

GOOD DAY! TO SURVIVE!

Surviving the Rainforest /Day One



Set the tone by having students listen to a recording of the ambient sounds of a rainforest:

<http://www.exploratorium.edu/frogs/rainforest/> This page contains audio clips of the ambient sounds of the rain forest. The recording was made at night near Arecibo, Puerto Rico.

A variety of species of frogs can be heard in the recording. One species you should be able to hear is the coquí (from Cacique... a Taino indian chief that was revered on the

island of Puerto Rico.) The coquí has gotten its name from the "koo-ke" sound that it makes.

Explain to students that for the next couple of weeks we are going to be traveling all over the world. We will see and do new things. Our goal is to SURVIVE!

Ask students what they know about the rainforest. Have them take a look at the biomes of the world. Explain what a biome is. A biome is a very large ecological area on the earth's surface, with plants and animals that adapt for their environment. There are five major biomes in the world. There are many sub-biomes and in those there are lots of ecosystems.

BIOMES- There are 5!

The five major biomes are Desert, Aquatic, forest, grasslands, and tundra. We are going on a trip a very important Forest Biome. Explain to them that we are AIM explorers. Show students the video of the rainforest at the link below. Then explain we are going on a trip to visit the rainforest. <http://www.thewildclassroom.com/biomes/>

Our only problem is that on our trip to the rainforest we wake up in the morning, after our boat crash and we discovered that we are lost in the jungle and unsure about whether or not rescue will be arriving. The dangers that lie beneath the canopy of green trees that make up the jungle are too numerous to count. The environment is infamous for testing the human limits. By sticking to the guidelines and working together, it is possible to survive this harsh environment and get back home safely.

Let the Games Begin...Tribal Survival

Has civilization got you down, man? Ever wanted to leave this culture behind and start over? We are! We're headed to the wilds of the rainforest and leaving civilization behind. But we don't want to leave too much behind, do we? What will we need to survive the rainforest?

In true Survivor fashion, students will be randomly divided into tribes. Throughout the unit, tribes will compete in fun, non-competitive activities that will challenge their intellectual, cooperative, and athletic skills. Students will be put into tribes on our 'reality show' that will last the entire ecosystem survival series. Everything they do, every decision they make matters to the tribe and helps us survive (or not...)



Getting Started- It is important to be able to distinguish between the activities of each tribe. Students need to be able to create a flag or banner that will represent their tribe. They will be participating in tribe challenges. These are not competitions between tribes but challenges that each tribe must get through.

Work with students to help them create their own flag/banner to represent their tribe. These banners will be used to signal when a team is done with a competition or to promote the team pride. Have students also think of a logo and slogan for their team. The banners should all be made out of the same materials but should be different to reflect each team's unique abilities.

Explain that a slogan is a catchy phrase and a logo is an image that represents the tribe. Both can be associated with brand or identity.

Mapping the tribes

Since our first survival area is in the Rainforest have student's research specific coordinates or areas on a map of the rainforest. Have students research places like Brazil or Madagascar that are within the rainforest. Have them research the flag of the local area. Then have students create their banners. These banners can be made out of white fabric and permanent markers, poster board and colors or markers, etc.

Mapping Coordinates

Use this link to view a program to see a map for any coordinates in the world.

<http://www.findlatitudeandlongitude.com/?loc=tropical+rain+forest>

Standards Alignment for Day One K-8

K

SL.K.2. Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.

K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

GLE 0007.10.1 Identify the sun as the source of heat and light.

How the standard will be used.

- After students listen to the teacher and video about the rainforest they will be asked about key details about the rainforest such as what foods we get from the rainforest, why it is called the rainforest, what they learned about the layers and more. They will also be encouraged to ask questions about what they did not understand about the rain forest.
- Students will view the website or a map to identify where the rainforest is. They will specifically be asked questions to show the relationship of where the rainforest is on the map. They will be asked to show their understanding by using the terms in the standard.
- They will learn how the sun affects the rainforest layers as they are listening to the video.

1st

SL.1.2. Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

SL.1.3. Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

GLE 7.5.2 Recognize that some organisms which formerly lived are no longer found on earth.

How the standard will be used.

- After students listen to the teacher and video about the rainforest they will be asked about key details about the rainforest such as what foods we get from the rainforest, why it is called the rainforest, what they learned about the layers and more. They

will also be encouraged to ask questions about what they did not understand about the rain forest.

- Students will learn about how some of the animals in the rainforest are now extinct. They will recognize that these organisms are no longer found on earth.

2nd

SL.2.2. Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

SL.2.3. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

7. T/E.2 Invent designs for simple products.

How the standard will be used.

- After students listen to the teacher and video about the rainforest they will be asked to recount key details about the rainforest such as what foods we get from the rainforest, why it is called the rainforest, what they learned about the layers and more. They will also be encouraged to ask questions about what they did not understand about the rain forest.
- Students will be asked to think of questions they have about the rainforest. When they research for their banner and map coordinates they will also research one of the questions they have about the rainforest and present this to the class.
- Students will design their own logo and slogan for their banner after they finish their research.

3rd

RI.3.7. Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

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

GLE 7.5.2 Classify organisms as thriving, threatened, endangered, or extinct.

How the standard will be used

- The students will information from a map or the rainforest website link to explain where the rainforest is. They will describe what they have learned about rainforests from the maps, and information on the website.
- They will share ideas as to why the rainforest is being endangered and will look specifically at what is the cause and effect of what is happening in the rainforests.
- They will review on the website or through discussion or research specific animals that are thriving, threatened, endangered or extinct.
[http://wwf.panda.org/what we do/endangered species/](http://wwf.panda.org/what_we_do/endangered_species/) (Visit this website for more information about endangered animals)

4th

SL.4.3. Identify the reasons and evidence a speaker provides to support particular points.

