



RAINFOREST ADVENTURE

Activity Guide

For educators



minotaur mazes

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Welcome to the rainforest! We're excited you'll be joining us to experience a Rainforest Adventure. Included in this guide you will find resources to use in your classroom before your visit and ideas on how to use the exhibit to extend on the content you're already teaching.

Activities are divided into grade band appropriate lessons for K-2nd, 3rd-5th, and 6th-8th grade, and they relate to standards in Life Science, Earth & Space Science, Language Arts, Math, and more. The section titled "Exploring the Exhibit" gives additional details and resources to help you make the most out of your visit. See the "Rainforest Adventure Connection" at the end of each activity to guide you toward the appropriate extension activity. There are additional lessons and activity resources provided in the educational materials folder from Minotaur Mazes.

Feel free to use and adapt the activities described in this guide to suit the needs of your students and classroom.

Enjoy!

Contents

K-2nd Classroom

ACTIVITY 1 - Rainforests Around the World	2
ACTIVITY 2 - Tree Stewardship	7
ACTIVITY 3 - The Great Kapok Tree	11

3rd-5th Classroom

ACTIVITY 4 - Build a rainforest	18
ACTIVITY 5 - How much water?	21
ACTIVITY 6 - Rainforest Animals and Adaptations	25
ACTIVITY 7 - Biodiversity and Earth's Rainforests	30
ACTIVITY 8 - Migration Headache	35
ACTIVITY 9 - Tropical Resources & Sustainability	37

6th-8th Classroom

ACTIVITY 10 - Tree Architecture	42
ACTIVITY 11 - Tropical Resources & Sustainability	47
ACTIVITY 12 - Migration Math Madness	52
ACTIVITY 13 - Animal Essays	54

Exploring the Exhibit

Hunting for Animal Adaptations	56
How Rainforests are Important	61
Layers of the Rainforest	63
Animal Classification	66

ACTIVITY 1 - Rainforests Around the World

Ages: Grades K-2

Time: 20-30 minutes

Standards: Life Science: Biological Evolution

Overview: Students will practice observation skills to compare and contrast ecosystems in rainforest environments from around the world.

Materials:

- Rainforests of the world coloring pages (provided)
- Coloring materials (crayons, colored pencils, etc.)

Procedure:

Part 1: Coloring the rainforest

- Let students pick (or assign) a coloring page highlighting plants and animals of a different rainforest around the world (provided in Resources). Try to hand out pages so that students sitting next to each other end up with different rainforest pages.
- Give students time to color the pages.

Part 2: Analyzing the rainforest

- After students have finished coloring their pages, let them compare their drawings with a neighbor. What animals and plants are the same and what is different? For example, both drawings might have birds, but one has a toucan and one has a hornbill. Ask students to dive deeper into their observations. If they noticed different birds, ask them what differences there are in the physical characteristics of the birds and if they can guess why the animals may have different features.

Part 3: Rainforests of the world

- Explain to the students that rainforests are located around the world. Show students a world map indicating where the rainforests are located in Africa, Asia, and South America.
- Rainforests provide home to lots of different types of plants and animals, which are very different from the ones we see everyday. Explain that just like humans look different around the world, so do the animals of the rainforests on different continents.

Rainforest Adventure Connection:

- As students explore the Rainforest Adventure exhibit, ask them to pay attention to the different animals highlighted on the informational panels.

- After visiting the exhibit, ask students to recall the animals they saw in the exhibit. If possible relate the animals to the coloring pages to determine which rainforest of the world they are from.

Resources:

- African Rainforest coloring page
- Amazon Rainforest coloring page
- Asian Rainforest coloring page

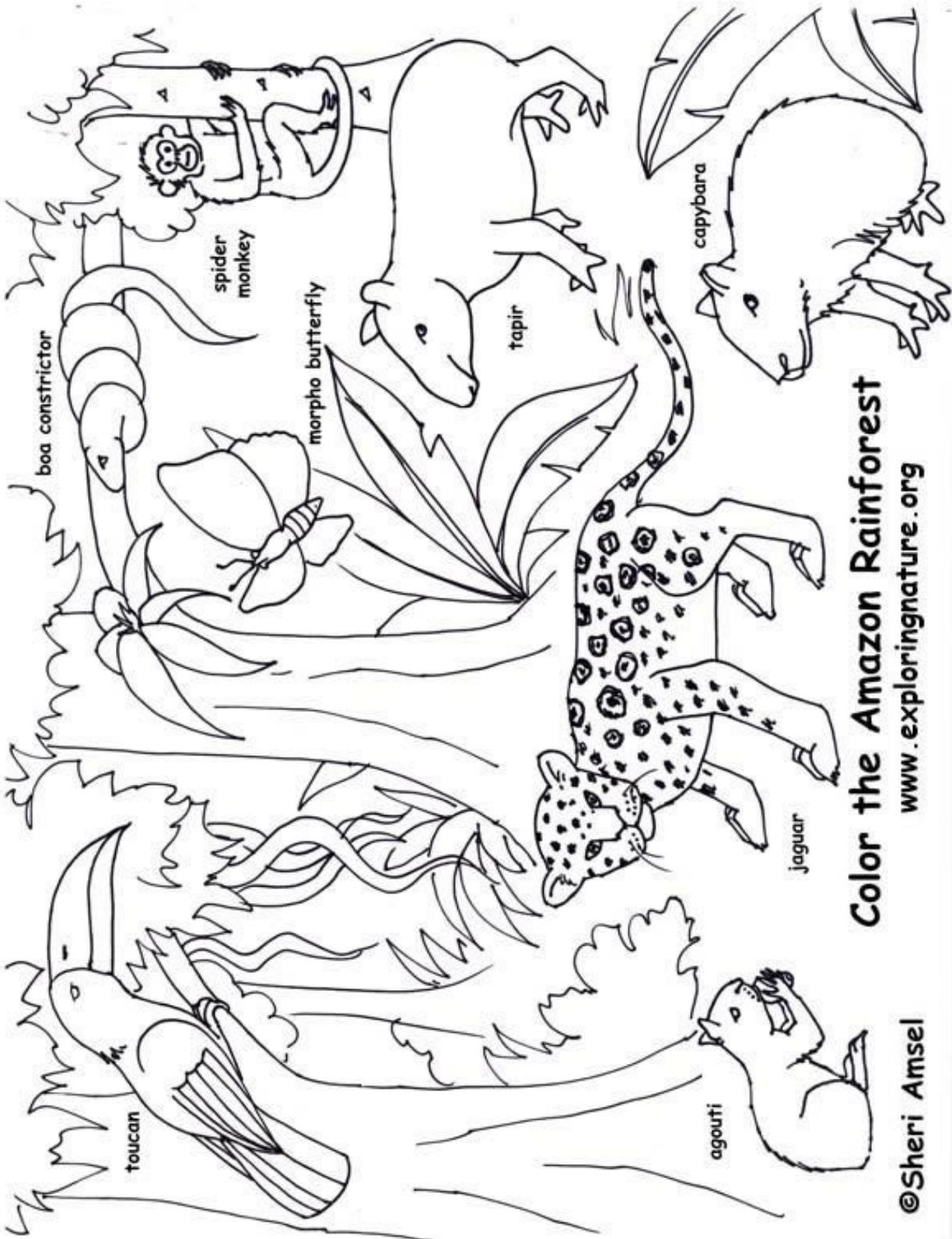
- Coloring Pages from
 - Amsel, Sheri. "Rainforest () Coloring Page" Exploring Nature Educational Resource ©2005-2020. April 3, 2020 < <http://www.exploringnature.org/> >

Color the African Rainforest



www.exploringnature.org

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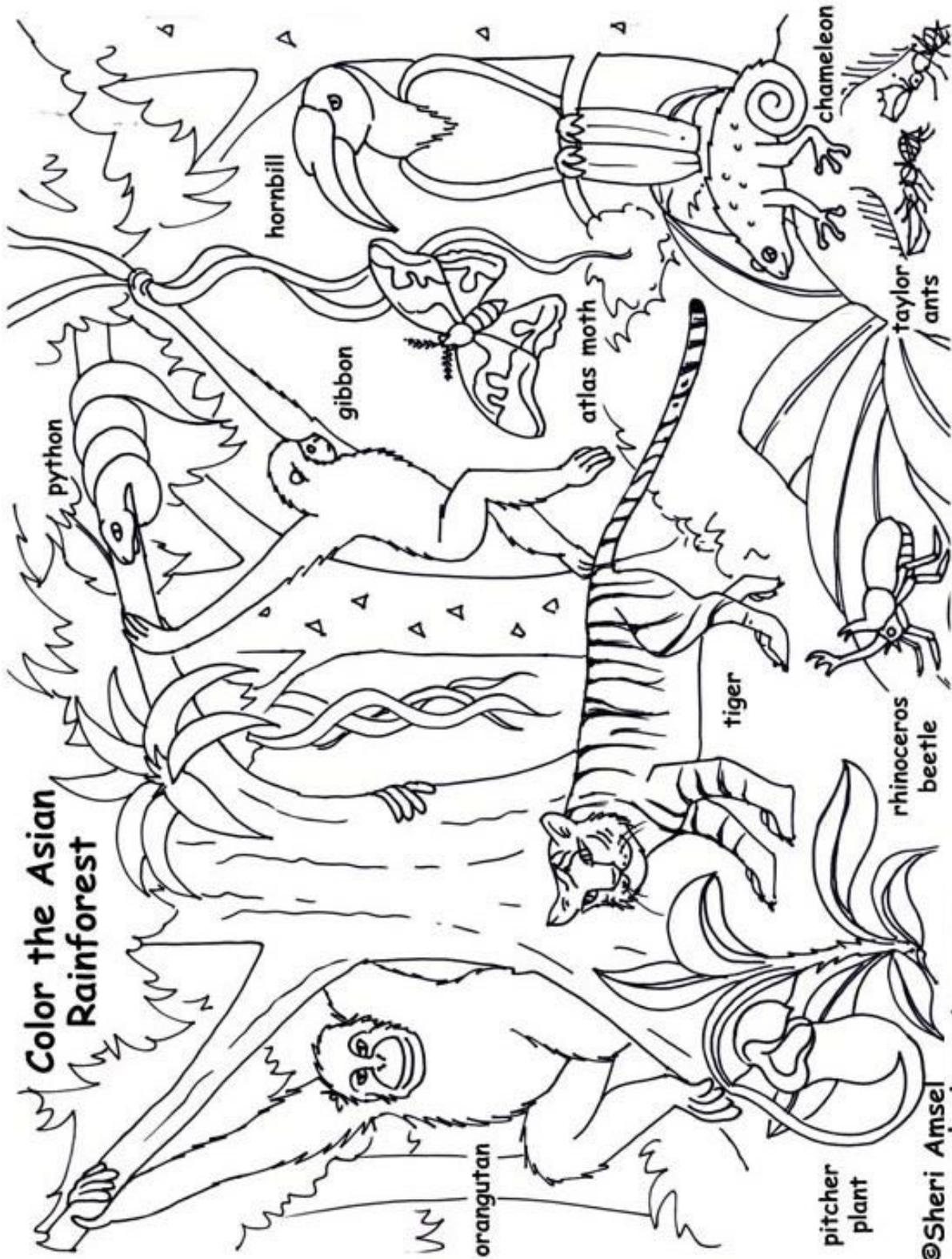


Color the Amazon Rainforest

www.exploringnature.org

©Sheri Amsel

Color the Asian Rainforest



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ACTIVITY 2 - Tree Stewardship

Ages: 1st-2nd grade

Time: 30-45 minutes

Overview: Students will develop an understanding of stewardship by exploring the things that trees give and need things from humans and what humans give and need from trees.

Standards: Language Arts: Key Ideas & Details; Earth & Space Science: Earth & Human Activity

Materials:

- A copy of *The Giving Tree* by Shel Silverstein (hardcopy, video, or digital)
- Chart paper and markers
- Examples of paper and cardboard products to display to class
- Leaf pattern (provided in Resources)
- Writing and coloring utensils
- Large teacher-made tree for bulletin board (see notes in Prep)

Prep: Draw a line down the middle of a piece of chart paper to divide it into two columns. Label one column “Giving” and the other “Receiving.”

Create a large tree trunk and branches for a display board by cutting out brown paper or color the paper brown. Alternatively, draw a large tree on a big piece of paper.

