

# RAIN FOREST ECOLOGIST



ACTIVITY BOOK



# Rain Forest Ecologist Activity Book

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This book features five hands-on activities designed for 8- to 12-year-olds. Each activity includes one 30- to 60-minute project and extensions. Activities can be used in any order. Also included are objectives and learning outcomes, assessment questions, ideas for a presentation or exhibit and topics for further investigation. Wonderwise learning outcomes are based on national science education standards identified by McREL (Mid-continent Research for Education and Learning), the Nebraska Educational Standards, and the National Science Education Standards developed under the direction of the National Research Council. This book incorporates concepts of inquiry-based learning and the 4-H Youth Development experiential learning model.

**Each youth participant should receive a copy of the activities. Copies of this book can be downloaded from the Rain Forest Ecologist CD-ROM.**

## WONDERWISE

### Women in Science Learning Series

Wonderwise introduces you to women who have made science their career. Each kit is a comprehensive instructional package that includes a video, CD-ROM, and activity book. With these materials, leaders and youth explore the world of women scientists and discover together the fun of learning about science. For more information about Wonderwise, including free samples, Web activities, resources, science education standards and ordering information, visit our Web site:

**wonderwise.unl.edu**



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Here are some ideas you might like to use for projects or exhibits.  
Learning Outcomes: Youth develop an understanding of diversity and adaptation in organisms, and of science as a human endeavor.