W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.

GLE 7.5.2 Describe how environmental changes caused the extinction of various plant and animal species.

How the standard will be used

- Students will be asked to specifically show what evidence and information they gained through the video or website that shows what they can do to help conserve the rainforest, and what information was present to show what is happening currently in the rainforest that is making it dwindle in size.
- Students will specifically research the tribes that live in the rainforest. They will learn where they live and will research their flags or banners as well as a bit about their way of life.
- They will review on the website or through discussion or research specific animals that are thriving, threatened, endangered or extinct.
[http://wwf.panda.org/what we do/endangered species/](http://wwf.panda.org/what_we_do/endangered_species/) (Visit this website for more information about endangered animals)

5th

SL.5.2. Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

RI.5.2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

5.NBT.5. Fluently multiply multi-digit whole numbers using the standard algorithm.

Student will summarize what they learn from their research as well as watching the video about the rainforest.

They will explain in their summary what is happening with to the rainforests. They will determine through texts two main ideas of what they learned and support them with key details.

- Students will also look at the locations of the map where rainforests are and will answer math multiplication word problems about the location and coordinates of the location of the rainforest as compared with others.

6th

W.6.1. Write arguments to support claims with clear reasons and relevant evidence.

Introduce claim(s) and organize the reasons and evidence clearly.

Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.

How the standard will be used

Students will clearly explain why they believe the rainforest is being affected. They will present ideas with relevant evidence of what they can do now help conserve the rainforest.

7th

W.7.1. Write arguments to support claims with clear reasons and relevant evidence.

SL.7.2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

7.7.9 Evaluate how human activities affect the condition of the earth's land, water, and atmosphere.

How the standard will be used

- Students will clearly explain why they believe the rainforest is being affected. They will present ideas with relevant evidence of what they can do now help conserve the rainforest. These ideas will be gathered from research online research specifically

looking into how human activities affect the rainforest and the earth, water and atmosphere.

8th

Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

GLE 7.5.5 Describe the importance of maintaining the earth's biodiversity.

7.T/E.2 Apply the engineering design process to construct a prototype that meets certain specifications.

How the standard will be used

- Students will be given mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points of different rainforests they will determine whether the line through the first pair of points intersects the line through the second pair.
- They will investigate and then report back on the importance of the rainforest in helping maintain the earth's biodiversity.
- They will engineer their own banner to specifications with their logo and slogan.

Day Two

Playing the Game-Rules

As we travel through the ecosystem each group will be given questions, like a survival pop quiz, and the instructor will have three levels of questions: easy, medium, and hard.

Each member that gets the easy question correct gets to earn a game piece for the team of food/drink category. Medium earns you a weapon. Hard earns you a luxury item.

Game pieces on three different colors of papers will need to be made and put into three different containers for students to draw from. Once students have had a chance to collect necessary items for their team, something will change in the current ecosystem we are travelling through (can be related to the activities we are currently studying, or studied the previous day, such as there is a huge area of quicksand and all team members will have to give up shelter) from the faceless

society/trial council. Tribes where all members turn in the piece advance while teams who can't stay in place.

Teams can win additional game pieces and resources from participating in group work, discussion, problem solving, good questions, good behavior, etc.

Transformational Transpiration



Rain forests are critical to all life on Earth. They are often referred to as the “lungs of the planet” because they play an important role in sustaining all life on the planet by regulating the global climate and the water cycle, absorbing carbon dioxide from the atmosphere, and providing us with medicines, food, and more.

A rainforest is a dense, warm, and wet forest area near the equator. They are havens for millions of plants and animals. Rainforests are extremely important in the ecology of the Earth since the plants of the rainforest generate much of the Earth's oxygen. An incredible number of animals live in rainforests. Millions of insects, reptiles, amphibians, birds, and mammals call them home. Insects are the most numerous animals in rainforests. Rainforests get over 80 inches of rain each year. The temperature in a rainforest never freezes and never gets very hot. The temperature stays between 75 and 80 degrees Fahrenheit. The soil of a rainforests is only about 3-4 inches thick and is ancient. Thick clay lies underneath the soil. Tropical rain forests help regulate the earth's environment in several ways. For example, tropical trees help control the amount of rainwater that reaches the ground. These trees absorb an enormous quantity of rain.

In a process called transpiration, much of this water evaporates from the trees' leaf pores and reenters the atmosphere as vapor. Eventually, the vapor condenses into water and falls to the earth again as rain. Transpiration may account for as much as half of the rainfall in some rain forests. By regulating rainfall, rain forest trees keep floods and droughts from becoming too severe. The dense rain forest vegetation also reduces soil erosion. Rainforest plants serve as a resource for medicinal ingredients in many groundbreaking medications

Rain forests help control temperatures in their own regions and in other parts of the world. Rain forest trees absorb light and heat. This absorption keeps tropical climates from becoming too hot or too cold. The forests also take in and store massive amounts of carbon dioxide, preventing the build-up of this gas in the atmosphere. Scientists believe the accumulation of carbon dioxide and other gases in the atmosphere increases temperatures around the world. By absorbing carbon dioxide, tropical rain forests may help keep worldwide temperatures from becoming too warm.

We can build our own rainforest –well, something a lot like one–in our classroom or home.

A terrarium is a closed container with a plant or plants inside. It is a miniature ecosystem: a model of a forest. It is easy to observe what happens in our terrariums because they are so small. In real life, it is hard to observe changes in our environment because it is so big. We can use what we observe in our terrariums to understand what might happen on our planet and to understand the water cycle.