Procedure:

Part 1: The Giving Tree

- Ask the students what trees give to people and keep track of responses on a piece of chart paper under a header labeled “Giving.”
- To explore the ways that trees give to people, read the book *The Giving Tree* by Shel Silverstein. Choose one of the options below to share the story with your students. If desired and if able, read the story outside under a tree.
 - Teacher reads a paper copy of “The Giving Tree” aloud to the class
 - Class watches a video: <https://www.youtube.com/watch?v=XFQZfeHq9wo>
 - Teacher and/or students read aloud from a projected version of the story as an online slideshare: <https://www.slideshare.net/peneglos/thegivingtree>
 - 12 students volunteer to read parts of the story as a Reader’s Theater activity: <https://www.slideshare.net/joselyn198/the-giving-tree-40608459>

Part 2: The Receiving Tree

- After reading the story, ask students to add any new ideas to the chart of what trees give to people.
- Explain that trees give people a lot, but they also need things in return.

- Ask students what they think trees need to receive, or in other words, what do people need to give trees? Responses can include: sunshine, air, soil, water, space to grow, no pollution. Catalog these responses on the opposite side of the chart paper under the header, “Receiving.”

Part 3: Giving and Receiving together

- Explain to students that there are ways trees can give to us and we can give to trees at the same time. Ask students to think about what paper has to do with trees. If students are stumped, explain that paper comes from trees and there are lots of paper products we get from trees! Hold up examples of tissues, paper towels, cardboard packaging, and other materials made from paper pulp.
- Explain that the more paper and cardboard used, the more trees that need to be cut. Recycled paper products are made from old paper that is remade into new products.
- Ask students why using two sides of paper, recycling paper, and buying recycled paper can help trees. Explain that if we do these things, we can use what trees have to offer, but not use so much that it hurts the trees.

Part 4: Stewardship

- Write the word steward on the board. Explain to students that people who take care of, treat with respect, and do not harm things are stewards of those things. “Tree stewards” are friends to the trees. They take care of and treat the trees with respect so that the trees will be around for a long time.
- Ask students how they can be stewards of trees and add responses to the “Receiving” side of the chart. Responses may include planting new trees, using less products from trees like cloth napkins rather than paper, reusable lunch box rather than paper bag, reusable cup rather than paper cup.

Part 5: Make a Receiving Tree

- Explain that we have now discovered ways people need and can help trees and trees need and can help people.
- To remind us to be good tree stewards, we are going to make our own “Receiving Tree” to keep in the classroom.
- Provide a large tree with trunk and branches cut from brown paper or colored brown, or draw one on paper. If desired, label the parts of the tree.
- Give each student a leaf pattern to cut out, add an illustration and/or sentence, and color. The illustration and sentence should show an example of a way people can give to trees or what trees can receive from people.
- When students are done, have them add their leaves to the tree branches to complete the tree.
 - Alternatively, students can take their leaves home to remind them to be Tree Stewards.

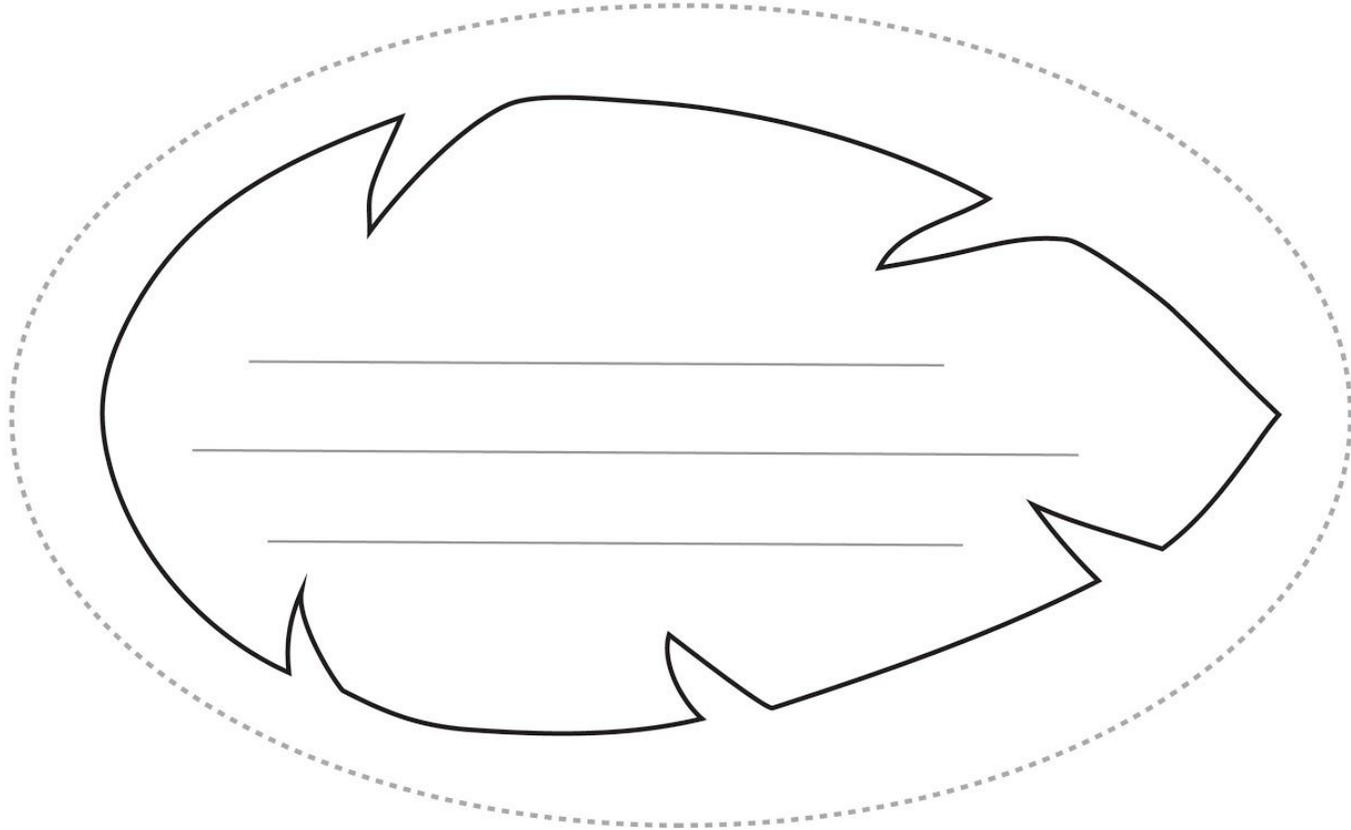
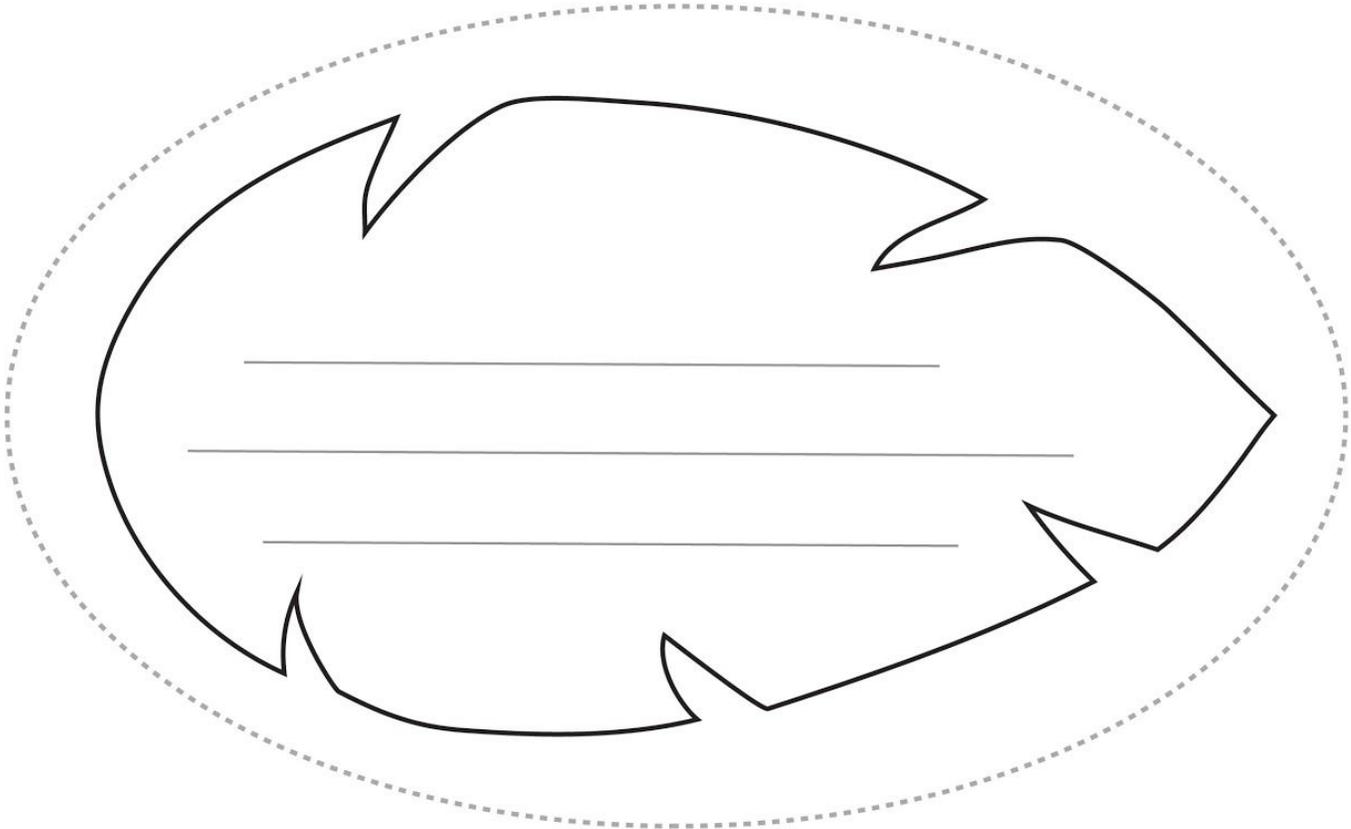
Rainforest Adventure Connection:

- Students should complete the Rainforest Adventure exhibit from start to finish.
- If possible, send students in small groups through the maze accompanied by adult chaperones. Adult chaperones should help students read question prompts and informational text so that students can get the most out of the exhibit experience.
- After completing the exhibit, ask students to reflect on their experience and think about what else they can add to their Giving and Receiving Tree chart.
- Based on the exhibit experience, have the class complete a Giving and Receiving Rainforest chart to highlight things humans get from the rainforest and what the rainforest needs from humans.

Resources:

- Giving Tree Leaf cut out

Giving Tree Leaf Cut Out



ACTIVITY 3 - The Great Kapok Tree

Ages: Grades K-2

Time: 30 minutes

Overview: Students will synthesize information from a story about human activity in the Amazon to develop an understanding of interdependent relationships in rainforest ecosystems.

Standards: Language Arts: Key Ideas & Details; Earth & Space Science: Earth & Human Activity; Life Science: Ecosystems

Materials:

- White board or chart paper
- *The Great Kapok Tree: a tale of the Amazon Rainforest* by Lynne Cherry
- Animal pictures (provided in Resources below)
- Tape
- Large drawing or construction paper cutout of a tree (see notes Prep)
- Drawing paper and pencils

Prep: Draw a large tree on paper and print pictures of the animals listed in the story.

Procedure:

Part 1: What animals need to survive

- Ask students to think about the animals that live outside in their neighborhood. As a class, develop a list of animals, where they live, and what they need to survive. You can record their responses on a white board or chart paper. Draw the conversation especially toward animals that live in or depend on trees. Examples of animals could include different types of birds, squirrels, bats, raccoons, opossums, chipmunks, porcupines, tree frogs, beetles, etc.
- After creating a list of animals, ask the students to think about what the animals need to survive and what might happen to them if they lose important resources like trees. Examples might include: birds lose nesting places, squirrels lose food sources, raccoons lose holes to nest inside of, etc.

Part 2: The Great Kapok Tree

- Explain to students that while we may only see a few animals outside around our neighborhoods, thousands of animals live in rainforests and the trees that they live around are very important to them. In this lesson, we will be meeting some of the animals of the rainforest.
- Read the story, *The Great Kapok Tree: a tale of the Amazon Rainforest* by Lynne Cherry
 - Video telling: Mrs. Thomas reads The Great Kapok Tree
<https://www.youtube.com/watch?v=H-j9RRSWS1U>

- Slideshare: Great Kapok Tree
<https://www.slideshare.net/YenTan1/great-kapok-tree>

Part 3: Rainforest animals

- After reading the story, have students review the details of the story as a class. Explain that you are going to create your own Kapok tree as a class to remind us how important trees are to animals around them.
- Hold up a picture of an animal described in the story. Ask the students to raise their hands and share a detail about what the animal told the sleeping man, discuss what the animal was afraid of losing if the man cut down the tree, and why it might be afraid. Write the answer next to the image for the class.
- Discuss where in the tree the animal lives (based on text in the story or prior knowledge) and have a volunteer place the cutout on the tree using a piece of tape. See notes in Prep for making the tree ahead of time.