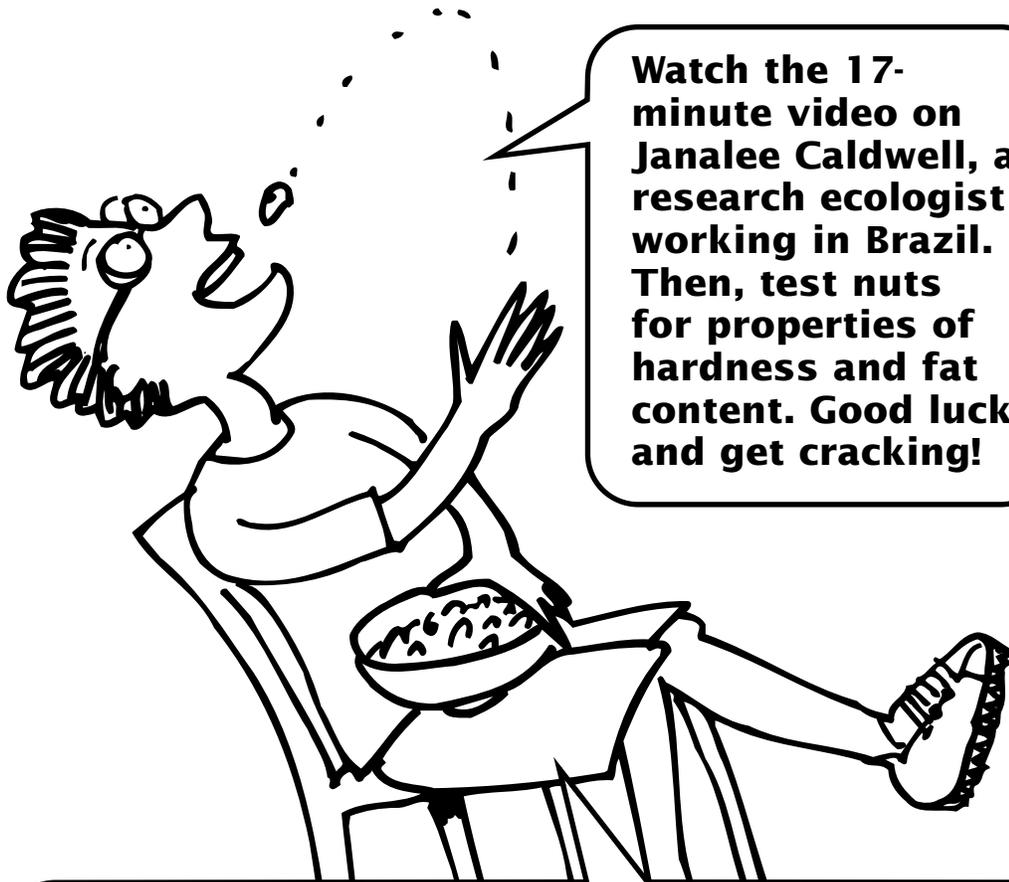
# INFORMATION FOR LEADERS

## What You Will Need for Each Activity

Listed below are the materials and preparations you will need for each activity. Most of the materials can be purchased locally. The more difficult-to-find items can be purchased from Wonderwise. The symbol © indicates that an item can be ordered from the Wonderwise Web site or GPN, the Wonderwise distributor. To purchase supplies, kits, videos, or CD-ROMs contact:

GPN (Great Plains National)  
 P.O. Box 80669 ▪ Lincoln, NE ▪ 68501-0669  
 Phone: 1-800-228-4630 ▪ FAX: 1-800-306-2330  
 e-mail: gpn@unl.edu ▪ Web site: gpn.unl.edu

<b>Activity 1</b> Nutty Investigations	<b>Activity 2</b> Frogs Up Close And Personal	<b>Activity 3</b> Build A Tree	<b>Activity 4</b> Rain Forest In Your Room	<b>Activity 5</b> Life In A Nutshell
<p><b>For the entire group:</b>                      © 17-min video,  <i>Janalee Caldwell,</i>  <i>Rain Forest Ecologist</i></p> <p><b>For each team of 3 or 4:</b>                      © Brazil nut with shell</p> <ul style="list-style-type: none"> <li>▪ 1 of each of the following nuts with shells: filbert, pecan, almond, peanut, walnut.</li> <li>▪ 1 sheet stiff paper 18 x 22 inch</li> <li>▪ masking tape</li> <li>▪ empty soup can with one lid removed</li> <li>▪ about 300 pennies (or washers about penny size and weight)</li> </ul>	<p><b>For each team of 2:</b>                      © 1 model frog</p> <ul style="list-style-type: none"> <li>▪ paper</li> <li>▪ pencil</li> <li>▪ lots of colorful magazines</li> <li>▪ scissors</li> <li>▪ glue stick or tape</li> <li>▪ cardboard or tagboard (6 x 6 inch are quickest to produce; larger sizes like 9 x 12 will offer more hiding zones)</li> </ul>	<p><b>For each team of 2:</b></p> <ul style="list-style-type: none"> <li>▪ masking tape</li> <li>▪ 1 large brown grocery bag - heavy gauge</li> <li>▪ green tissue paper cut into 10 x 6 inch pieces (four pieces per team)</li> <li>▪ 10 x 10 inch pieces of tagboard or cardboard (1 or 2 pieces per team)</li> <li>▪ scissors</li> </ul>	<p><b>For each team of 2:</b></p> <ul style="list-style-type: none"> <li>▪ tape</li> <li>▪ 2-3 grocery bags or brown construction paper</li> <li>▪ several sheets of different shades of green tissue paper</li> <li>▪ scissors</li> <li>▪ pencil</li> <li>▪ crayons, colored pencils or paint</li> <li>▪ ruler</li> </ul>	<p><b>For each team of 4:</b></p> <ul style="list-style-type: none"> <li>▪ 1 die for each game board</li> <li>▪ scissors, pencils</li> <li>▪ tape</li> <li>▪ markers: green, yellow, red and orange</li> </ul> <hr/> <ul style="list-style-type: none"> <li>▪ <i>copy Chance Cards (p.32) on stiff, colored paper</i></li> <li>▪ <i>cut, fold, and tape Critter Game pieces—toad, mosquito, damsel fly, poison frog (p.28)</i></li> <li>▪ <i>cut out scorecards (p.31)</i></li> </ul>



**Watch the 17-minute video on Janalee Caldwell, a research ecologist working in Brazil. Then, test nuts for properties of hardness and fat content. Good luck and get cracking!**

## Before You Begin

**Teams of 3 or 4**

Length:  
Part I — 60 mins., including 17 min. video  
Part II — 30 mins.