The basic idea is, grab a container (an old jar, a soda bottle with the lid cut off, or maybe a small fish tank) and fill the bottom with an inch of sand/gravel. Over the top of that put an inch of soil and compost.



Grab a few plants African Violets seem a popular choice, but ferns are great as well. If you really want to be impressive, grab an orchid and stick that in there as well.

Carefully plant your 'rainforest' vegetation and give it a good old watering.

Now put something over the top of the fish tank or jar, cling film if it's a small jar or a piece of cover glass if it's a fish tank and put your new mini rainforest somewhere light. Make sure it isn't in too much direct sunlight or the poor plants will cook in there!

Don't forget to put a nice big rock in there for decoration

Now sit back and watch as your mini rainforest starts the cycle of taking up water from the soil through 'transpiration', using the

nutrients they need along the way and then releasing the water back into the system through 'evapotranspiration' as the water evaporates into the air. The water droplets on the surface of the tank or jar are caused by the water in the air 'condensing' on the cold glass and then drop back down to the soil for the roots to take them back through the plant again.

This cycle is important for plant life, but it's also important for sustaining the land. The process works like a huge filter (like the one that you might have had in the fish tank you are using now).

If you see a bit of mold appearing in the jar then lift the lid off and let some air in to circulate. You shouldn't have to water your rainforest for 4 weeks or more!



Materials:

- Two-liter plastic soda bottle
- Scissors
- Plastic wrap
- Gravel
- Charcoal (sold for use in fish tank filters)
- Two small tropical plants such as a fittonia, philodendron, prayer plant, artillery plant, etc.
- Potting soil

Procedure:

1. Take the label off the bottle and remove the black bottom; rinse the bottle
2. Cut the top off the bottle where it begins to curve.
3. Line the detached bottom with plastic wrap that has been folded several times.
4. Spread about one-inch of gravel over the plastic wrap. Spread a thin layer of charcoal over the gravel and fill with potting soil.
5. Dig a hole in the soil for each of your plants. Place them in the holes and press lightly.
6. Water the plants with about one-third cup of water. Invert and place the plastic cover over the plants forming a dome.
7. Place the terrarium in a spot that will receive a lot of light, but not direct sunlight.
8. Watch your rain forest to see the water released from the plants form droplets on the inside of the dome. These will rain down on the plants and continuously water them. (You might have to add a small amount of water to the soil every few weeks.)



Let the games begin: Rainforest Resources

Objectives: Students will be able to give at least two examples of competition that takes place in a real world ecosystem through the following activity.

- Students will be able to explain how and why competition takes place in ecosystems through activity.
- Students will be able to explain 'How can change in one part of an ecosystem affect change in other parts of the ecosystem?'



Materials:

- Fruit Loops (or store brand)
- Tape
- Markers
- Baggies (1 per student)

(Before activity the teacher will need to spread fruit loops in a designated coned off area to represent an ecosystem. An outside area is ideal and more authentic)

The students will review key vocab words such as food chain, food web, prey, herbivore, carnivore, omnivore, Predator, scavenger, procedures, consumers, decomposers by using 'I have, who has game' as the teacher facilitate.

Ask the students to choose a rainforest animal they want to be (ex. macaw, howler monkey, giant charapa turtle, jaguar, green anaconda- without letting them know what the activity is) and write it on a piece of tape and put it on their shirt. [Macaw- Herbivore, Howler Monkey-Herbivore, Capybara-Herbivore, Turtle- Omnivore, Jaguar-Carnivore, King Vulture—Carnivore, Green Anaconda--Carnivore]

Explain that we will be going outside in an area that is marked off as an ecosystem. There will be fruit loops on the ground.

The students' job is to collect fruit loops. When they are finished collecting fruit loops they need to leave the ecosystem. (Don't time this, some students will collect a lot, while others will collect only a few and stop and some will only collect a certain color based on preference and that is okay)

- When the students are down, have them return to the coned off area of the ecosystem, they will need to sort their fruit loops in piles according to color. (Give them a few minutes to organize their fruit loops. Doing this activity outside gets students in a different environment, moving and outside)

Reveal what each color represents: ex. bring out a chart paper and be Vanna White – Usually most don't know how that is so it becomes a teachable moment.

Green: plants

Blue: Water

Red: Predator Meat

Yellow: Shelter

Orange: Scavenger Meat

Purple: Pollution

The teacher will announce: Let the games begin....who will survive in this Ecosystem?

Explain if students are a macaw, howler monkey, or capybara you need to take away (put back in their baggies) the red and orange (meats) because you are a herbivore and this resource is not useful to you.

- The teacher will explain if you are a King Vulture, Jaguar, or Green Anaconda you need to take away green (plants). The teacher will also explain that if you are a King Vulture you need to take away red as they are scavengers.

Omnivores, ex. the turtle, get to keep both plants and meats.

At this point, "the game" really begins of who stays alive because now you make up situation such as the ones below.

- Say "For every purple (pollution) you have – it takes away one water or food source as it contaminates it. (Some may "die" at this point and they should go to the corner of the room.)
- Then say, "You need to have 5 waters, 5 food sources, 5 shelters to survive the first round." Those who "die" from not having enough resources go to one corner of the room. Everyone else puts the fruit loops they used in the baggies because those are used resources.
- The teacher will say to the ones alive, "You now need 4 water, 4 food sources, 4 shelters." A few more will "die".
- The teacher will then say, "The buzzards can take 5 food sources from someone next to them that is 'dead'." (This is because they would have more food sources if things die off because they are scavengers)
- The teacher will then say, "You now need 4 water, 4 food sources, and 4 shelters." A few more will "die".
- This will go on until you have a few left or even just one. The process will show how competition between animals affects an ecosystem.