Part 4: Animal-tree connections

- After discussing the story, provide students with paper and drawing materials. Ask the students to each pick one animal from the story and draw a picture of it in its habitat. Make sure students highlight how the animals depend on their tree in their drawing.

Rainforest Adventure Connection:

- Students should complete the Rainforest Adventure exhibit from start to finish.
- If possible, send students in small groups through the maze accompanied by adult chaperones. Adult chaperones should help students read question prompts and informational text so that students can get the most out of the exhibit experience.
- After completing the exhibit, students should pause in the final room to complete the Rainforest Puzzle and place animals in their correct habitat.
- Students may also spin the wheel in the final room to go on a Rainforest Quest to find the animals throughout the maze.
- After visiting the exhibit, debrief the experience by discussing the animals that were showcased within the exhibit. Did the exhibit have any animals in common with *The Great Kapok Tree* story?
- Adaptation: Older students who are proficient at reading may be able to complete the “Hunting for Animal Adaptations” activity described in the “Exploring the Exhibit” section of this activity guide.

Resources:

Pictures of animals from The Great Kapok Tree



Boa Constrictor



Bumble Bee



Monkey



Toucan



Macaw



Cock-of-the-Rock



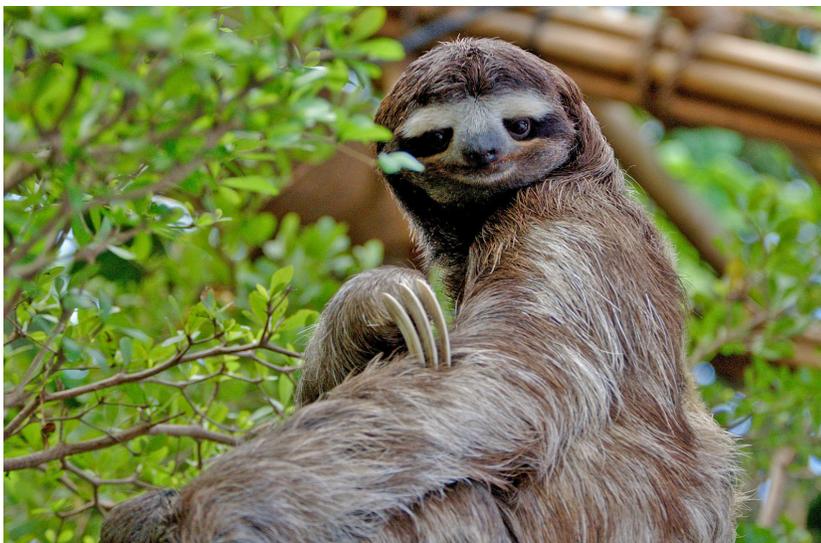
Red-eyed tree frog



Jaguar



Giant Anteater



Three-toed sloth

ACTIVITY 4 - Build a rainforest

Ages: 3rd-5th grade

Time: 90-120 minutes, can be divided over 2-3 class periods, or assign diorama construction as homework

Overview: Students will use a KWL chart to collect information from video resources, then create a diorama to demonstrate understanding of the structure of and ecological relationships in rainforests.

Standards: Language Arts: Comprehension; Life Science: Ecosystems; Visual Arts: Create a model that represents an environment

Materials:

- KWL chart (written in science journals or on paper provided by instructor)
- Video projector or TV monitor with Internet access
- Shoe boxes
- Craft materials (construction paper, tissue paper, pipe cleaners, markers, crayons, colored pencils scissors, tape, glue, hot glue)

Procedure:

Part 1: Video introduction to rainforests

- Before watching the video, ask students to complete a KWL chart about the rainforest. Students may use science journals, if applicable, to create and complete their own KWL chart. Students should complete the K and W columns by themselves first, then share with a partner. Review the answers as a class to get a sense of what to help students highlight from the video.
- Watch an introductory video about the Amazon Rainforest (approximately 7 minutes)
 - “Virtual Field Trip - Amazon Rainforest”, starting at 2:00 minutes.
<https://www.youtube.com/watch?v=JEsV5rqbVnQ>
- As students watch the video, ask them to jot down notes in the L column of their chart. When the video is finished, students should finish their notes with complete sentences.
- Optional Extension: Students can create and complete KWL charts for different aspects of the rainforest (i.e. animals, plants, water, human populations, etc.)

Part 2: Rainforest layers reviewed

- After watching the video, the instructor should draw a profile of the rainforest on a whiteboard or large piece of paper, or use a projected image on a smart board. See an example profile image provided in the Resources section for this lesson.
- As a class, ask for student help labeling the 4 layers of the rainforest on the drawing or image. Students should share what they learned about the rainforest layers from the

video and work together to create a list of descriptive words for each layer. Place the correct words next to their corresponding layer on the drawing or image.

- Additionally, create a list of the plants and animals that live in the forest and match them to the layer in which they most frequently reside in the rainforest.

Part 3: Diorama design

- Provide students with a shoebox and craft materials to build a rainforest model. Students should label the model to demonstrate understanding of rainforest structure.

Part 4: Animal habitats

- Ask students to draw and place different animals in the model in their correct habitats (see examples of animals to be included in the dioramas listed below). If desired, provide information relating to the needs of each animal so that students can use information to help with placement.
 - Emergent layer: howler monkey, harpy eagle, vine snake
 - Canopy layer: toucan, sloth, red-eyed tree frog
 - Understory: jaguar, green anaconda, horned guan
 - Forest floor: capybara, leaf-cutter ant, poison dart frog



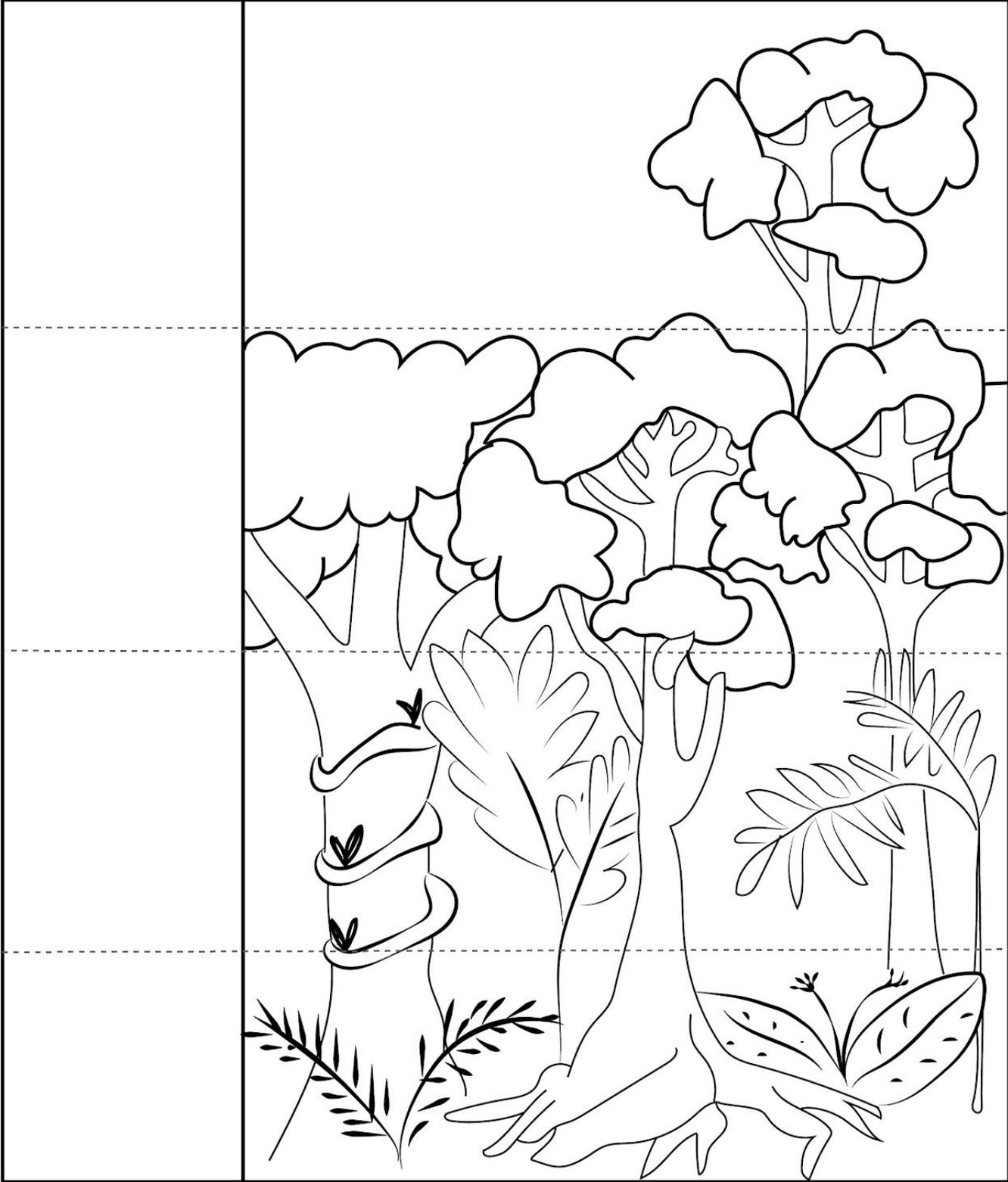
Rainforest Adventure Connection:

- While at the Rainforest Adventure exhibit, students should work in partners or small groups to complete the “Layers of the Rainforest” activity outlined in the section of this guide labeled “Exploring the Exhibit.”

Resources:

- Layers of the Rainforest image (can be used as a worksheet or projected on a whiteboard)

Layers of the Rainforest



ACTIVITY 5 - How much water?

Ages: 3rd-6th grade

Time: 60 minutes

Overview: Students will review the water cycle, use a measuring tool to create a number line and compare relative average rainfall of locations in North America to the tropics. They will then use a model to help understand why precipitation is higher in warmer, tropical climates.

Standards: Earth & Space Science: Earth's Systems; Math: Measurement & Data

Materials:

- Tape measure or yardsticks
- Prepared notecards with city names and average rainfall (see Resources for list)
- 2 quart sized glass jars with lids, containing 1 inch of water in the bottom
- Classroom thermometers
- Map of world biomes indicating tropical rainforests (provided in Resources)
- Projector and video playing equipment
- Optional materials from Amazon Water Cycle Role-play (see below)

Prep: Prepare notecards with locations and average rainfall. This list is provided in Resources. See notes in Part 4 of this activity about preparation and adaptations for this experiment.

Procedure:

Part 1: What causes rain?

- Review the water cycle with students to recall what causes precipitation. To do so, you may watch a review video or complete a separate lesson on the water cycle.
 - Video resources from YouTube:
 - 1) The Water Cycle by the National Science Foundation (6:46) <https://www.youtube.com/watch?v=al-do-HGulk> or
 - 2) The Water Cycle | Educational Video for Kids by Happy Learning English (3:56) <https://www.youtube.com/watch?v=y5gFI3pMvol>
 - Amazon Water Cycle Role-play activity from the California Academy of Sciences PDF (also available in resources folder provided by Minotaur Mazes)
 - https://www.calacademy.org/sites/default/files/assets/docs/pdf/039_amazonwatercycleroleplay_redesignmay2015.pdf

Part 2: Precipitation around the world

- Precipitation is crucial for life on Earth, but it is not evenly distributed. Sometimes it even comes down as snow instead of water!
- Let's compare rainfall in different places around the world to that in the tropics. How do you think your home would measure up?

- Use a tape measure or yard sticks to create a long number line (you will need at least 30 feet of space to measure this all out). Give each student a city label with the corresponding amount of rainfall in inches.
- After measuring out 30 feet of distance with your class, ask students to place their cities along the number line. Review the locations with the students and ask them if they notice any trends. Is anything surprising? Provide students with a map if necessary to help identify trends.

Part 3: Why does it rain so much in the tropics?

- Use a projector to show students a map of the world's biomes and ask them to make observations to identify a trend in the locations of tropical rainforests. Make sure the map highlights the Equator and preferably the Tropics of Cancer and Capricorn to show the extent of range for the rainforest. See the provided Resources for example maps.
- Notice that for the most part the tropics are located near the equator.
- The equator is warmer than the rest of the planet, receiving more sunlight throughout the year, averaging 70-90 degrees Fahrenheit throughout the day, around the year.
- Ask students to make predictions about how the warmth might affect rainfall? To spur ideas, ask them to think about taking a hot bath or shower. Have they noticed anything about the air in the bathroom as they do that, or condensation collecting on the walls or mirror?