## What You Need

**For the entire group:**

⊙ 17-min video, *Janalee Caldwell, Rain Forest Ecologist*

**For each team of 3 or 4:**

- ⊙ Brazil nut with shell
  - 1 of each of the following nuts with shells: filbert, pecan, almond, peanut, walnut.
- ⊙ 1 sheet stiff paper 18 x 22 inch
  - masking tape
  - empty soup can with one lid removed
  - about 300 pennies (or washers about penny size and weight)

**What We Know.** Brazil nuts come from a giant rain forest tree called castanha (cas-tan-yah) or Brazil nut tree. Every May these giant trees bloom high in the jungle canopy. After a special bee pollinates the flowers, seeds (or nuts) begin to grow. In a few months the seedpods swell to the size of a cantaloupe. When ripe, the pods come crashing to the forest floor.

The nuts stay locked in their pods unless something comes along to set them free. Many animals would love to eat these tasty nuts, but only a few have the tools to break open the tough woody pods. Macaws can do it with their giant beaks. Agoutis (ah-goo-tees) are South American rodents that look like a large guinea pig. They have strong jaws that can do the job of opening the pods. Humans with long knives

called machetes whack open the pods and collect the nuts.

The Brazil nuts are either eaten or gathered for later. All the harvesters of Brazil nuts drop the cracked pods onto the forest floor. Later the shells fill with rain and become homes for many small creatures, including mosquitoes, frogs, toads, and damsel flies.

The human harvesters, called Castanheiros (cas-tan-air-os), carry the nuts out of the forests and down to the rivers. Bags of nuts are loaded onto boats and floated downstream to be sold in local towns. Nuts from all over the forests are piled up, cleaned, sorted and bagged in warehouses. From there Brazil nuts are shipped all over the world. Look for them in your local store around Christmas.

## Part One: Nutty Test

- 1 Watch the video of Janalee Caldwell. Then make a nut cracking tool. Roll the sheet of paper into a tube measuring 56 centimeters long (see diagram below). Adjust the tube so it fits loosely around the empty can. Secure the tube with tape.
- 2 Hold the tube upright. Now test whether the can drops through the tube. Make sure it falls easily. (Once you fill the can with pennies, you'll have your nut cracking tool. But don't fill it yet.)
- 3 First get your nuts. Work with your partner to match the nuts to the pictures below.



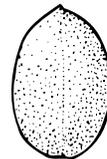
*Walnut*



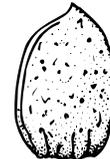
*Peanut*



*Brazil nut*



*Pecan*

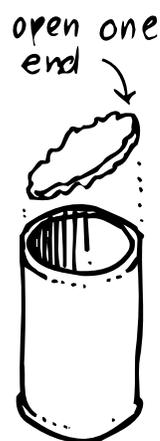
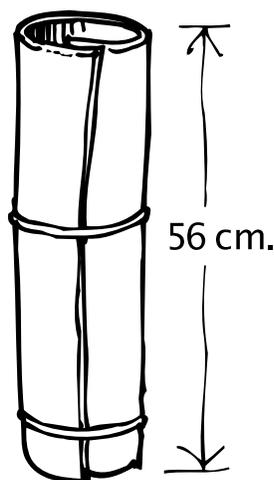


*Almond*



*Filbert*

- 4 Which nut do you think will be easiest to crack? From left to right, place all the nuts in order of how easy you think they will be to crack.



