with a soft-focus, skip the pressing.

6R. Does the amount of time soaking in the water make a difference in the final color?
7R. Does the temperature of the water make a difference in the final color?
8R. Does the sun print paperwork if you get the paper wet first?
9R. Does a spherical object cast a shadow that is the same shape as the object?

Reference: Make Sun Prints, WHAT IS A CYANOTYPE?, HOW TO MAKE SUN PRINTS, Sun Prints: Cameraless Photographs, Sun Prints Tutorial to the Rescue!

Cloud Formation, Cloud in a Bottle

Objective: To understand how clouds form and affect sunlight.

Grades: K-6. K-3 needs more guidance and help.

STE Standards:

5-ESS2-1. Use a model to describe the cycling of water through a watershed through evaporation, precipitation, absorption, surface runoff, and condensation.

8.MS-ESS2-5. Interpret basic weather data to identify patterns in air mass interactions and the relationship of those patterns to local weather

Time: 30 min

Context:

Clouds form every day above us and block out the sunlight but they don't block out everything that comes from the sun like ultraviolet light also known as UV light. This light causes people's skin to burn so even when the clouds are above us we aren't even safe. Look at the clouds and realize there are different types of clouds, how do you think they form?

Materials:

Per 20 girls

1. 20, 2-liter plastic bottles
2. 20, Matches
3. Warm water

Instructions:

<u>Preparations:</u>
None

<u>Information on how clouds form:</u>

Water evaporates when it's hot and rises in the air. As it goes up it gets colder so they condense on particles in the air. When the clouds can't hold the water anymore due to the temperature decreasing or the amount of water is too much for the cloud to hold it rains.

Step-By-Step:

1. Before starting the activity go over the contest and some of the questions to introduce the topic.
    a. There is not much sunlight today. Why might that be?
        i. The clouds are blocking the sunlight.
    b. Can anyone tell me what clouds are made up of?
        i. Water and dust
2. Pour a little bit of water into the plastic bottle.
3. Put the cap back on, but leave it open.
4. Light the match, then blow it out so it smokes. The younger kids might need an adult to light the match for them.
5. Suck the smoke into the bottle by squeezing the bottle gently a few times.

6. Close the cap.
7. Squeeze the bottle and then release it. The kids can stand on it and off it.

8. Repeat step 6 several times and a cloud should start appearing in the bottle.

Reflection questions:

- Why do you think we put the smoke in the bottle?
    - The smoke gives the evaporated water something to bind to when it condenses.
- What do you think happens when you squeeze the bottle?
    - It increases the temperature so the water evaporates and then when you let go the water condolences on the smoke.

References:

http://www.planet-science.com/categories/experiments/weather/2011/03/make-a-cloud-in-a-bottle.aspx

https://www.wikihow.com/Make-a-Cloud-in-a-Bottle

EXPERIMENTING & ANALYZING THE REACTIONS TO CREATE ICE CREAM

Objective:

The objective of this activity is for the girls to explore temperatures and the different methods of temperature change. In this activity, the girls will explore the process of freezing, in which they will be creating ice cream inside of a bag. The girls will be using their knowledge of cooling and applying it to a daily-life experience, all the while improving their culinary skills.

Grades:

Grades K-6. Be more hands on with the groups of grades K-2.

STE Standards:

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tools.

1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.

3.3-5-ETS1-4(MA). Gather information using various informational resources on possible solutions to a design problem. Present different representations of a design solution.

Time:

This activity will take approximately 1 hour long.

Context:

Hello my store owners! It is I, the CEO! We, here at **Girls Inc. & Co. Ice Cream Parlor** are about to announce our newest product. But before we do so, we need to make the best ice cream we can. And today is the day we do this. Each one of you will be making and testing your own ice cream to get the best possible ice cream. **Good Luck & Enjoy!!!**

Materials:

For a group of 20 girls:

1. 5 cartons of 32 fl. oz. Half & Half
    a. Optional: 1 cartons of Lactose-Free Half & Half
2. 3 bags of 16 oz. Rock Salt
3. 2 Large bag of Ice
    a. Recommended to have 3
4. 1 bottle of 16 fl. oz. Vanilla Extract
5. 1 bag of 16 oz. Sugar
6. Water tight Ziploc Bags
    a. Minimum of 30 Small Bags
    b. Minimum of 30 Large bags
7. Minimum of 30 Spoons
8. Measuring Utensils
    a. 2 Cup-measurement spoon
    b. 2 Teaspoon-measurement spoon
    c. 2 Tablespoon-measurement spoon
9. Recommended 4-5 pairs of warm Gloves
10. Ice Cream Condiments:
    a. Melted marshmallows
    b. Strawberry sauce
    c. Chocolate fudge
    d. Melted Caramel
    e. etc.
11. Toppings:
    a. Gummies
    b. Sprinkles
    c. Skittles
    d. M&Ms
    e. Chocolate

Instructions:

Preparation:

1. Set up table full of materials/ingredients with caution of potential allergies:
    a. Small ziploc bags
    b. Half & Half & Cup-measuring spoon(s)
        i. Make sure the lactose free Half & Half are in the seperate location
    c. Vanilla Extract & Teaspoon-measuring spoon(s)
    d. Sugar & Tablespoon-measuring spoon(s)
    e. Big ziploc bags
    f. Cooler full of Ice
    g. Rock Salt & Cup-measuring spoon(s)
    h. Gloves
    i. All of the toppings and condiments with spoons
    j. Spoons for eating the ice cream

Activity:

1. Pick a volunteers to demonstrate the activity to the girls
2. Have a volunteers pick the material need for the ice cream
    a. Small ziploc bag
    b. 1 cup of Half & Half
        i. Pour it into the small ziploc bag
    c. Add 1 teaspoons of vanilla extract into the bag
    d. Add 1 tablespoon of sugar
        i. They can add one more tablespoon if they wish
3. Once all the materials are occurred, have her securely close the bag
4. Then grab the rest of the materials:
    a. Large ziploc-bag
    b. Ice
        i. Fill the bag half-way
    c. ¼ cup of rocksea salt
        i. Use cup-measurement spoon
        ii. Put the salt into the large ziploc bag
5. Place the small ziploc bag into the big ziploc bag
    a. Option to add more ice into the large bag
6. Securely close the large bag
7. Grab a pair of gloves and shake the large bag
    a. This is an optional step
    b. There are only 5 gloves to grab
8. Shake the bag for 6-10 minutes
    a. Add more ice if needed during those 10 minutes
9. At this point, have the girls line up and grab the materials as previously mentioned and repeat the sets.

10. Once done, take out the small bag
    a. Rince the bag with cold water
    b. Also rince the top of the bag (above the seal)
11. Once done, grab a spoon from the table
12. Open the small bag and mix the ice cream with the spoon
13. When satisfied, grab some condiments and topping from the table
14. **Enjoy!!!**

Reflection Questions:

1. How did everyone try to prevent salty ice cream?
    - The best way was to use two small bags (one over the other).
2. Why did we add salt to the large bag? What does the salt do?
    - The salt causes the ice to become colder and turn into slush, allowing the Half & Half mixture to turn into ice cream. The salt decreases the freezing point, or temperature, of the water to below 32°F, or below freezing. The reason we use salt rather than a freezer is so that we can achieve the "ice cream"-texture, rather than putting it in a freezer and just having an icey rough texture.
3. Why did we use rock salt versus regular salt?
    - The rock salt is more effective in cooling than regular salt.
4. Why did we shake the bags?
    - To evenly spread out the freezing ice as much as possible. This allows for the mixture to evenly freeze and turn into ice cream.
5. Why did we use gloves to shake the ice cream?
    - The salt makes the ice get colder, so it would be safer to wear gloves.

Apply For The Future:

- There are different ways to get to your goals, as we saw today with the ice cream
    - You can use one or two small zip-loc bags, or shake at different speeds or times, and ultimately come out with the same results
    - In everyday life, use this. You do not have to do things like everyone does. Just remember that when you do it differently, you will face a different set of problems. **Always hope for the best and prepare for the worst!**
- Now whenever you are feeling hungry or its hot and you need something cold and refreshing, you can use what you learned from this activity and recreate it making the best food
- **Maybe one day, you can create your own ice cream business from what you learned today!**

References:

https://www.thebestideasforkids.com/ice-cream-in-a-bag/

APPLYING CREATIVITY TO BUILD A TOWER

Objective:

The objective of this activity is to reinforce their girls' math knowledge, active capabilities, and creative thinking. To be strong is to be both mentally and physically capable. The purpose of this activity is to engage the girls' physical and mental prowess by having them run and be active for a portion of this activity. For the remaining time, their mental strength will be challenged with a competitive task.

Grades:

Grades K-6.

STE STANDARDS:

1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tools.

Time:

This activity will take between approximately 30 and 45 minutes.

Context:

Have you ever been to Dubai? That is where the tallest building in the world is. It is called the Burj Khalifa. It is over 2700 feet tall. You and your team have the chance to beat that and set a new record for building the tallest building. However, you are not the only team trying to do this. There is another team trying to beat you. Your team has to compete for the top. We have some stuff that will help you build. Take it before the other team can. You have to make a building taller than everyone else's. After all, who doesn't want to reach for the stars!!

Materials:

1. Paper with Numbers written on them
    a. Up to 20 for K-2nd grade
    b. Up to 50 for 3rd-6th graders
2. Math Number Problem Cards
    a. For K-2nd:
        i. Addition
        ii. Subtraction
        iii. Counting with Fingers

   b. For 3rd-6th:
      i. Double-Digit Addition
      ii. Double-Digit Subtraction
      iii. Multiplication
      iv. Simple Division
3. Marker
4. Tape
   a. To use to tape number cards on girls' back
5. Wooden Blocks
   a. Different shapes & sizes
6. Cones
   a. To mark of the sides of each team
7. Small ring
   a. To place the blocks inside
8. Ruler
9. Tape measure

Instructions:

Pre-Game Setup:

1. Set up the cones 20 feet apart
   a. Two cones at each end for team to stand behind
   b. One cone in the middle (10 feet from the other cones) to show where the block would be
2. Put the ring next to the middle cone
   a. When the **Steal It** game begins, place the block inside the ring
3. Place the number cards into a pile
   a. Since there are about twenty kids, put thirty number cards in the pile
4. Take about 30 blocks to use for the middle
5. Grab about 30 Problem Cards from the deck
   a. Must match the number of blocks being used

General Rules:

1. Have the girls split up into two teams
   a. Should be even groups of about 10 per team
   b. Have one team at a time pick out the numbers
      i. While doing this, have the other team turn around
      ii. One number per person
   c. Have them tape it to their backs
      i. The girls can ask each other or the instructors for help
   d. Do not show or tell the number to the other team
      i. The other team cannot peek

    e. Once the first team is done, have the second team do the same steps (a-c)
2. When everyone has their numbers taped to their back, have them line up behind their specific starting lines
    a. Shown by the cones

Steal It Rules:

1. When both teams are lined up behind their respective starting lines, the first round begins
2. Place a random block inside the ring, next to the middle cone
3. Grab a Problem Card and read it out loud
    a. Once done drop the card and do not use it again
4. Whoever has the answer to the Problem Card written on their back can go
    a. Sometimes it may be:
        i. Both teams have a person with that number
        ii. Only one team has a person with that number
        iii. Either team has more than one person with that number
        iv. No one has that number
5. That person or those people must run into the middle and steal the block
    a. If….
        i. Only one team has a person with that number:
            1. They get to take the block back to their base
        ii. No one has that number:
            1. Switch out the block
            2. Do not use it again
6. Once the block is grabbed, that person must run back to their side to keep the block
    a. The person from the other team who has the same number can stop them by tagging them
        i. If that person is tagged, the instructor will take back the block
            1. The block will be switched out (can use again)
        ii. If it is a 2v1 situation:
            1. If two people are one the offensive (they have the block), they can…
                a. Throw the block to each other to keep it safe
                    i. But the person from other team can steal it or knock it down
                b. Have one teammate use their body as a shield for the other teammate to get by
            2. If two people are on the defensive (they do not have the block), then can…

a. Try to tag the person from the other team

iii. If the block hits the floor after it is picked up, and before it crosses to a base, the instructor will take the block back

1. The block will be switched out (can use again)

iv. The tagging only can start when one person picks up the block and it leaves the ring

7. After each round, repeat **Steps 2-6**, until it has been **10 minutes** or there are **no more blocks**

Build It Rules:

1. When the **10 minutes** are up or there are **no more blocks**, have the girls collect their blocks and head to the pavilion
2. Have the girls sit in their groups with their blocks
3. Give each team four rulers
4. The teams have to use their blocks to build the tallest possible tower
5. The base of the tower must be 4 inches by 4 inches
    a. No more
    b. No less
6. They have **15 minutes** to build the tower
    a. Once the time is done, both teams must drop what they are doing
7. The instructors must then measure the tower using a tape measure
    a. First measure the base to make sure it fits the requirements (4”x4”)
    b. Then, if it does, measure the height of the tower

The Endgame:

1. Whichever team has the tallest building will win a prize
    a. They will get to pick and choose **one 12-count pack of Starburst**
2. The losing team will be given a consolation prize for their effort
    a. They will get to pick and choose **two 3-count packs of Starburst**

Guiding Questions:

Ask These Questions During The Activity!

- Do you think it's better to line up in an order or just random?
    - Why?
- After coming back from getting a block, do you it a good idea to go back to the same spot you were in before?
    - Why?
- Do you plan on starting with the base or going straight for height?
    - Why?
- Are you going to be using all of the blocks or just some of them?
    - Why?
    - If you are only using some? Which ones?

Reflection:

- Did you end up seeing the numbers of the other team when trying to steal the blocks?
    - If so, how did you find out who had which number?
- What strategies did you use when trying to steal the blocks?
- In those first 10 minutes, what worked and what did not work?
- When it came to building the tower, what did you think worked best for your group?
- What blocks did you use for the base? What did you use for the height?
- Are there any blocks that you left out?

- Everyone has their strengths and weaknesses. How was your team able to use those strengths and weaknesses to your advantage?
- If you were to do this activity again, what would you do differently?

Apply For The Future:

- Tall and beautiful buildings like the Burj Khalifa do not get built in one day, one week, over sometimes even one month.
- They take a lot of time, failed attempts, trials, adjustments, creativity, and teamwork to become as amazing
- As engineers and scientists it is important to trust in the attempts, the failures, the changes, and in your teammates to get the job done
- Everyone has strengths and everyone has weaknesses. It is important to address them for yourself and for your team. Find ways to improve your strengths, find ways to get over those weaknesses. Doing that can push you to do anything.

Design Worksheet

1. ***Design***: Think about how your design solves the objective.
2. ***Draw***: Draw and label your design
3. ***Review:*** Show your instructor your design.

My Design	Materials I Used
	_____ _____ _____ _____ _____ _____ _____