Part 4: Water Cycle in a Jar demonstration

- Let's look at a miniature water cycle in a jar to see if we can figure out why it rains so much in the warm climate of the tropics.
- Add 1 inch of water to the bottom of two 1-quart jars with lids. Place one jar in a sunny spot, and the other in a shady spot. Label the jar in the sunny spot "tropical" and the jar in the shady spot "temperate" If possible, tape a thermometer to the side of each jar above the water level.
- Make observations of both jars every 15 minutes for an hour to notice any changes.
- At the end of an hour, compare and contrast the changes in condensation in each jar and rise in the thermometer. The jar that was warmed by the sun should have seen a greater rate and more total condensation on the sides of the jar.
- ADAPTATIONS: If time does not allow for making observations over an hour, this experiment may be set up ahead of time and students can make observations after the jars have been sitting. If a sunny space is not available, a heat lamp may be used instead. If a heat lamp or sunny space are both not available, use hot water in one jar and room temp water in another jar as a proxy for climate.

Part 5: Debrief

- Ask students to reflect on this activity and make a hypothesis for how the climate (warm temperatures and amount of rainfall) affect the living things in the rainforest.

Rainforest Adventure Connection:

- Before exploring the exhibit, prompt students to pay attention to the diversity of animal life discussed throughout the exhibit.
- Ask students to spend a few extra minutes reviewing the, “How Much Water” informational panel before exploring the rest of the exhibit.
- Debrief the experience after visiting. Ask students to share one thing that surprised them and to reflect on their previous answer to the question of how climate (temperature and rainfall) is related to the diversity of life in the rainforest.

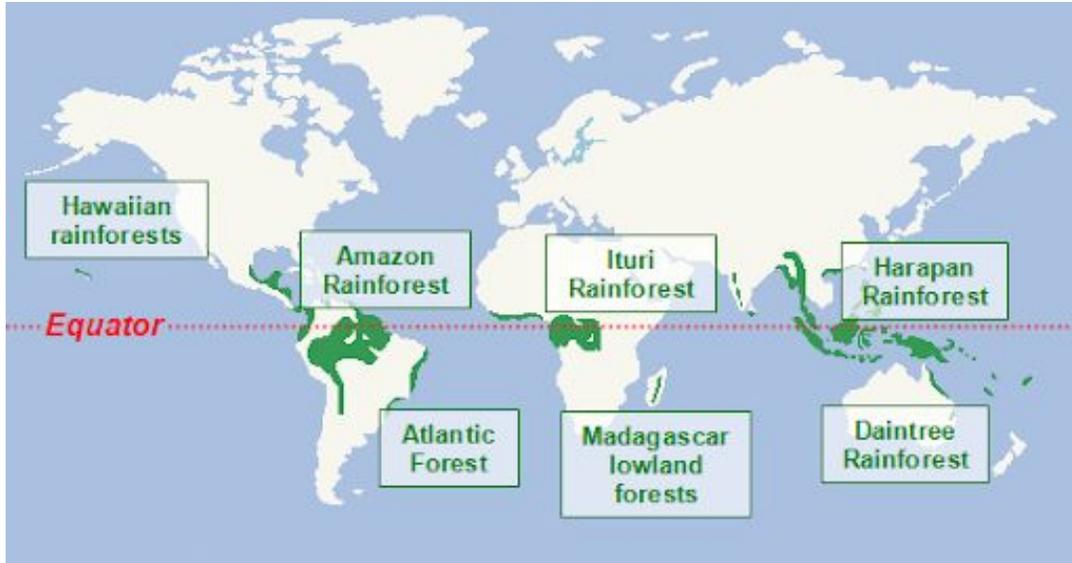
Resources:

- City names and annual average rainfall amounts
- World map showing tropical rainforests biomes in relation to the Equator

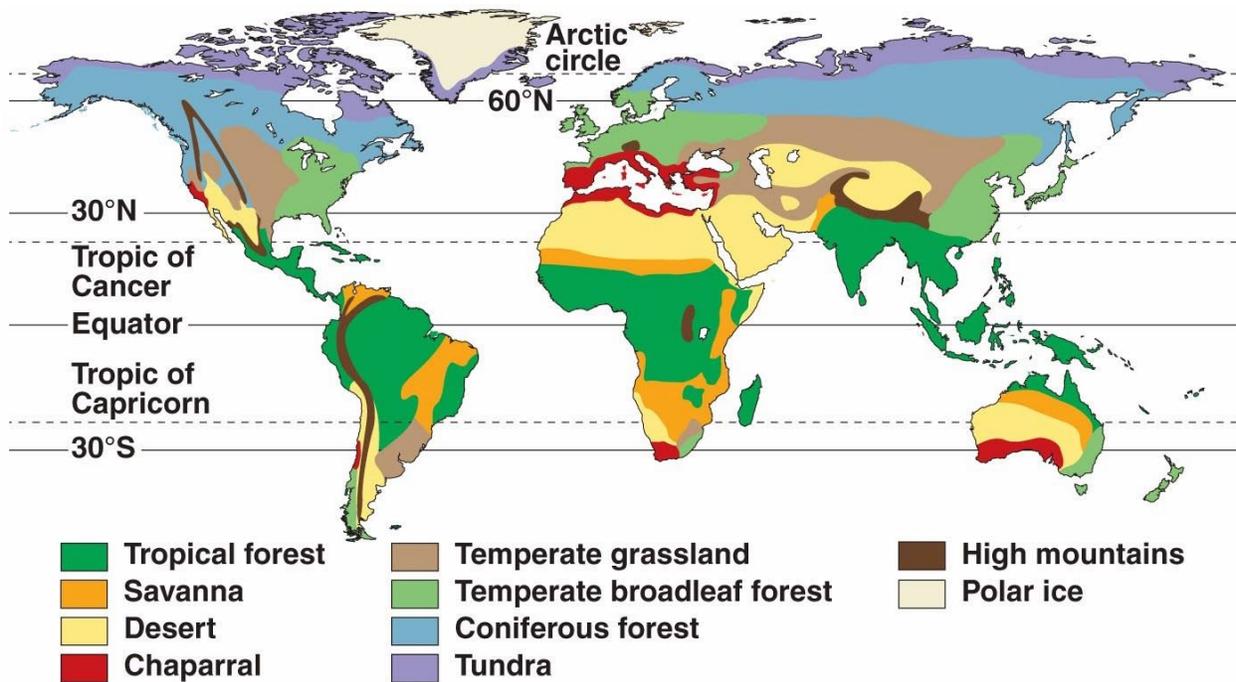
Annual average rainfall of select cities

* Prepare notecards ahead of time with several of the following city names and rainfall amounts.

4.2" - Las Vegas	50" - Houston
11" - Albuquerque	52" - Atlanta
13" - Calgary, Canada	54" - Memphis
15"- Los Angeles	62" - Miami
17" - Denver	64" - New Orleans
23" - London, UK	Research your local average rainfall and prepare a card
25" - San Francisco	
31" - Toronto, Canada	
32" - Minneapolis	Rainforests:
36" - Chicago	102" - average across Monteverde Cloud Forest, Costa Rica
38" - Seattle	120" - average across the Amazon Rainforest, Brazil
43" - Portland, OR	130" - average across Borneo Rainforest, Indonesia
47" - New York City	385" - Kauai, Hawaii (top 5 wettest places on Earth)



Map indicating the location of the world's rainforests in relation to the Equator
 Source: <http://geography.parkfieldprimary.com/climate-types/equatorial-regions>



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World biomes relative to the Equator and Tropics of Cancer and Capricorn
<http://mrsbioblog.blogspot.com/2014/03/chapter-41-what-is-ecosystem.html>

ACTIVITY 6 - Rainforest Animals and Adaptations

Ages: 3rd-5th grade

Time: 45-60 minutes

Overview: In this activity students will review structural and behavioral adaptations by learning about rainforest animals* that exhibit each type of trait. Then students will apply their understanding of animal needs and adaptations to design their own animal.

*Note the animals described in this activity are limited to those of the Amazon Rainforest

Standards: Life Science: Ecosystems, Biological Evolution; Language Arts: Comprehension

Materials:

- TV monitor or projector capable of showing video
- Slips of paper with animal requirements (provided in Resources)
- Drawing paper
- Pencils
- Colored pencils

Prep: Prepare slips of paper for the Design an Animal activity described in Part 5 below.

Procedure:

Part 1: Tap into prior knowledge

- Check for prior knowledge by asking students to share the names of rainforest animals they already know about.
- After hearing a few suggestions, explain to students that every type of animal on Earth can be found in tropical rainforests, including rhinoceroses, deer, leopards, gorillas, chimpanzees, elephants, armadillos and even bears. In this activity we'll be exploring the incredible adaptations that help so many animals survive around each other!

Part 2: Watch some incredible animals!

- Prepare students to watch a video overview of common animals from the Amazon Rainforest. Ask them to pay attention to the physical traits or behaviors that help animals survive in the wild.
- Show students a video spotlighting common rainforest wildlife. Choose either resource below or find another age appropriate option that highlights specific wildlife.
 - "Most INCREDIBLE Animals of the Amazon" by Talltanic (approximately 10:00 long) - Highlights 26 animals, including physical characteristics and adaptations
 - <https://www.youtube.com/watch?v=t16qP6HRkaM>
 - "10 Jungle Animals for Kids || Amazon Animals for Kids" by Socratica Kids (approximately 6:20 minutes long)
 - https://www.youtube.com/watch?v=qgK1WdYq_aw

Part 3: Incredible adaptations

- Share with students that the average four-square-mile area of tropical rainforest contains up to: 125 mammal species, 400 bird species, 100 reptile species, 60 amphibian species, 150 butterfly species, and 30 to 80 million insect species.
- Ask students to think about what all these animals have in common to help them cohabitat in the same space? The answer? They all have adaptations!
- Explain that an adaptation is a physical (structural) or behavioral trait that helps a plant or animal survive. There are two types of adaptations. You can discuss each of these adaptations by writing a list on the board for students to have as reference.
 - Structural adaptations relate to the physical features of an organism, including:
 - Fur, feathers, or scales - body protection for the animal's environment
 - Coloration - can help attract mates or be used as camouflage; may change seasonally
 - Camouflage - specific color patterns to help blend in with surroundings
 - Mimicry - color or body structure to make an animal look like something more dangerous or less palatable
 - Super senses - smell, hearing, and eyesight help locate food or predators
 - Claws, talons, teeth - to procure food or for defense
 - Tails - useful for balance or propulsion, or as an extra hand
 - Flight - allows for high mobility
 - Number of legs/limbs - two or four legs, or no legs at all
 - Size/shape of body or body features (like eyes, ears, hands etc.)
 - Behavioral adaptations are the things organisms do to survive, including:
 - Vocalizations - use of different voice sounds for communication
 - Migration (moving north to south seasonally, or up and down trees throughout the day) - helps animals avoid dangerous habitats
 - Huddling - groups provide each other warmth and protection
 - Herds, colonies, or large family groups - for group protection
 - Nocturnal or Diurnal - being active at certain times of day

Part 4: Types of adaptations

- Highlight animal adaptations by rewinding the video and replaying bits about specific animals. Ask students to describe what they see and how the animal's traits or behaviors help them survive. Encourage them to refer to the list written in the previous part for help describing what they see. Animals that would make for good discussion include:
 - Capybara - flees to water if predators are present, live in groups and communicate with each other
 - Tapir - has a long flexible nose that can act like a snorkel
 - Capuchin or Spider Monkey - has a prehensile tail that they can use like an extra arm
 - Jaguar - spots are great camouflage
 - Poison dart frog - uses bright colors as a warning sign

- Macaws - vocalize to communicate with each other
- Giant Anteater - has giant claws and a long face to access ants and termites
- Kinkajou - nocturnal, with feet that can rotate 180 degrees

Part 5: Design an animal

- Evaluate student understanding by letting them design their own animal.
- Let each student choose a slip of paper with an Animal Type, an Animal Niche, a Structural Adaptation, and a Behavioral Adaptation. At the teacher's discretion, students can trade slips as long as they end up with one of each type of card. Use the cards provided in the Resources.
- Students should draw a picture of an imaginary animal that fits all the requirements specified by the cards and provide labels for adaptations and important features. They can give the animal a common and Latin name if they choose.

Rainforest Adventure Connection:

- Complete the "Hunting for Animal Adaptations" activity described in the "Exploring the Exhibit" portion of this activity guide.
- After visiting the exhibit, review and discuss the six interactive animal adaptation activities the students completed while traveling through the exhibit. For reference, the interactive adaptation activities include:
 - Flight (Glide like a butterfly on the monorail)
 - Prehensile tail (Swing like a monkey on the bars)
 - Camouflage (Camouflage mural and Bonus Seek & Find)
 - Powerful legs (Leap like a frog)
 - Migration (Migratory bird magnet maze)

Resources:

- Design an Animal activity cards
 - Print these cards and cut apart, enough so that each student can have one from each category.
 - Allow students to select one card from each type so they should have one Animal Type card, one Niche card, one Structural Adaptation card, and one Behavioral card.