Have the students will "think" about what this activity represents and why. The teacher will explain that the students will work with their partner (pair) to determine how it works and be able to explain competition using the terms. Each group will select a spokesperson to explain their group's explanation as to why this represents competition. (Share)

In groups, students will critically think about the essential question: How can change in one part of an ecosystem affect change in other parts of the ecosystem? If we added more water but then fewer plants who would that affect? (Less herbivores, then less carnivores, then...).

Teacher Notes:

- Competition between organisms exists in every ecosystem. Organisms are forced to compete against their own species and also different species in order to survive. The stronger and fit organisms have an advantage over those who are weaker, and they have a better chance of surviving.
- Competition between the same species is called intraspecific competition. Many birds of the same species compete for the best nesting grounds. In cases when food or water is scarce, members of the same species will compete for food in order to survive.
- Competition between different species is called interspecific competition. Different species often compete for space, food, or water. For example the lion and the hyena both compete for zebra.

Standards Alignment for Day Two K-8

K GLE 7.4.1 Observe how plants and animals change as they grow.

GLE 0007.9.1 Describe an object by its observable properties.

- Students will construct and observe the plants in their terrarium. They will identify what is needed to help their plants grow and they will observe the changes throughout the week.
- The students will describe the objects needed for the project for their terrarium.

1st

GLE 7.3.1 Recognize that plants and animals are living things that grow and change over time.

7.10.2 Predict and determine what happens over the course of a school day when containers of sand, soil and water with thermometers are placed in a shady location.

- Students will meet both of the standards as they work on their terrarium projects. They will predict what will happen with the temperature in the terrarium as the sunlight shifts throughout the day.

2nd

7.3.2 Design a model of a habitat for an organism in which all of its needs would be met.

7.2.2 Investigate ways that plants and animals depend on each other.

- Students will design a habitat for their plants in their terrarium. They will plan to ensure they meet the needs of their plant. They will investigate through the fruit loops game how plants and animals depend on each other by observing what happens when you don't have enough food for animals that eat plants or animals.

3rd

7.5.2 Investigate the connection between an organism's characteristics and its ability to survive in a specific environment.

7. Inq.3 Maintain a science notebook that includes observations, data, diagrams, and explanations.

Through both activities students will investigate what both plants and animals need to survive in the rainforest. They will keep their observations of their terrarium throughout the week in their science journal.

4th

SPI 7.5.1 Investigate an organism's characteristics and evaluate how these features enable it to survive in a particular environment.

GLE 7.5.2 Describe how environmental changes caused the extinction of various plant and animal species.

Through both activities students will investigate what both plants and animals need to survive in the rainforest. They will specifically look at the animals in the fruit loop game and determine what they need to survive in the rainforest. They will make a connection in how changes in the environment can cause the extinction of various plants and animals.

5th

GLE 7.9.3 Investigate factors that affect the rate at which various materials freeze, melt, or evaporate.

7.Inq.2 Identify tools needed to investigate specific questions.

Students will be given the challenge to create the terrarium. They will be given materials to choose from the make it and then will be asked to design it. They will be asked to specifically determine through the experiment if they can create a small scale design to replicate the rainforest. In this

investigation they will have to look into factors that affect evaporation of the water within the terrarium.

6th

SPI 7.2.2 Interpret how materials and energy are transferred through an ecosystem.

GLE 7.2.4 Analyze the environments and the interdependence among organisms found in the world's major biomes.

Students will observe how materials and energy are transferred through the rainforest through the fruit loops game. They will see how a lack of a particular resource can affect the whole system. They will make connections and will analyze how environments are different and how organisms are all interconnected.

7th

7.Inq.5 Design a method to explain the results of an investigation using descriptions, explanations, or models.

7. T/E.5 Develop an adaptive design and test its effectiveness.

Students will keep records and observations of their terrariums throughout the week. They will make connections between the terrarium they design and the rainforest. They will make adaptations in there project to prepare for temperature changes, lack of plant growth and more. Their records will contain descriptions, and explanations.

8th

GLE 7.5.4 Explain why variation within a population can enhance the chances for group survival.

SPI 7.5.4 Identify several reasons for the importance of maintaining the earth's biodiversity.

Through the fruit loop game students will explain why a variation within a population could enhance the whole group survival. During the game they will discuss how important it is to maintain the earth's biodiversity.

Day Three

Building the Great Kapok Tree

Read and discuss with your students the following book. *The Great Kapok Tree* by Lynne Cherry. Related Resource & Video: <http://www.unique-southamerica-travel-experience.com/kapok-tree.html>

Learners build a model tree and then figure out how to make their tree stand up by itself. This illustrates how the tall rain forest trees adapt to support a huge trunk and heavy branches, while also sending their roots out instead of down.

Teams of 2

For each team of 2:

- masking tape
- 1 large brown grocery bag - heavy gauge
- green tissue paper cut into 10 x 6 inch pieces (four pieces per team)
- 10 x 10 inch pieces of tagboard or cardboard (1 or 2 pieces per team)
- scissors