# NUTTY INVESTIGATIONS

ACTIVITY  
ONE

## Part One: Nutty Test (cont'd)

- 5 Write the name of the nut you think will be the easiest to crack in the Nut Cracking Table below. Try to guess the **least** number of pennies you think it will take. Record your estimate on the Nut Cracking Table. Put the pennies in the can.
- 6 Place the nut under the paper tube. Drop the can from the top of the tube so it lands on the nut. Check the nut to see if it is cracked. (Consider it cracked if it is easy to pry open).
- 7 If the nut is **not** cracked enough to pry open, add another 25 pennies to the can and drop test again. Add pennies in groups of 25. Repeat the drop test until the nut cracks. Record the actual number of pennies it took to crack your nut on the Nut Cracking Table.
- 8 Use the results from this test to re-think the predictions you made about the other nuts. List the name of each nut on the Nut Cracking Table, recording your predictions from softest to hardest.
- 9 Write your estimate of the number of pennies needed to crack each nut on the table. Then test each nut and record the actual number of pennies needed. Set the shells aside. Do not eat the nuts. Keep them for Part two: Fat Testing.

### NUT CRACKING TABLE

NUT NAME <small>(List below from softest to hardest based on your predictions)</small>	TOTAL NUMBER OF PENNIES NEEDED TO CRACK EACH NUT	
	Estimate	Actual

**Think It Over**



Ever hear the expression "tough nut to crack?"  
If you were a seed, why would you need a shell  
that is like a suit of armor?

[A large, lined worksheet area with a vertical margin line on the left and two hole-punch marks.]

## Part Two: Fat Testing

A nut is a baby plant in a box with its lunch. Packed within each nut is nutritious food for the baby plant to grow on. Nuts are famous for their fat content. If you have ever left an oily food on a paper napkin, you know that it leaves a greasy stain. Use this knowledge to test which nuts contain the most fat.

- 1 Use the Fat Test Worksheet on p.7. Label each test square with the name of a nut, using the nuts from the crack test.
- 2 Remove each nut from its shell. Peel away the thin outside skin until you see the cream-colored nut meat.
- 3 Take each nut and rub it across the square that has its name on it. Rub three times, corner to corner, trying to keep the rubbing pressure the same for each test.
- 4 Hold the paper up to the light. A translucent (see-through) stain shows that the nut contains fat.
- 5 Which nut appears to have the most fat? The least fat? Write the answers below.  
most fat \_\_\_\_\_ least fat \_\_\_\_\_
- 6 The Fatty Nut Table below shows how many grams of fat are found in one cup of each type of nut.

According to the table, which nut has the most fat? \_\_\_\_\_

Which nut has the least fat? \_\_\_\_\_

How do your fat test results compare to the information on the table?



*Brazil nut and pod*

<b>FATTY NUT TABLE</b>	
<b>one cup of nuts</b>	<b>grams of fat</b>
Brazil nuts	94
pecans	84
almonds	77
filberts	72
peanuts	70

## Part Two: Fat Testing (cont'd)

### FAT TEST WORKSHEET

- 1** Label each square.
- 2** Rub the nut meat across the square three times.
- 3** Test each nut separately.
- 4** Hold the paper up to the light. A translucent (see-through) stain shows the amount of fat.



Nut Type:

Nut Type:

Nut Type:

Nut Type:

Nut Type:

Nut Type:

# NUTTY INVESTIGATIONS

ACTIVITY  
ONE

## Think It Over

Why would a fatty seed have a hard shell?



# FROGS UP CLOSE & PERSONAL ACTIVITY TWO

**Observe a colorful poison frog. Then investigate one of the poison frog's outstanding features: protective coloration.**



**What We Know.** Frogs come in a wide variety of shapes, sizes, and colors. In fact, there are more than 2,500 different kinds of frogs in the world. While some physical features are standard frog equipment, others are designed to fit a frog's special neighborhood. Bright, crazy colors are probably the first thing you will notice about

poison frogs. Some of these frogs use color as camouflage, to disappear in their environment for protection. Others use color to advertise their presence to their enemies. Their bright colors warn enemies that they are armed and dangerous. Some of these frogs make a very strong poison; just one drop could kill 40,000 mice!

## **Before You Begin**

**Teams of 2**

Length:  
Part I — 45 mins.  
Part II — 30 mins.