Animal Type Cards

Bird	Reptile	Amphibian
Canine	Feline	Rodent
Butterfly	Beetle	Mammal
Monkey	Fish	Marsupial

Structural Adaptation Cards

<p>Body covering - This animal has fur, feathers, or scales (choose which is appropriate for your animal type)</p>	<p>Mouth shape - This animal has a mouth that is well adapted for what it eats (choose what is appropriate for your animal type)</p>
<p>Tail shape - This animal's tail is useful for balance or propulsion, or as an extra hand</p>	<p>Coloration - This animal uses bright colors to communicate with other animals</p>
<p>Claws - This animal has sharp claws that help it find food by catching it, climbing for it, or digging it up</p>	<p>Super senses - This animal relies on a powerful sense of smell, hearing, or eyesight to help locate food or predators</p>
<p>Mimicry - This animal looks like something more dangerous or less palatable</p>	<p>Camouflage - This animal has coloring that helps it blend in with its surroundings</p>
<p>Foot shape - This animal has feet that are adapted to where it lives. Choose what makes sense for your animal (may be webbed, prehensile, small, or big)</p>	<p>Size and shape of body - The shape of this animal's body helps it survive (choose what is appropriate for your animal type - big, small, long and skinny, etc.)</p>

Behavioral Adaptation Cards

<p>Migration - This animal needs to be able to move from the forest floor to the tree canopy</p>	<p>Migration - This animal moves to breeding grounds in colder, northern climates</p>
<p>Large groups - This animal lives in a colony or family group for protection</p>	<p>Diurnal - This animal is active during the day</p>
<p>Solitary - This animal primarily lives by itself</p>	<p>Nocturnal - This animal is only active at night</p>
<p>Vocalization - This animal makes certain sounds or calls for communication</p>	<p>Huddling - This animal gathers with others of its species for protection</p>

Animal Niche Cards

<p>Herbivore - This animal only eat plants</p>	<p>Frugivore - This animal only eats fruit</p>
<p>Carnivore - This animal eats other animals</p>	<p>Insectivore - This animal eats insects</p>
<p>Ground dweller - This animal spends almost all of its life on the forest floor</p>	<p>Nectarivore - This animal prefers to eat flowers and nectar</p>
<p>Arboreal - This animal lives primarily in trees</p>	<p>Aquatic - This animal has to live in or near water</p>

ACTIVITY 7 - Biodiversity and Earth's Rainforests

Ages: 4th-5th grade

Time: 45-60 minutes

Overview: Students will review biomes and use a world map to find tropical rainforests. They will learn about biodiversity and compare the location of tropical rainforest biomes with biodiversity hotspots. Lastly, they will create a poster project to demonstrate their understanding of biodiversity hotspots and human impacts.

Standards: Earth & Space Science: Earth's Systems, Earth & Human Activity; Visual Arts: Creating art to share a message

Materials:

- Biome coloring pages (provided in Resources)
- Colored pencils, markers, or crayons
- Drawing paper
- Projector or TV monitor
- Map of Biodiversity Hotspots (provided in Resources)

Prep: Print biome coloring pages (one per student)

Procedure:

Part 1: Biomes review

- Review the definition of a biome with your students.
 - A biome is a large region of Earth that has a certain climate and certain types of living things. The plants and animals of each biome have traits that help them to survive in their particular biome.

Part 2: Tropical rainforest biome mapping

- Provide students with a biome coloring page (see Resources). Review the list of biomes provided in the key and briefly describe their characteristics. In this lesson we are focusing on rainforest biomes.
- Ask students to color in all the biomes, or, depending on instructor discretion, just the rainforest biomes, similar to how they would complete a color by number activity.
- After students have finished coloring their maps, ask them to compare their finished drawings with a neighbor to check for accuracy.

Part 3: Biodiversity Hotspots and Rainforests

- Explain to the students that tropical Rainforests only cover 2% of earth's land but contain 50% of the life on earth including plants and animals.

- The term scientists use to describe this immense variety of life in a particular habitat or ecosystem is “biodiversity.”
- Explain to students that when an area of biodiversity is also threatened with destruction, it becomes known as a “biodiversity hotspot.” The term biodiversity hotspot specifically refers to 25 biologically rich areas around the world that have lost at least 70 percent of their original habitat.
- Use a projector to show the class a map of the world’s Biodiversity Hotspots (provided in Resources). Ask the class to reflect on what overlap they see between the biodiversity hotspots and tropical rainforest biomes. Students should first think about what they observe, share their observations with a partner, and then discuss with the class.
- After discussion, ask students to draw a star on their colored biome maps where there is also a Biodiversity Hotspot.
- Share with students that more than half of the world’s rainforests have been destroyed, making most of them eligible to “biodiversity hotspots.”

Part 4: Biodiversity awareness

- Have students create a poster for International Day for Biodiversity (May 22nd each year), that demonstrates their understanding of the great diversity in tropical rainforest biomes.
- For more information on International Biodiversity Day, visit <https://www.cbd.int/idb/>
- Example posters:



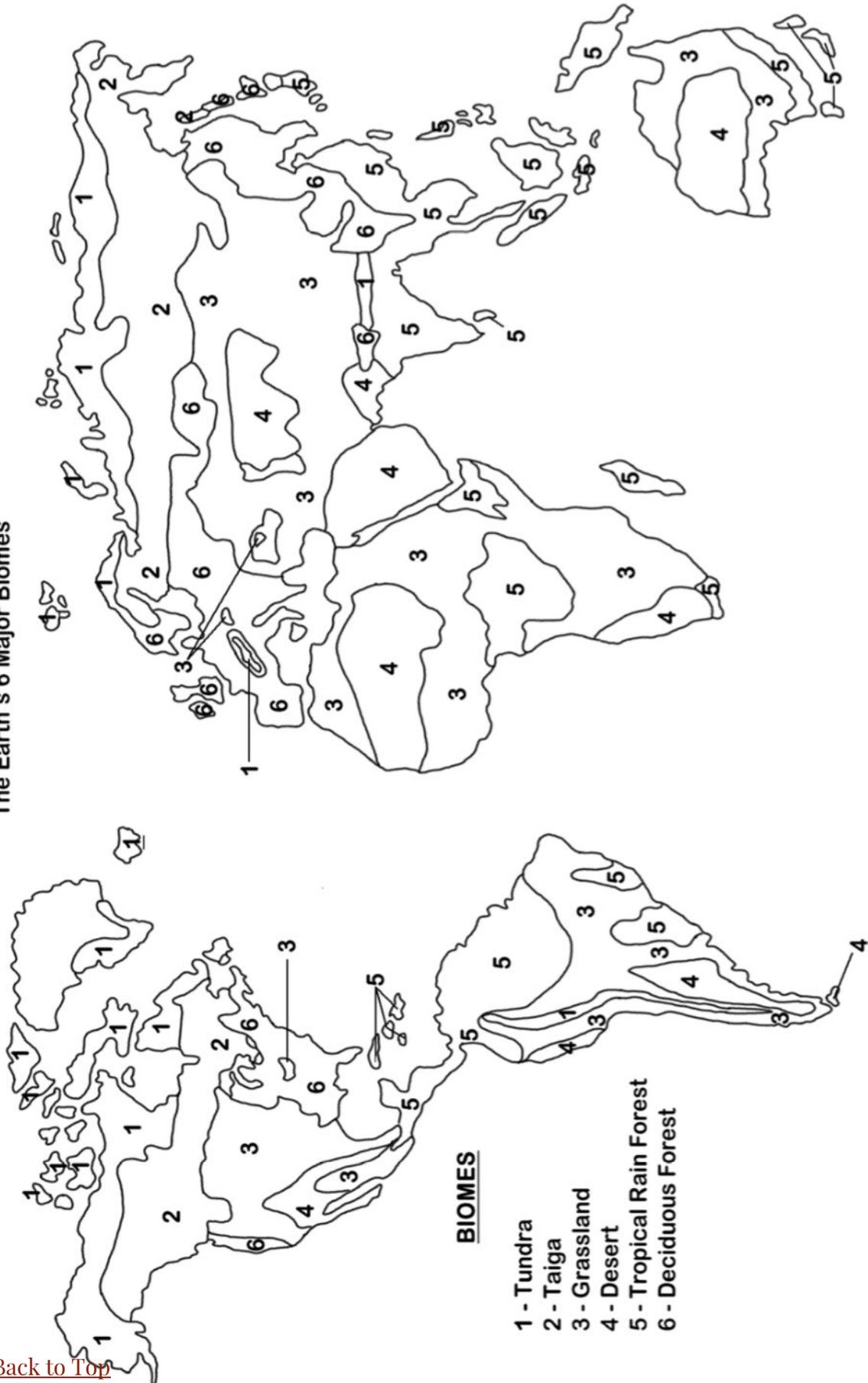
Rainforest Adventure Connection:

- Students should go through the exhibit from start to finish and count how many and what types of animals are discussed throughout the exhibit. See the activity “Animal Classification” in the “Exploring the Exhibit” portion of this guide for more ideas on how to formalize this experience.
- After returning from the exhibit visit, review the term “biodiversity” and ask students to reflect on what biodiversity they observed in this exhibit.

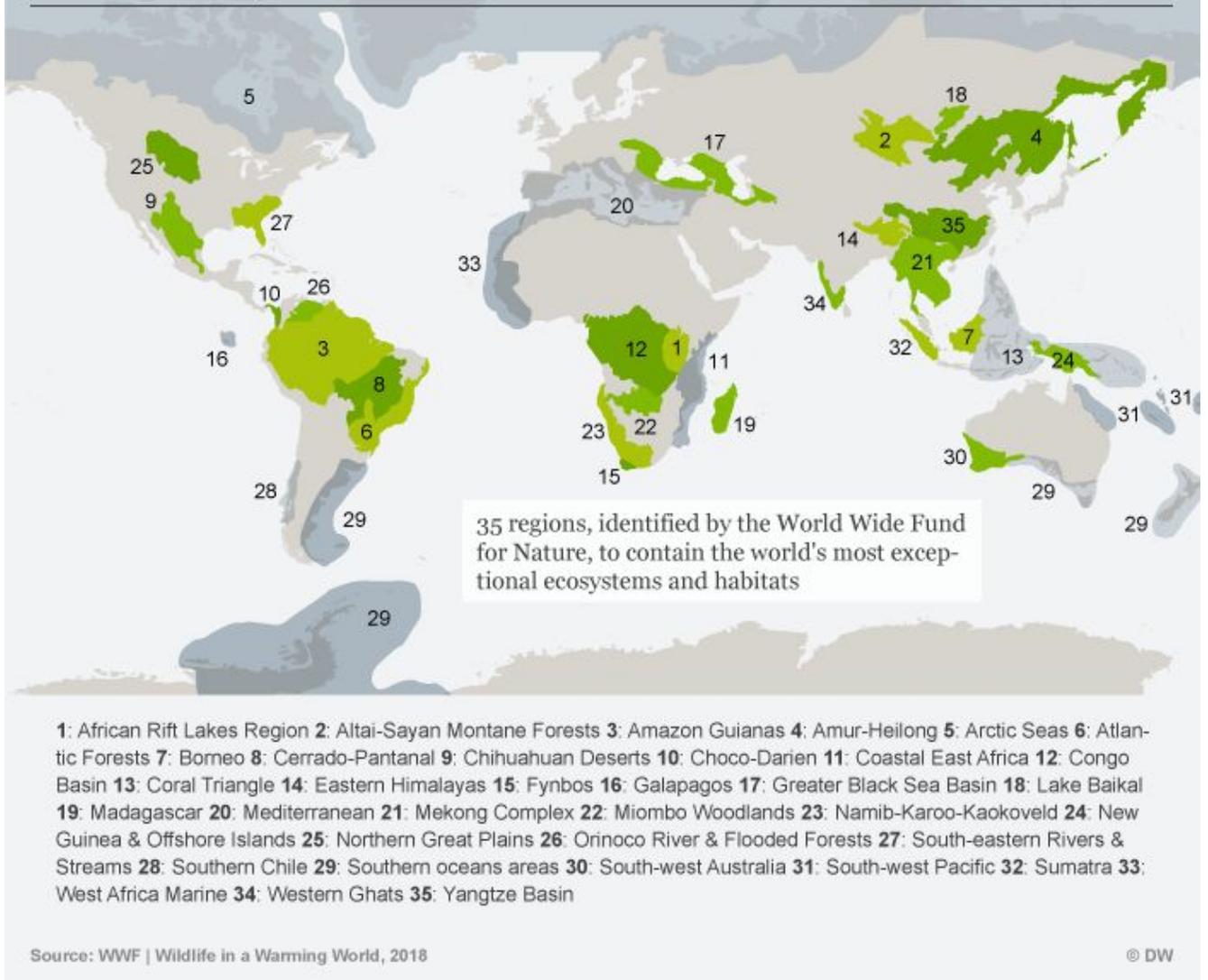
Resources:

- Biome coloring page, downloadable PDF
<https://www.worksheetplace.com/index.php?function=DisplaySheet&sheet=Biomes-Map-Outline&links=3&id=&link1=241&link2=454&link3=459>
- Biodiversity Hotspot map from the World Wildlife Fund
<https://www.dw.com/en/climate-change-threatens-half-of-wildlife-in-biodiversity-hotspots-study-says/a-42973405>

The Earth's 6 Major Biomes



WWF's Priority Places



Source:

<https://www.dw.com/en/climate-change-threatens-half-of-wildlife-in-biodiversity-hotspots-study-says/a-42973405>

ACTIVITY 8 - Migration Headache

Grade Level: 3rd-5th grade

Time: 45 minutes

Overview (taken from Migration Headache activity guide): Students become “migrating shorebirds,” traveling between nesting and wintering habitats. Along their journeys they experience some of the threats that affect the survival of migratory shorebird populations.