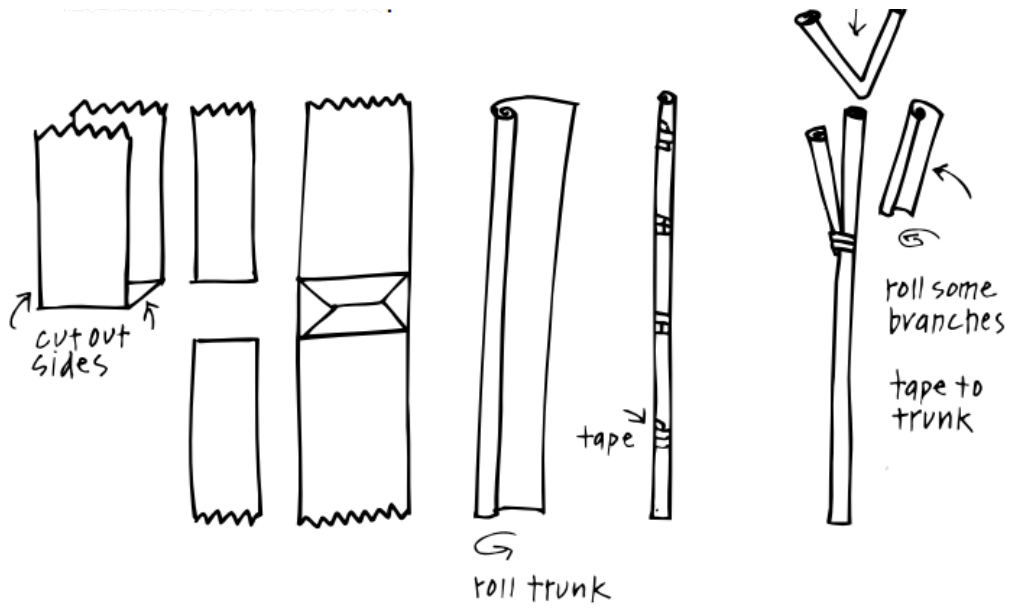
What We Know. In the rain forest, competition for light and space is fierce. One way trees solve this problem is to grow taller than their neighbors. But being a tall tree has some big problems. A woody giant must support a huge trunk and heavy branches without toppling over.

Big rain forest trees need a lot of foot room. The forest is a crowded place, and the soils of the rain forest are very shallow. These trees can't reach deep to get a good grip in the earth. Rain forest trees are forced to send their roots out instead of down. This makes standing up tall a bit tricky

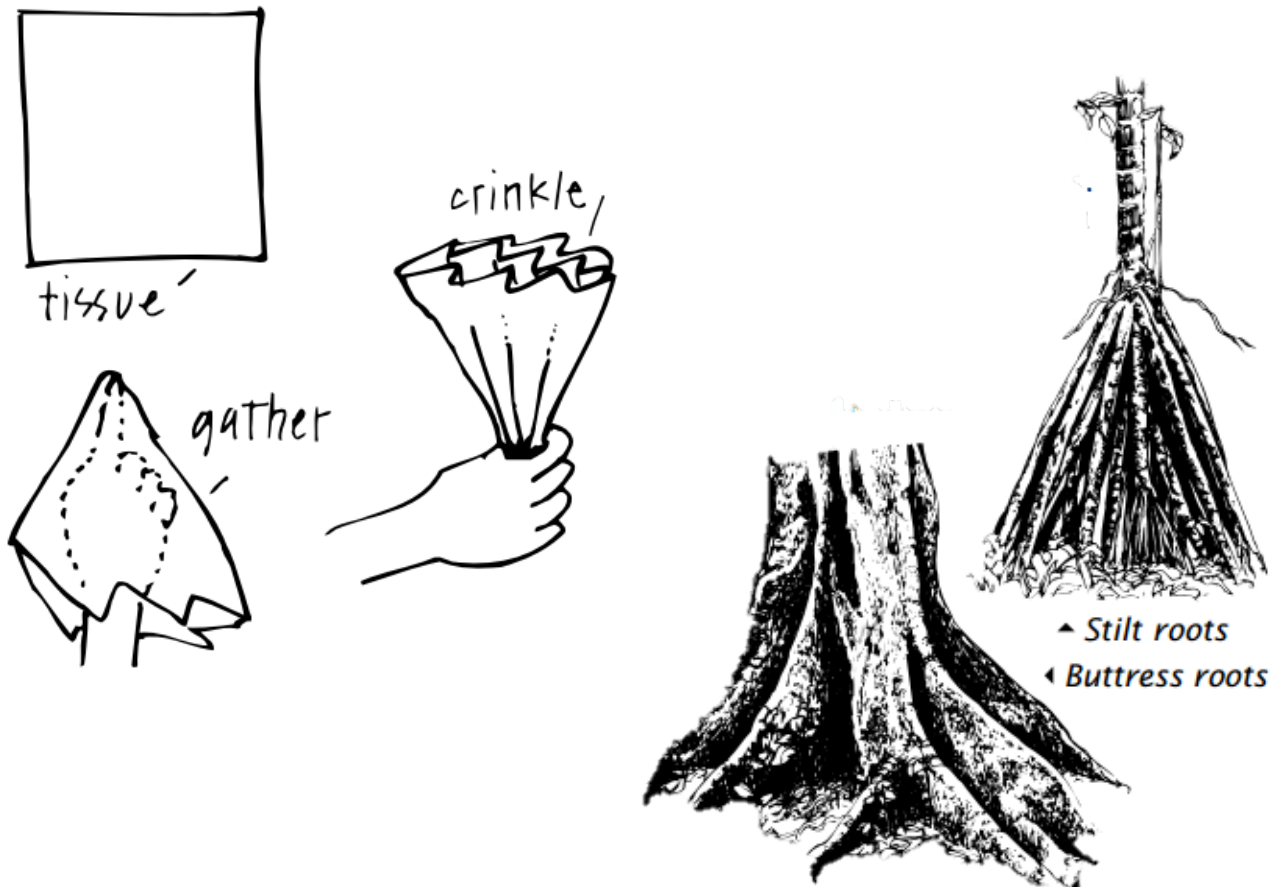
Part One: Build a Tree

Have students choose a partner or assign one to them. Follow the steps below to build a rain forest tree out of your paper bag.