## **What You Need**

**For each team of 2:**

⊙ 1 model frog

- paper
- pencil
- lots of colorful magazines
- scissors
- glue stick or tape
- cardboard or tagboard (6 x 6 inch are quickest to produce; larger sizes like 9 x 12 will offer more hiding zones)

## Part One: Frog Bodies

Here is your chance to meet a frog face to face. The good news is that these frogs won't wiggle.

1 Divide into groups of two and obtain a poison frog. Take a good look at your frog. Write down everything you observe about the shape, size, color(s) and texture of your frog.

2 Some frogs have colors that can either help them camouflage or advertise themselves. Create a colored habitat card that will camouflage your frog.

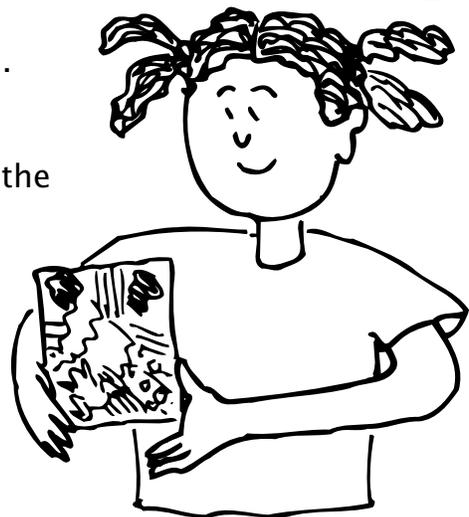
3 Flip through the magazines and tear out colors you think will make your frog disappear. Place the colors on the board (remember your habitats will be seen from across the room). You can crumple, curl, loop or otherwise make textures for your frog's background.

4 For some ideas to make your frog hide, check "Creature Colors" on p. 11. When you have a habitat that works, glue the colors in place and trim the edges.

5 Find the best hiding position for your frog on the habitat card. Use a loop of tape to stick the frog in position (taping the feet works well; make sure the frog stays in place when the card is tipped).

6 To test your habitat card, tack it up in the viewing spot with all the others. Look at your card up close. Then step back and check it from about halfway across the room.

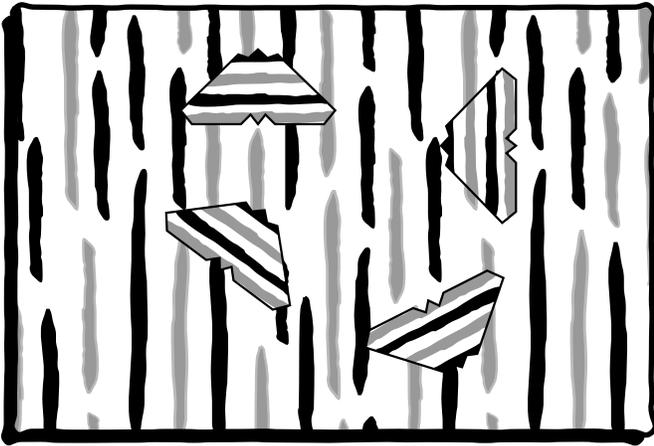
HIDING



## Part One: Frog Bodies (cont'd)

### Creature Colors

Nature has some tricky ways of coloring living things. Here are some ideas to consider before creating your habitat cards.



*Matching colors and patterns blend into the background.*



*Animals that live in a textured habitat hide best if they have textured skin.*

### Think It Over

Why would camouflage be an advantage for frogs?

## Part Two: A Real Stand Out



Flip the card you made in Part one and create a habitat on the other side that does the best job of advertising or making your frog stand out. Glue and trim. Then step back to view and test it.

With your partner, check your habitat. Discuss how it looks from a distance and up close.

Check out the habitats made by other teams. What do all the good hiding habitats have in common?

### Think It Over



# BUILD A TREE

ACTIVITY  
THREE

**Build a rain forest tree, then experiment with ways of making your tree stand alone.**



## Before You Begin

Teams of 2

Length:  
Part I - 45-60 mins.  
Part II - 30 mins.

## What You Need

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.