Materials: (taken from Migration Headache activity guide)

- Large playing field or gymnasium (approximately 70 feet long by 20 feet wide)
- Two paper plates for every three students (Clearly mark the plates, perhaps with a large X on one side, to differentiate top from bottom.)
- Additional plates based on one-fourth of the total number of plates from calculation above.
- Factors Affecting Survival Cards or Habitat Scenarios listed in Migration Headache Game pdf
- Flip chart and several colored markers

Prep: See the Migration Headache Game for additional information on materials and preparation.

Procedure:

Part 1: Introduction (taken from Rainforest Adventure exhibit text)

- Share with students that about 200 bird species migrate from their summer breeding grounds in North America to winter feeding grounds in Central and South America each year. The majority are songbirds but many shorebirds and some raptors (hawks, kites and vultures) also migrate. They need safe places to rest and refuel along the way. Tropical rainforests are the final destination for some migratory birds. For others, they make ideal stopovers on long journeys further south.

Part 2: Migration Headache Game

- Complete the Migration Headache Game originally created by Project Wild and shared by many environmental education organizations. The pdf of this game is available in the education resource folder provided by Minotaur Mazes or online at:
https://migration.pwnet.org/pdf/Migration_Headache.pdf

Rainforest Adventure Connection:

- While visiting the exhibit, students should find the informational panel about migratory birds labeled, “Safe Haven.” Ask students to read the text, play the game, and observe

which types of birds were included, as well as what were the stopovers and threats visited by birds along the route.

- After completing the visit to the exhibit, ask students to reflect on their experience, especially on the migratory bird maze. Discuss the fact that many of the tropical migratory birds are songbirds.
- Identify the threats that were discussed in the games and strategies for mitigating threats to tropical migratory songbirds at home and around the world.

ACTIVITY 9 - Tropical Resources & Sustainability

Ages: 3rd-5th grade

Time: 30 minutes

Overview: Students will become familiar with a variety of everyday products that derive from the rainforest. They will develop an understanding of stewardship and how the act of stewardship can help preserve rainforest products into the future.

Standards: Earth & Space Science: Earth & Human Activity

Materials:

- Rainforest Products Matching sheet (provided in Resources)
- Products of the Rainforest worksheet (provided in Resources)

Prep: Print enough Rainforest Products Matching sheets so that each student has one.

Procedure:

Part 1: Products of the Rainforest

- Pass out the Rainforest Products matching sheets.
- Ask students to complete the sheet by matching the common household item to the correct rainforest source. Review the answers as a class.
- Note: This activity may be very challenging for students to do alone because the plants and final products look very different from each other. This activity can be done as a class to limit frustration and emphasize the Aha! factor.

Part 2: Rainforests in my day-to-day

- After reviewing the matching sheet, ask students to circle all the things on the sheet that they have consumed and/or used.
- Then ask the students to number the top 5 items that are most important in their daily lives
- Ask students to share their results with a partner and compare and contrast their choices.

Part 3: Sustainable use

- Explain to students that using materials that are from the rainforest is not a bad thing if we do so in a way that doesn't destroy the rainforest.
- Tell students to consider this example of people consuming oranges.
 - Eating foods that come from the rainforest is not always good. For instance, in order to make enough orange juice for everyone, some orange juice companies destroy rainforest land to plant orange groves. One thing we can do to help save the rainforests is to drink orange juice made only from oranges that are grown in

the United States. Orange juice containers will say where their oranges are grown. Oftentimes it will say that the oranges are from Brazil, which means they were grown on cleared rainforest land. If that's the case, try to find another brand of orange juice to buy.

Part 4: Stewardship

- Write the word steward on the board. Explain to students that people who take care of, treat with respect, and do not harm things are stewards of those things. “Rainforest stewards” are friends to the rainforests. They take care with the resources they consume from the rainforest to ensure that the rainforest will be around for a long time.
- Ask students to reflect on the example about oranges. Students should think-pair-share a response to how this example demonstrates how someone can be a steward.
- As a class, ask students to brainstorm ideas about how they can be rainforest stewards. Responses may include eating foods that were sustainably harvested (eg. Rainforest Alliance Certified), recycling or reusing things made from rainforest sourced materials, and encouraging parents to buy “tree friendly” products.

Part 5: Rainforest products at home

- Ask students to return to their houses with the Products of the Rainforest worksheet and make note of all the things in their house that come from the rainforest.
- Ask students to write a paragraph describing how they can be stewards of the Rainforest in their homes and with their families.

Rainforest Adventure Connection:

- While visiting the exhibit, complete the activity “How Rainforests are Important” detailed in the “Exploring the Exhibit” section of this activity guide.

Resources:

- Rainforest Products matching sheet and answer key
- Products of the Rainforest worksheet

Rainforest Products Matching

Write the name of the item from the word bank below the correct picture of its rainforest source.



Rainforest Products word bank

Coffee Chocolate Cashew nuts
 Vanilla Banana Cinnamon Sugar
 Black pepper Rubber Chewing gum

Rainforest Products Matching Answer Key

Write the name of the item from the word bank below the correct picture of its rainforest source.



Black Pepper



Vanilla



Rubber



Sugar



Cinnamon



Banana



Cashew nuts



Chewing Gum



Coffee



Chocolate

Rainforest Products word bank

Coffee Chocolate Cashew nuts
Vanilla Banana Cinnamon Sugar
Black pepper Rubber Chewing gum

Products of the Rainforests

Place a check next to each of these rainforest products that you've used or seen

Nuts

___ Cashew nuts

___ Macadamia nuts

___ Brazil nuts

Fruits

___ Lime

___ Tangerine

___ Pineapple

___ Lemon

___ Banana

___ Orange

___ Mango

___ Grapefruit

___ Papaya

___ Coconut

___ Avocado

___ Guava

Spices

___ Black pepper

___ Cayenne red pepper

___ Paprika

___ Cinnamon

___ Ginger

___ Nutmeg

Beverages

___ Coffee

___ Tea

Treats

___ Chocolate

___ Vanilla

___ Sugar

___ Chewing gum

___ Tapioca

Household items

___ Rattan (wicker furniture)

___ Bamboo (furniture, kitchen utensils)

___ Rubber

___ Latex balloons

___ Insect Repellant (camphor)

ACTIVITY 10 - Tree Architecture

Ages: 5th-8th grade

Time: 45 minutes

Overview: Rainforest trees can grow to be hundreds of feet tall despite living in thin soil. In this activity students will use household materials to complete a challenge that models tropical trees. Students will learn how buttress roots help massive trees stay upright in thin soil.

Standards: Life Science: Biological Evolution; Engineering Design: create and test a model

Materials:

- Brooms or yardsticks (enough so that students can work in pairs or groups of three)
- Cardboard
- Scissors
- Masking tape
- Pictures of buttress roots (provided in Resources)
- Biomimicry matching sheet (provided in Resources)

Procedure:

Part 1: Broom trees

- Divide students into partners or groups of three and spread them out around the room so they each have space to work.
- Provide each group with a household broom (or yardstick if brooms are not available or abundant) and challenge them to stand it on end with the handle down and broom up.
- Ask students to make observations about what is happening to their broom and why they are unable to stand it upright.

Part 2: Buttressed brooms

- Ask students to brainstorm in their groups about what they could do to make their broom more stable. Note: They can't tape it to the ground. After a few minutes of brainstorming, ask students to share ideas with the class.
- Direct student discussion toward adding support structures to the bases of the brooms. Since this lesson is about buttress roots, try and facilitate the ideas in this direction.
- Let students build and add buttresses by cutting triangles out of cardboard and taping them to the sides of the base. Students can experiment with different sizes, shapes and numbers of supports. Give students 10-15 minutes to work to get their broom to stand.

Part 3: Buttress roots in nature

- After letting students add buttresses to their brooms, ask students to reflect on the results. Did this structure help the brooms stand up?

- Show students a picture of tall rainforest trees with buttress roots to help provide inspiration. If desired, these pictures can be shared via TV monitor or projector. See Resources for an example image.
- Explain to the class that this structure is called a buttress and it provides support. Humans copied the idea from trees and have used buttresses to stabilize structures. Show images of human-made buttresses (i.e. cathedrals, buildings, coat trees, etc.)
 - Note, in architecture, a buttress is defined as a support built against or projecting from a wall that serves to support or reinforce a wall.

Part 4: Nature Designs

- Tell students that humans get a lot of great design ideas from observing natural phenomena. Provide students with a Design By Nature matching sheet of plants and animals and the things they've inspired humans to engineer.
- Explain to students that humans commonly borrow good ideas from nature. This is also known as biomimicry. Review the Design by Nature matching worksheet students just completed and discuss the examples identified.

Rainforest Adventure Connection:

- While at the Rainforest Adventure exhibit, students should find and read the informational panel about buttress roots. These buttress root models will give students a hands-on example of what they look like in nature.
- As students travel through the exhibit, they can find and complete the activity titled "Can you help these trees stand up?"

Similar Lessons:

- https://www.pbs.org/journeyintoamazonia/teacher_broom.html
- https://www.teachengineering.org/activities/view/cub_lifescience_lesson03_activity2

Resources:

- Picture of a tree with buttress roots
- Pictures of buttresses in architecture
- Design by Nature matching sheet



Ficus tree with buttress roots



Gothic cathedral in Europe with flying buttresses



Daniel-Johnson Dam in Quebec, Canada with buttresses

Designed by Nature Matching Sheet

Draw a line connecting an invention with the natural phenomenon that helped inspire it.

Human-made Invention



Sonar



Suction cups



Velcro



Super adhesive tape



Water repellent fabric

Designed by Nature



Octopus tentacles



Gecko toes



Lotus leaves



Echolocation



Seed burrs

ACTIVITY 11 - Tropical Resources & Sustainability

Ages: 6th-9th grade

Time: 30 minutes

Objective: Students will read content from the Rainforest Adventure exhibit and explore concepts in sustainability as it relates to their use of everyday items.

Standards: Earth & Space Science: Earth & Human Activity, Language Arts: Key Ideas & Details, Integration of Knowledge & Ideas

Materials:

- Products of the Rainforest worksheets (provided in Resources)
- Sustainability Stories (provided in Resources)

Prep: Print enough copies of the Products of the Rainforest sheet and Sustainability Stories for each student. Each student only needs one of the four Sustainability Stories.

Procedure:

Part 1: Rainforest Products

- Pass out a “Products of the Rainforest” sheet to each student. Instruct students to go through the list and mark which products they have used at least once in their lives. Clarify any products that students are uncertain about.
- When students have finished checking off their lists, discuss the results. Ask students if they were surprised by any of the items on the list.

Part 2: Essential Items

- Ask students to circle 5 items on the sheet they couldn’t live without. Then have them share their answers with a neighbor. Do their answers have anything in common?

Part 3: Harvesting Raw Materials

- Explain to students that using materials from the rainforest is not necessarily a bad thing. The most important thing is the manner in which humans harvest products from the rainforest. Read the following example about oranges and discuss.
 - Eating foods that come from the rainforest is not always good. For instance, in order to make enough orange juice for everyone, some orange juice companies destroy rainforest land to plant orange groves. One thing we can do to help save the rainforests is to drink orange juice made only from oranges that are grown in the United States. Orange juice containers will say where their oranges are grown. Oftentimes it will say that the oranges are from Brazil, which means they were grown on cleared rainforest land. If that's the case, try to find another brand of orange juice to buy.

Part 4: Sustainable Production

- Divide students into groups of 4 and give each student one of the short Sustainability Stories to read (see provided Resources). Each student should have a different story. These stories are taken directly from the Sustainability Stories informational panel in the Rainforest Adventure exhibit.
- Students should read the story and think about 1) what tropical resource is being used and 2) what sustainable action is being taken to make sure the resource stays viable.
- After reading the stories, students should share with their small groups.
- Within small groups, ask students to reflect on the stories and something that all the stories have in common.