1. Cut the narrow side panels out of your paper bag and set them aside.
2. Lay the bag out flat. Make a 1-centimeter fold along one long edge.
3. Roll the paper bag tightly around the fold to make a long, skinny tube. When finished, the tube should be tight and measure about 2 centimeters in diameter by 80 centimeters long.
4. Tape the tube shut. You have formed the trunk of your model tree.
5. Roll one of the paper bag panels you had set aside using the same method. Tape it shut. Bend it in half and insert it into the top of the trunk to make a branch (see picture).



6. Roll the second panel and tape it just as you did the first one. Cut it in half. Tape onto the trunk to create more branches.
7. To make leaves, place your index finger in the center of a piece of tissue paper. Gather paper around your finger to form a handle. Crinkle it to look like leaves.
8. Stuff it into a tube (branches) and tape it in place. (See below for an example).

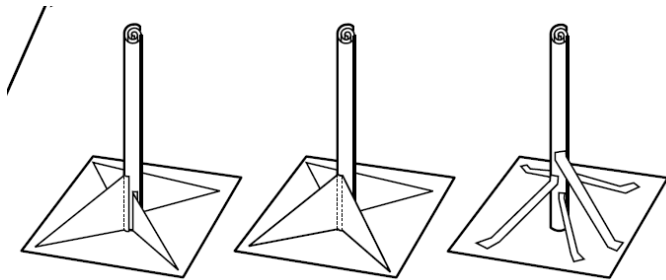


Part Two: The Stand-up Challenge

Hiking in the rain forest is like stepping across a maze of thick cables. The forest floor is a tangled mess of roots as trees reach out to get a good hold on the earth. In the in a rain forest you will soon notice that many of the trees have weird structures at the base of their trunks. Wing-shaped wedges called buttress roots stick out of some tree bases, while other trees have stilt roots. Scientists aren't sure, but many think these roots evolved to help trees stand up.

Challenge: Invent a system to make your tree stand alone. Use cardboard and tape to help solve the challenge. Then, find a flat space to set up your tree alongside your tribes trees to create a forest.

Part Three: BrinMake to scale replicas of animals that were in the Great Kapok tree and decorate your trees with the animals that would live in the tree or on the rainforest floor. Then the teacher will judge which rainforest appears to be the most realistic and best designed. Tribes will be judged on how well they met the tree challenge. The ideas below suggest some solutions.



If your tree will not stand alone, try another idea or ask someone to help you.

If there is time, come together as a group. Talk about what worked and what didn't.

Standards Day Three K-8

K

K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and thread) and drawing shapes.

K.G.1. b) describe the relative positions of objects using terms such as above, below, beside, in front of, behind, and next to.

How the standards will be used:

Students will model shapes of trees as they work on the project.

They will describe their final projects using the terms to describe relative positions.

1st Grade

1. MD.2.c). Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

1.G.5. Model shapes in the world by building shapes from components (e.g., sticks and paperclips) and drawing shapes.

Students will describe their finished tree by measurable attributes.

They will model the shapes of the world by creating their trees.

How the standards will be used:

2nd Grade:

2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.3. Estimate lengths using units of inches, feet, centimeters, and meters.

7.T/E.3 Use tools to measure materials and construct simple products.

How the standards will be used:

Students will be given specific design lengths to use when making their trees or they will be given the option to describe their finished trees by estimating the lengths in inches and centimeters. They will use the appropriate tools to make the measurements.

3rd Grade:

3.MD.4. a) Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

7.T/E.3b Determine criteria to evaluate the effectiveness of a solution to a specified problem.

How the standards will be used:

Students will be given specific design lengths to use when making their trees or they will be describe their finished trees by measuring their lengths by halves and fourths of an inch . They will use the appropriate tools to make the measurements. They will make a design to make their tree stand up.

4th Grade:

4.MD.1. a) Know relative sizes of measurement units within one system of units including inch, foot, yard, km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec.

7.T/E.3b Determine criteria to evaluate the effectiveness of a solution to a specified problem.

How the standards will be used:

Students will be given specific design lengths to use when making their trees or they will be describing their finished trees by measuring their lengths. They will use the appropriate tools to make the measurements. They will make a design to make their tree stand up.

5th Grade:

5.MD.1.b) Use conversions between measurement units in solving multi-step, real world problems.

7.12.2 Identify the force that causes objects to fall to the earth.

Students will use conversions to determine the scale of their trees compared to the trees in real life.

Students will discuss gravity and how it causes objects to fall to the earth.

6th Grade

7.T/E.2a Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

7.T/E.1b Use appropriate tools to test for strength, hardness, and flexibility of materials.

Students will discuss what the engineering process is and then put it into play as they create their trees and have them stand up. They will work to use the appropriate tools to create the tree to have the strength and flexibility that it needs.

7th Grade

7.T/E.2a Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

7.T/E.1b Use appropriate tools to test for strength, hardness, and flexibility of materials.

Students will discuss what the engineering process is and then put it into play as they create their trees and have them stand up. They will work to use the appropriate tools to create the tree to have the strength and flexibility that it needs.

8th Grade

G-MG.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost or use of materials)

7.T/E.2a Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

Students will discuss what the engineering process is and then put it into play as they create their trees and have them stand up. They will have a challenge to see who can create a viable model with the least amount of materials or the most realistic model with the limited resources they have. They will work to use the appropriate tools to create the tree to have the strength and flexibility that it needs.

Day Four

STOP and Think

As we travel through the rainforest we'll need to use the Boy Scouts mnemonic device of "STOP", which stands for "Stop, Think, Observe, and Plan".