Part 5: The Common Thread

- Debrief the stories as a class and ask a representative from each group to share what they think is the common thread between the stories. One possible answer is that local farmers or businesses who are connected to the land, are all working together to protect the land and its resources.

Extension: Sustainability Mapping

- As homework, ask students to catalog activities in their communities that help achieve the world's Sustainable Development Goals.
- If downloading and using mobile apps are an option for you and your students, use the Mapping app <http://www.mapping.org/> to catalog these local activities. Otherwise these reports can be handwritten and recorded in a class log.

Rainforest Adventure Connection:

- While visiting the Rainforest Adventure exhibit, students should complete the “How Rainforests are Important” activity provided in the “Exploring the Exhibit” portion of this activity guide. Make sure students take the Save the Rainforest pledge at the end of the exhibit
- After visiting the exhibit, ask students to reflect on the pledge. Discuss how the actions identified on the pledge promote sustainable use of rainforest resources.

Resources:

- Products of the Rainforest worksheet
- Sustainability Stories

Products of the Rainforests

Place a check next to each of these rainforest products that you've used or seen.
Then circle 5 items that you use the most frequently.

Nuts

___ Cashew nuts

___ Macadamia nuts

___ Brazil nuts

Fruits

___ Lime

___ Tangerine

___ Pineapple

___ Lemon

___ Banana

___ Orange

___ Mango

___ Grapefruit

___ Papaya

___ Coconut

___ Avocado

___ Guava

Spices

___ Black pepper

___ Cayenne red pepper

___ Paprika

___ Cinnamon

___ Ginger

___ Nutmeg

Beverages

___ Coffee

___ Tea

Treats

___ Chocolate

___ Vanilla

___ Sugar

___ Chewing gum

___ Tapioca

Household items

___ Rattan (wicker furniture)

___ Bamboo (furniture)

___ Teak (hardwood furniture)

___ Rubber

___ Latex balloons

___ Insect Repellant (camphor)

Medicines

___ Ouabain
(heart medication)

___ Quinine
(malaria, pneumonia)

___ Vincristine/Vinblastine
(cancer treatment)

Sustainability Stories

Story 1: *Foods from the Forest*

Chocolate, brazil nuts, bananas and mangoes are some of the 200 varieties of tropical fruits and vegetables we eat that can be sustainably grown within rainforests. There are actually more than 3,000 known food types available for sustainable harvest, not counting the spices, oils and fibers that also grow in healthy natural rainforests.

Theo Chocolate and Yachana Gourmet Jungle Chocolate are two of an ever-increasing number of companies that are buying rainforest-grown chocolate and other produce directly from local farmer cooperatives. The farmers get a fair price, the rainforests are protected, and we enjoy delicious chocolate!

Story 2: *Ecotourism – A Growing Business*

Ecotourism is sustainable, nature-based, environmentally friendly and socially responsible travel. Ideally that means people visit incredible natural places like rainforests, learn about their natural history, eat local, sustainably grown food and stay in solar-powered, green-built lodges where local workers make a living wage.

This is a growing industry that places a direct value on intact ecosystems, native wildlife and local cultures.

The Monteverde Cloud Forest Reserve is 26,000 privately owned acres of pristine cloud forest in the mountains of Costa Rica. The Reserve generates an average of \$4.5 million in revenue or more than \$500 per acre annually. Farmland outside the reserve earns only \$100 to \$300 annually.

Story 3: *Sustainable Timber Sources*

Tropical hardwoods have been used to build furniture, boats, musical instruments and flooring. Unfortunately, the demand for this wood is growing much faster than the trees can. Rainforests continue to be clear-cut with only the valuable timber actually used.

Fortunately, there are sustainable alternatives:

- Selective harvesting allows for planting new trees within the existing natural habitat.
- Bamboo, a fast growing grass that can be harvested in 2 to 7 years, makes excellent flooring and paneling.

By buying sustainably harvested wood products, you can help preserve tropical hardwoods and the rainforests they come from. Groups, such as the Forest Stewardship Council, certify wood from forests that are sustainably harvested and managed for long-term land use as well as the social and economic well-being of local workers and communities.

Story 4: *A Better Cup of Coffee*

Farmers traditionally planted coffee under tall rainforest trees, alongside food-bearing orange, avocado and lime trees. For a time, many farmers turned to sun cultivation and while the beans ripened faster, the farmers had to clear the land and purchase more fertilizers and pesticides.

Conscientious farmers are returning to traditional planting methods because coffee grown in the shade reduces soil erosion and needs less water and fewer chemicals. This makes it easier for farms to qualify as organic.

International coffee importers work with farmer-owned cooperatives to pay fair prices directly to the farmers for their rainforest-preserving, shade-grown, organic crops.

ACTIVITY 12 - Migration Math Madness

Grade Level: 6th-8th grade

Time: 30 minutes

Overview (taken from Migration Math Madness activity): Students discover that shorebirds migrate long distances between northern breeding grounds and southern breeding habitats, using five corridors or “highways” in the sky. By using the migration map provided, they measure and calculate the distances some shorebirds travel and come to understand why shorebirds must stop to feed and rest along the way

Standards: Life Science: Ecosystems, Biological Evolution; Math: The Number System; Social Studies: Geography

Materials: (taken from Migration Math Madness activity guide)

- Migration Math Madness activity available in educational resources provided by Minotaur Mazes
- Twenty-centimeters pieces of string (one per student or group)
- One set of Migration Math Map Worksheets and the Migration Madness reading for each student (available in Migration Math Madness pdf)
- Pens or crayons for each student

Prep: See the Migration Math Madness for additional information on materials and preparation.

Procedure:

Part 1: Introduction (taken from Rainforest Adventure exhibit text)

- Share with students that about 200 bird species migrate from their summer breeding grounds in North America to winter feeding grounds in Central and South America each year. The majority are songbirds but many shorebirds and some raptors (hawks, kites and vultures) also migrate. They need safe places to rest and refuel along the way. Tropical rainforests are the final destination for some migratory birds. For others, they make ideal stopovers on long journeys further south. In this activity we’ll look at similar migratory patterns made by shorebirds.

Part 2: Migration Math Madness activity

- Complete the Migration Math Madness activity originally created for “Seasonal Wetlands.” Santa Clara Audubon Society. “Salt Marsh Manual: An Educator’s Guide.” San Francisco Bay National Wildlife Refuge. The pdf of this game is available in the education resource folder provided by Minotaur Mazes or online at the following website:
 - <https://cdn1.migratorybirdday.org/wp-content/uploads/2018/05/29164124/Shorebird-Migration-Games.pdf>

Rainforest Adventure Connection:

- While visiting the exhibit, students should find the informational panel about migratory birds labeled, “Safe Haven.” Ask students to read the text, play the game, observe which types of birds were included in the maze, and important stopovers and threats visited by birds along the route.
- After completing the visit to the exhibit, ask students to reflect on their experience, especially on the migratory bird maze. Discuss the fact that many of the tropical migratory birds are songbirds.
- Discuss the threats that were identified in the game and brainstorm strategies for mitigating threats to tropical migratory songbirds at home and around the world.

ACTIVITY 13 - Animal Essays

Ages: Grades 5-9

Time: 1-3 class periods*

* One class period to watch each of the videos and take notes. One class period for presentations. Research can be done in class or assigned as homework.

Overview: In this activity, students will research the characteristics of a variety of rainforest organisms and present their research findings to the group. As a class, they will construct a bulletin board that places the animals by their position in the environment, gives information about each animal, and shows their interrelationships.

Standards: Life Science: Biological Evolution; Language Arts: Integration of Knowledge and Ideas, Text Types and Purposes

Materials:

- Construction paper in various colors
- Art tissue paper (especially browns and greens but other colors also)
- Markers, colored pencils, crayons
- Bulletin board or poster board
- Scissors, rulers, glue
- Yarn
- Reference materials: encyclopedias, magazines, Internet

Prep: Prepare a rainforest themed bulletin board or poster board materials. If desired, students can help with bulletin board construction. An ideal bulletin board would have a dark green background. Tree trunks would be made from rolled newspaper covered with brown tissue paper with rolled paper bags to resemble vines. Construction paper backed with florist's wire with tissue paper fronds represent ferns. Bromeliads may be made from toilet paper rolls with layers of construction paper and tissue. Flowers can be constructed from tissue. Animals will be represented by student drawings.

Procedure:

Part 1: Video introduction

- Watch a video to introduce the content (approximately 45 minutes): Wild Amazon Documentary HD by National Geographic
 - <https://www.youtube.com/watch?v=F5UPc8dya-M>

Part 2: Research introduction

- Students will use books, magazines, and internet resources to research one of a number of organisms that live in the Amazon rainforest. For younger students, a list of organisms

should be provided, though older students should be able to identify appropriate organisms on their own through reading or by watching the video. A list of possible plants and animals is provided below.

- Selected Organisms For Research:
 - Plants: Fern, Brazil Nut, Banana, Cecropia, Strangler fig, Palm trees (many varieties), Coffee, Kapok, Cocoa, Orchid, Vanilla, Bromeliad, Passion flower, Philodendron, Breadfruit, Cashew, Manioc, Yucca, Heliconia, Mahogany, Rubber Fungus
 - Animals: Anaconda, Ant, Anteater, Beetle, Boa constrictor, Pit viper, Butterfly, Fer de Lance, Capybara, Caiman, Coatimundi, Cockroach, Electric eel, Catfish, Frog, Pink dolphin, Katydid, Grasshopper, Monkeys (many varieties), Jaguar, Kinkajou, Puma, Macaw, Parrot, Crow, Manatee, Mosquito, Bot fly, Parrot, Tarantula, Bat, Termite, Sloth, Quetzal, Toucan
- As part of the final product, students should prepare a color drawing and/or model from the provided materials for use on the display board, as well as a 5x8 inch card giving basic information about the organism.
- Students will post their organism in the proper position on a classroom bulletin board. The information card will be placed on the perimeter of the board with a string connecting the information to the organism model.
- As an extension, colored yarn may be used to connect organisms to one another to illustrate the concepts of a food web, commensalism, symbiosis, competition for resources, or predator-prey relationships. Different colors can be used to represent different relationships.
- After completion of the display, students should give a 2 to 5 minute presentation for the class about their organism. The presentation should provide general characteristics and identify the organism's diet.

Rainforest Adventure Connection:

- Complete the “Hunting for Animal Adaptations” or the “Animal Classification” activity described in the “Exploring the Exhibit” portion of this activity guide.

Exploring the Exhibit

The following is a list of activities to help guide exploration while at the Rainforest Adventure exhibition. Each of these activities is designed to take 15-30 minutes for students to complete. The activities reinforce content connections made in the supplemental activity guide. The short duration of activities solidifies content while allowing students time to free-explore within the exhibit, discover new content, and pique curiosity in unexplored areas.

Hunting for Animal Adaptations

Ages: Upper Elementary School, Middle School

Time: 15-20 minutes

Content Area: Life Science: Biological Evolution

Overview: This activity contains two parts, one interactive part (Adaptation Activities), and one informational part (Species Hunt). Assign one or both activities to students based on teacher discretion and desired outcomes from the experience.

Procedure:

Preparation:

- Divide students into partners to go through the maze using a buddy system. If possible, divide students into small groups with an adult chaperone to guide them through the maze and help read and interpret informational text.

Part 1: Adaptation Activities

- As students go through the maze, ask them to complete the Adaptation Activities. These are the highly interactive components of the exhibit that encourage students to embody an animal's specific adaptations. A worksheet is provided below, but since these activities are very hands-on, it is preferable to let students complete the worksheet in the classroom after the experience.

Part 2: Species Hunt

- After completing the maze and Adaptation Activities, students should go back through the maze on a Species Hunt to find the informational panels about each of the species listed on the provided worksheet. After reading the panels, they should write down a key word or sentence about the animal's adaptations for survival. If time is limited, assign 2-3 animals to each student or group of students, then have students share their findings in the classroom after their field trip. A worksheet is provided below, but if preferred, this worksheet can be completed in the classroom after visiting the exhibit.

Debrief:

- In the classroom after the visit, discuss the experience with students. Ask students to share whether they thought any of the adaptations were surprising, which were the most incredible, and how each adaptation increases the animal's chances of survival.

Resources:

- Adaptation Activities worksheet
- Species Hunt worksheet
- Species Hunt answer key

Adaptation Activities

1. Find the informational panels with the following titles. Complete the activity.

Safe Haven Help birds make their long journey.	Swing Like a Monkey! Can you? Spider Monkeys
Butterfly Zip Line Glide like a Butterfly?	Butterfly Camouflage Mural Can you find all four stages?
Bonus Seek and Find Can you find these animals?	Frog Jump How Far Can You Leap?

2. After completing the activities, write in the spaces provided what the adaptation is and how it helps the animal survive.