Here is a list of what we should be doing:

1. Find a source of drinking water.
2. Find or build a shelter before nightfall.
3. Fashion a weapon we can use for self-defense.
4. Wait to see if rescue arrives.
5. Find a source of food.
6. Travel in one direction during daylight hours.

Build a Treetop Walkway!

Build and test a scale model of a rainforest canopy walkway. Rainforest researchers must consider materials, transportation, and cost so they don't damage the fragile canopy environment as they

study it. You'll 'carry in' your supplies, build a model bridge, and then test it to see how much weight it can support. This activity is also available as an online simulation.

Materials for each bridge:

- Pencil
- Paper
- Ruler
- 20 craft/popsicle sticks
- 2 meters (about 6 feet) of heavy thread or light string
- 6 paperclips
- 20 toothpicks
- 6 straws
- 2 chairs
- Glue
- Masking tape
- Measuring tape (or meter/yard stick)
- 14 ounce soup can (full)

We are researchers in the rainforests of Peru. To reach your research site high in the treetops, we must build a walkway using only the materials you can carry into the rainforest (listed above). We have a limited amount of funds/trade goods available to us to use at the store.

Give students a budget and/or assign a value to each item. Ex. 3,500 pesos (\$3.50) as a budget and 10 cents per construction item, with an additional .05 per 'waste' left in the rainforest [aka. broken or wasted supplies.]

Your Challenge:

1) Design and build a walkway that includes:

Two chairs (the seats of the chairs will be viewing platforms).

A pulley system that can raise a soup can from the floor to the seat of one chair.

A 25 centimeter high bridge (from the floor) that is 40 centimeters long (from one chair leg to a leg on another chair). The bridge should be wide and strong enough to support the soup can for 30 seconds.

Students must construct a successful walkway that keeps the costs down but still is effective in lifting the required weight.

2) Use a pencil, paper, and ruler to sketch your walkway design in actual size. List the materials you plan to use. Describe where you plan to use them. This will help you build your walkway.

3) Once designed, build your walkway out of the craft/popsicle sticks, thread, paperclips, toothpicks, straws, chairs, glue, and tape. You may use the measuring tape (or meter/yard stick) and scissors as tools, but they cannot be part of the walkway. You do not need to use all your materials, but you can't use any more (Remember, you were unable to carry any more into the rainforest).

4) After you build your walkway, test it! Gently place the soup can on the center of the walkway. If the walkway supports the can's weight for 30 seconds, you've created a successful walkway. Now try to raise the can to the seat of the chair with your pulley.

What's Going On?

A canopy walkway is a unique and tricky bridge to build. The walkway must be strong enough to hold the weight of all of our researchers and their equipment. Heavy equipment supports, and other building materials destroy the fragile ecosystem. Canopy walkways are often designed to support four or five times the weight they need to carry to ensure the safety of the people using them. Can your walkway support five soup cans? If not, what changes can you make so it will? What types of materials can you use?

Tip” Help your students think about the design of the walkway before they build and tests it. List the characteristics of a safe and effective canopy walkway (e.g. it should be strong enough to support the weight of the researchers; it shouldn't destroy the canopy, etc.).

Standards Alignment for Day FOUR K-8

K

K.MD.1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and thread) and drawing shapes.

K.G.1. b) describe the relative positions of objects using terms such as above, below, beside, in front of, behind, and next to.

How the standards will be used:

When constructing their treetop walkways from the provided materials students will need to first plan their walkways by drawing them out. Then, after the teacher has demonstrated the terms, the students will describe the positions of the objects they are using and where they want to be using positional words.

Students will measure the distances between the chairs using provided objects, such as a pre-measured string, rulers, etc. and compare objects for length, weight, etc. and describe them using words such as heavier, lighter, longer, and shorter.

1st Grade

1.MD.2.c). Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

1.G.5. Model shapes in the world by building shapes from components (e.g., sticks and paperclips) and drawing shapes.

1.G.1.b) describe the relative positions of objects using terms such as above, below, beside, in front of, behind, and next to.

How the standards will be used:

When constructing their treetop walkways from the provided materials students will need to first plan their walkways by drawing them out. Then, after the teacher has demonstrated the terms and written them on the board, the students will describe the positions of the objects they are using and where they want to be using positional words such as above, below, behind.

Students will measure the distances between the chairs using provided objects, such as a pre-measured string, rulers, etc. and compare objects for length, weight, etc. and describe them using words such as heavier, lighter, longer, and shorter.

2nd Grade:

2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.3. Estimate lengths using units of inches, feet, centimeters, and meters.

7.T/E.3 Use tools to measure materials and construct simple products.

How the standards will be used:

The standards will be met through the activity when students use tools to measure the distances of and between objects and weights and lengths of construction supplies in order to build their walkways and also use tools to make their walkways. Once students have measured their objects they can use them to estimate the distances and heights and weights of the objects they are using to build and test their walkways.

3rd Grade:

3.MD.4. a) Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

3.MD.2. a) Measure and estimate lengths, volumes, weights, and/or masses of objects using standard units, ex. grams (g), kilograms (kg), and liters (l).

7.T/E.3b Determine criteria to evaluate the effectiveness of a solution to a specified problem.

How the standards will be used:

The standards will be met through the activity when students use tools to measure the distances of and between objects and weights and lengths of construction supplies in order to build their walkways and also use tools to make their walkways. Once students have measured their objects they can use them to estimate the distances and heights and weights of the objects they are using to build and test their walkways.

4th Grade:

4.MD.2. a. Use the four operations to solve problems involving distances.

4.MD.1. a) Know relative sizes of measurement units within one system of units including inch, foot, yard, km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec.

7.T/E.3b Determine criteria to evaluate the effectiveness of a solution to a specified problem.

How the standards will be used:

The standards will be met through the activity when students are asked to measure the construction supplies and the distances using a system of units, ex. cm, meters or inches and yards. Students will be asked to verbally compare them and state which size and type of measurement would work best in a variety of situations, such as a paperclip vs. the distance between two chairs. Students will take notes on the measurements, and then can use the data to estimate in a variety of situations, ex. how many of an object, ex. paperclips, they will need to span a distance, how heavy five soup cans might be, etc.

Students, and the class as a whole, will help determine the criteria for success or effective construction of their walkways, ex. In order to be successful student's bridges will need to be able to lift a minimum of one soup can from the floor to the seat of the chair without falling apart.

5th Grade:

5.MD.1.b) Use conversions between measurement units in solving multi-step, real world problems.

7.12.2 Identify the force that causes objects to fall to the earth.

7.11.3 Conduct experiments using a simple experimental design to demonstrate the relationship among mass, force, and distance traveled.

How the standards will be used:

The standards will be met through the activity when students are asked to measure the construction supplies and the distances using a system of units, ex. cm, meters or inches and yards. Students will be asked to verbally compare them and state which size and type of measurement would work best in a variety of situations, such as a paperclip vs. the distance between two chairs. Students will take notes on the measurements, and then can use the data to estimate in a variety of situations, ex. how many of an object, ex. paperclips, they will need to span a distance, how heavy five soup cans might be, etc. Students will be asked to convert between them, ex. cm to meters, while doing so. Ex. If one paper clip is 3 cm and we need to go half a meter, how many paper clips will we need?

Students will be asked to determine what force is causing their objects to fall to the ground and is trying to hold the soup can down in opposition to their pulley.

While building their walkways students will determine how the mass and weight of the soup can are related to the force necessary to lift the can the distance to the height of the seat. They will determine whether increasing the mass or weight of the object that they are trying to lift affects either the distance they can lift it or the force they need to do it.

6th Grade

6.SP.5. b) Describe the nature of the attribute under investigation, including how it was measured and its units of measurement.

7.T/E.2a Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

7.T/E.1b Use appropriate tools to test for strength, hardness, and flexibility of materials.

How the standards will be used:

The standards will be met when students measure the construction supplies and the distances and describe in their notes what the objects are in the planning diagrams of their walkways and note what measurement each object is and how they got it, ex. paperclips, 3cm, with a ruler, 1 soup can, 6oz with a scale.

Students will practice the engineering design process when constructing their walkways. The teacher will go over the steps of the engineering process prior to students working on their projects and when students encounter challenges during testing or construction they will be encouraged to go back to the steps, try new ideas, and retest until a successful prototype is made.

Materials will be tested during the building phase of the project by students when they use them for construction and test them using tools such as hands, scissors, other objects, etc. Students will use these comparisons to choose the best materials for constructing their walkways based on what characteristics they are looking for, ex. strength, desired amount of flexibility, etc.

7th Grade

7.G.6. Solve real-world and mathematical problems involving volume, weight, mass, length, and/or height of two- and/or three-dimensional objects.

7.T/E.2a Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

7.T/E.1b Use appropriate tools to test for strength, hardness, and flexibility of materials.

How the standards will be used:

- The standards will be met when students measure the construction supplies and the distances and describe in their notes what the objects are in the planning diagrams of their walkways and note what measurement each object is and how they got it, ex. paperclips, 3cm, with a ruler, 1 soup can, 6oz with a scale.
- Students will practice the engineering design process when constructing their walkways. The teacher will go over the steps of the engineering process prior to students working on their projects and when students encounter challenges during testing or construction they will be encouraged to go back to the steps, try new ideas, and retest until a successful prototype is made.
- Materials will be tested during the building phase of the project by students when they use them for construction and test them using tools such as hands, scissors, other objects, etc. Students will use these comparisons to choose the best materials for constructing their walkways based on what characteristics they are looking for, ex. strength, desired amount of flexibility, etc.

8th Grade

G-MG.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost or use of materials)

6.Math.7 Use length, area, weight, mass, and/or volume to estimate and explain real-world problems.

7.T/E.2a Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.

The standards will be met when students construct their walkways with the goal of staying in budget, minimizing cost, and still building an effective walkway that lifts the required weight.

Students will practice the engineering design process when constructing their walkways. The teacher will go over the steps of the engineering process prior to students working on their projects and when students encounter challenges during testing or construction they will be encouraged to go back to the steps, try new ideas, and retest until a successful prototype is made.

Students will be asked to measure the construction supplies and the distances using a system of units, ex. cm, meters or inches and yards. Students will be asked to verbally compare them and state which size and type of measurement would work best in a variety of situations, such as a paperclip

vs. the distance between two chairs Students will take notes on the measurements, and then can use the data to estimate in a variety of situations, ex. how many of an object, ex. paperclips, they will need to span a distance, how heavy five soup cans might be, etc. Students will be asked to convert between them, ex. cm to meters, while doing so. Ex. If one paper clip is 3 cm and we need to go half a meter, how many paper clips will we need?

Academic Vocabulary focus for the week

K- animal, growth, observe, parts, shapes, size, tools

1st- sequence, investigate, push, pull, plant, life cycle, estimate, direction

2nd-investigate, observation, habitat, distance, dimensions, depend

3rd- threatened, thriving, endangered, tools, conservation

4th- relationship, erosion, diversity, population, exploration

5th- data, point of view, solution, symbiosis, region, urbanization

6th abiotic, biotic, biome, design constraint, prototype

7th simulation, phenomenon, simple machine, function, stress

8th biodiversity, consumption, species, variation, sequence