Species Hunt

Find the picture of each animal listed below within the exhibit, read it's description, and write down its unique adaptation.

Vine Snake _____

Jaguar _____

Sloth _____

Poison Dart Frog _____

Harpy Eagle _____

Toco Toucan _____

Red-eyed Tree Frog _____

Howler Monkey _____

Species Hunt Answer Key:

Answers are provided in phrases with key words **bolded**.

Vine Snake - This snake uses **camouflage** to look like vines.

Jaguar - Spots help **camouflage** this animal as it stalks its prey.

Sloth - This animal is drab and covered in moss and algae, excellent **camouflage!**

Poison Dart Frog - **Warning colors** tell predators to look elsewhere for a meal.

Harpy Eagle - These are **fast, agile** birds with **sharp talons** that can capture prey in the trees.

Toco Toucan - These birds live in **flocks** and are very **vocal**. They are loud enough to communicate over half a mile away.

Red-eyed Tree Frog - **Suction cups** on the toes of these frogs help them climb trees.

Howler Monkey - **Vocalization** helps these animals communicate over long distances.

How Rainforests are Important

Ages: Upper Elementary School, Middle School

Time: 15-20 minutes

Content Area: Earth & Space Science: Earth & Human Activity

Overview: Students will explore the content of the Rainforest Adventure exhibit to discover how they depend on the rainforest, why rainforests are so important to people, regardless of where on Earth they live, and how they can help protect rainforest resources.

Materials:

- Important Rainforests activity sheet (provided in Resources)

Procedure:

- Divide students into partners or small groups to complete this activity. If possible, younger students should be accompanied by an adult chaperone to help students read and understand information.
- Provide each student group, or the adult chaperone, with an “Important Rainforests” activity sheet and writing utensil. Optional: this sheet can be completed in the classroom after the visit if desired.
- Students should complete the 3 items indicated on the worksheet including:
 - Completing the sentence, “Rainforests are important to me because”
 - Identifying valuable rainforest resources by smell
 - Taking the “Save the Rainforest” pledge at the end of the exhibit
- After visiting the exhibit, make sure students have completed their “Important Rainforests” activity sheet. As a class, go through the items on the sheet and ask students to reflect on their answers and whether or not this exhibit changed how they feel about rainforests.

Resources:

- Important Rainforests activity sheet

Important Rainforests

Rainforests cover only 6% of the world's surface, but provide resources to people living thousands of miles away, including you and me. Complete the following challenges to learn more about how important rainforests are and how you can help protect them!

1. Find and read the panel titled, "How are Rainforests Important to You?" and complete the sentence below:

Rainforests are important to me because _____

2. Find the squeeze and sniff activity station by the "Supermarkets of the World" panel. Can you identify these rainforest products by smell?

I got _____ out of _____ right!

One of the rainforest products that I have seen or tried before is

3. Find the Save the Rainforest pledge and place check marks next to each item you commit to doing in your daily life.

I Pledge to:

- Ride my bike, walk, carpool, or take the bus.
- Bring reusable water bottles to school or work.
- Use a lunch box rather than paper bags.
- Eat a few plant-based meals each week.
- Buy local produce and products.
- Buy fair trade products like coffee, tea, and chocolate.
- Recycle scrap paper, plastic bags, and aluminum cans.
- Use post-consumer recycled paper.
- Plant an organic garden.
- Turn off lights and electronics when not in use.
- Learn more about rainforests and share what I learn.

Layers of the Rainforest

Ages: Upper Elementary School

Time: 15-20 minutes

Content Area: Life Science: Ecosystems

Overview: Students will extend their knowledge of the four primary layers of the rainforest as they travel through four distinct areas of the Rainforest Adventure exhibit.

Materials:

- Layers of the Rainforest activity sheet (provided in Resources)

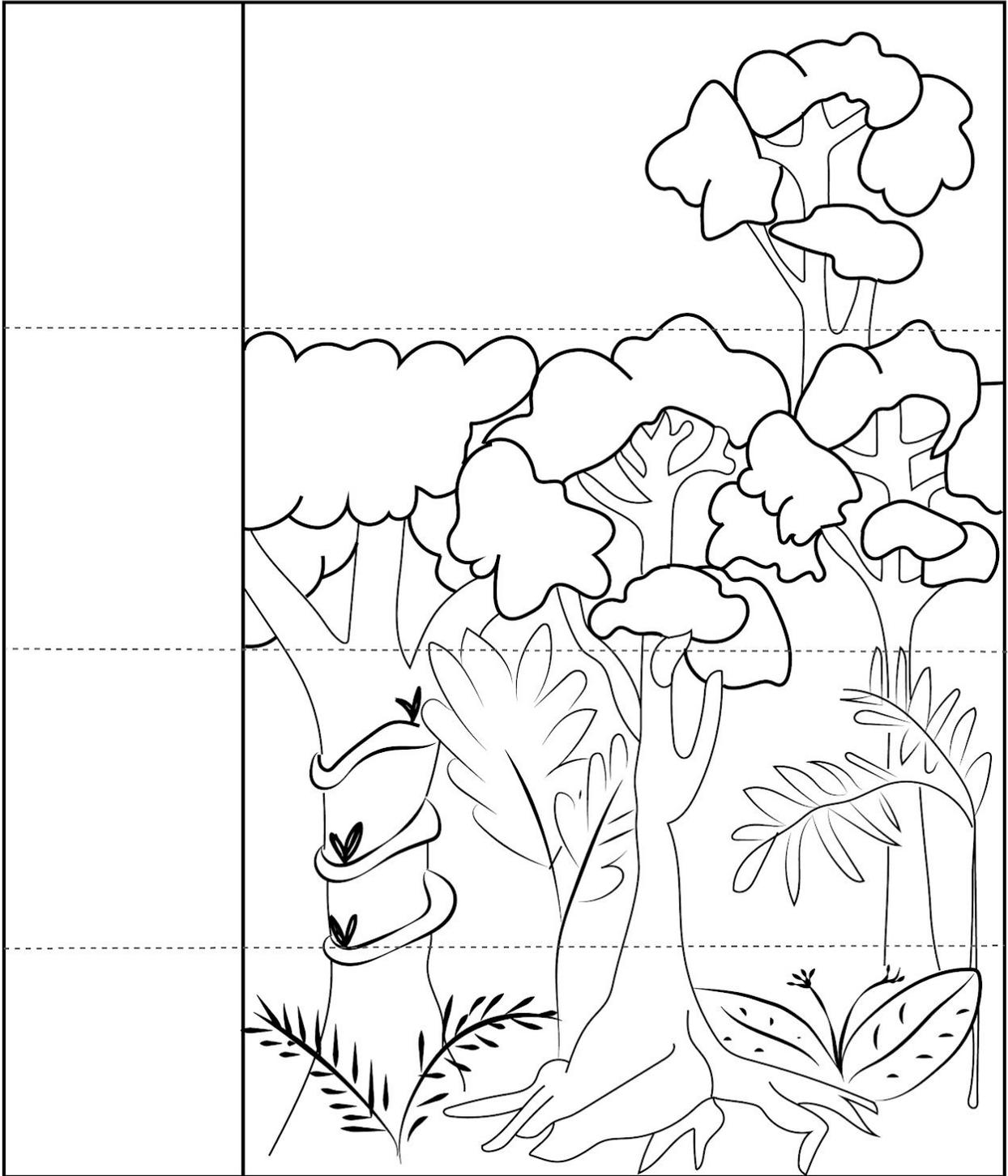
Procedure:

- Divide students into partners or small groups to complete this activity.
- Students should go through the maze and find the informational panels describing the four layers of the rainforest.
- Using the provided “Layers of the Rainforest” activity sheet, write down important information about the characteristics of the layer. If desired, students can complete this worksheet in the classroom after visiting the exhibit.
- Students should then continue through the exhibit to find informational panels about animals that live in each layer of the rainforest.
- If time is limited, assign each group a different layer to research. Multiple groups can learn about the same layer, but each group will only have to visit one section of the exhibit. Groups can report back findings to the class after the visit and groups can fill in the remaining sections of their activity sheet.
- Further differentiation by age group can include:
 - Younger students: List 2-3 examples of animals that inhabit each layer.
 - Older students: Based on text, describe the plant density and sunlight of each layer. List 2-3 examples of animals that inhabit each layer and draw conclusions about why they live in each layer based on available plant life and sunlight.
- Upon finishing the exhibit, students should complete the Rainforest Species Puzzle and correctly place each animal in its corresponding habitat.

Resources:

- Layers of the Rainforest activity sheet and answer key

Layers of the Rainforest



Layers of the Rainforest Answer Key:

Emergent Layer

- Description:
 - This layer is made of the tops of the tallest trees, reaching over 200 feet tall. Sunlight is the most abundant in this layer.
- Animals:
 - Howler Monkey
 - Harpy Eagle
 - Blue Morpho Butterfly
 - Vine Snake

Canopy

- Description:
 - The roof of the forest, the canopy, is a dense layer of leaves, vines, fruits and colorful flowering plants that allows little light to penetrate below.
- Animals:
 - Sloth
 - Toco Toucan
 - Monarch Butterfly
 - Red-eyed Tree Frog

Understory

- Description:
 - In the understory, smaller trees compete with each other for the little sunlight that filters through the thick green roof of the canopy.
- Animals:
 - Jaguar
 - Horned Guan
 - Rhinoceros Beetle
 - Green Anaconda

Forest Floor

- Description:
 - The forest floor is a tangle of large roots and very little light to guide you.
- Animals:
 - Capybara
 - Great Curassow
 - Leaf-cutter ant
 - Poison-arrow frog

Animal Classification

Ages: 5th grade and up

Times: 20 minutes

Content Area: Life Science: Biological Evolution

Prior knowledge required: Experience with the taxonomic classification system is preferred but not necessary.

Overview: Students will explore the great diversity of animal life within rainforests and practice using the standard taxonomic classification system to place animals in their correct place in Animalia.

Materials:

- Animal Classification activity sheet (provided in Resources)

Procedure:

- Before letting students explore the exhibit, prime them with the information that 10% of animal species on Earth can be found in the rainforest. The average four-square-mile area of tropical rainforest contains up to: 125 mammal species, 400 bird species, 100 reptile species, 60 amphibian species, 150 butterfly species, 30 to 80 million insect species.
- Explain to the students that in this activity, their goal is to explore the exhibit and catalog the animals they find, placing them in their appropriate taxonomic groups within the Animal Kingdom.
- Provide students with the Animal Classification worksheet and let them explore the exhibit.
- After completing the visit, review the answers on the worksheet, including the defining characteristics of each group.

Resources:

- Animal Classification worksheet and activity guide

Animal Classification Worksheet

<p>Mammals (Class: Mammalia)</p> <p>Description: a warm-blooded vertebrate animal that has hair or fur, typically gives birth to live young, and females secrete milk to nourish the young.</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p>	<p>Invertebrates (Phylum: Arthropoda)</p> <p>Description: an animal lacking a backbone, such as an arthropod, mollusk, worm, etc.</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>6. _____</p>
<p>Reptiles (Class: Reptilia)</p> <p>Description: a vertebrate animal with dry scaly skin, typically lays soft-shelled eggs on land. Includes snakes, lizards, crocodiles, turtles, and tortoises.</p> <p>1. _____</p> <p>2. _____</p>	<p>Amphibians (Class: Amphibia)</p> <p>Description: a cold-blooded vertebrate animal with an aquatic gill-breathing larval stage, typically followed by a terrestrial lung-breathing adult stage. Includes frogs, toads, newts, and salamanders.</p> <p>1. _____</p> <p>2. _____</p>
<p>Birds (Class: Aves)</p> <p>Description: a warm-blooded egg-laying vertebrate with feathers, wings, and a beak and typically able to fly.</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>	<p>Bonus!</p> <p>Which animal group contains the most species? (Check one)</p> <p><input type="checkbox"/> Reptilia</p> <p><input type="checkbox"/> Aves</p> <p><input type="checkbox"/> Mammalia</p> <p><input type="checkbox"/> Amphibia</p> <p><input type="checkbox"/> Arthropoda</p>

Animal Classification Answer Key:

Mammals (Class: Mammalia)

- Capybara
- Howler Monkey
- Jaguar
- Sloth
- Spider Monkey

Invertebrates (Phylum: Arthropoda)

- Rhinoceros Beetle
- Blue Morpho Butterfly
- Leafcutter Ant
- Rainforest Spiders
- Monarch Butterfly
- Rainforest Spider

Birds (Class: Aves)

- Harpy Eagle
- Horned Guan
- Great Curassow
- Toco Toucan

Reptiles (Class: Reptilia)

- Anaconda
- Vine Snake

Amphibians (Class: Amphibia)

- Poison Dart Frog
- Red-eyed Tree Frog

Bonus answer: Arthropoda