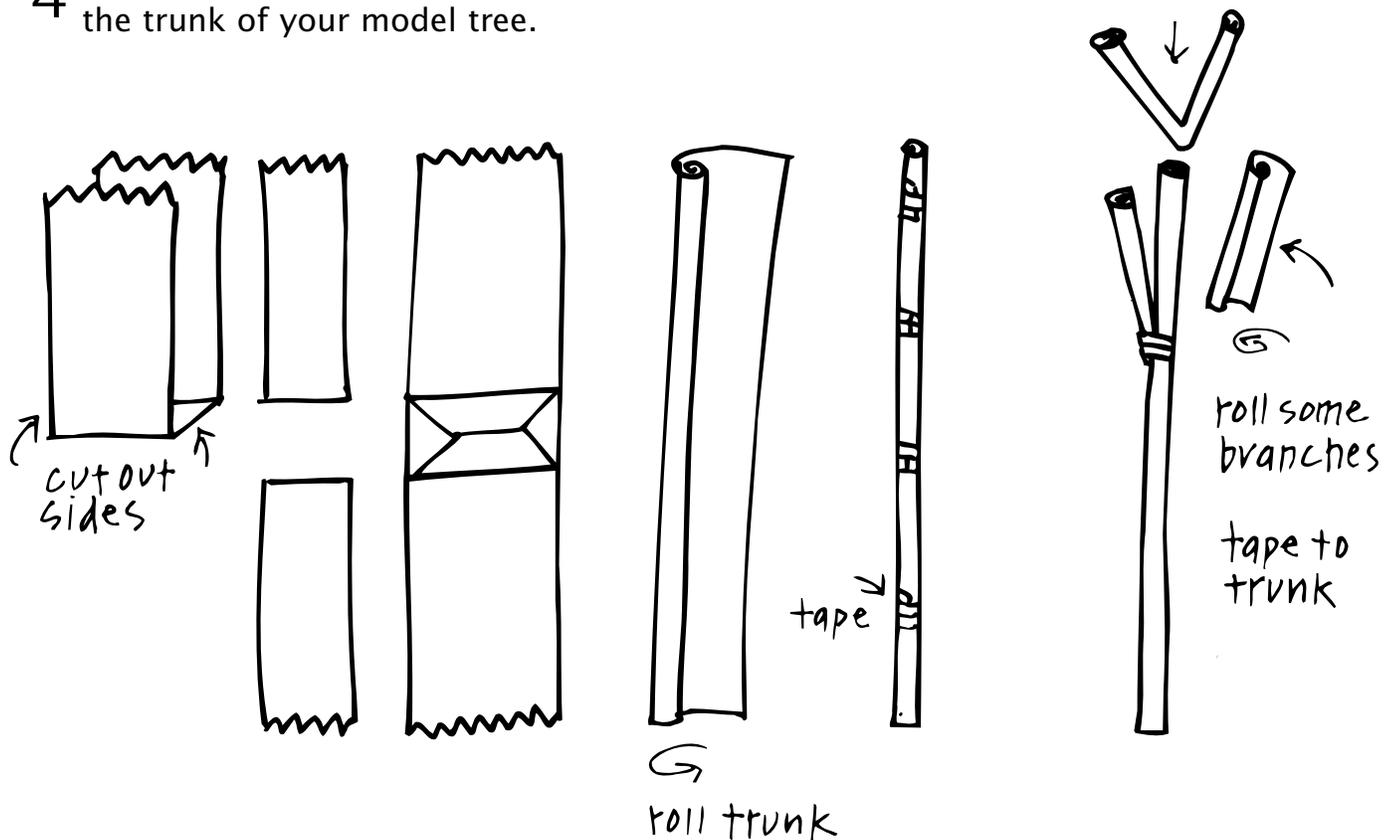
Big rain forest trees need a lot of foot room. The forest is a crowded place, and the soils of the rain forest are very shallow. These trees can't reach deep to get a good grip in the earth. Rain forest trees are forced to send their roots out instead of down. This makes standing up tall a bit tricky.

# BUILD A TREE

## Part One: Build a Tree

Choose a partner. 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.



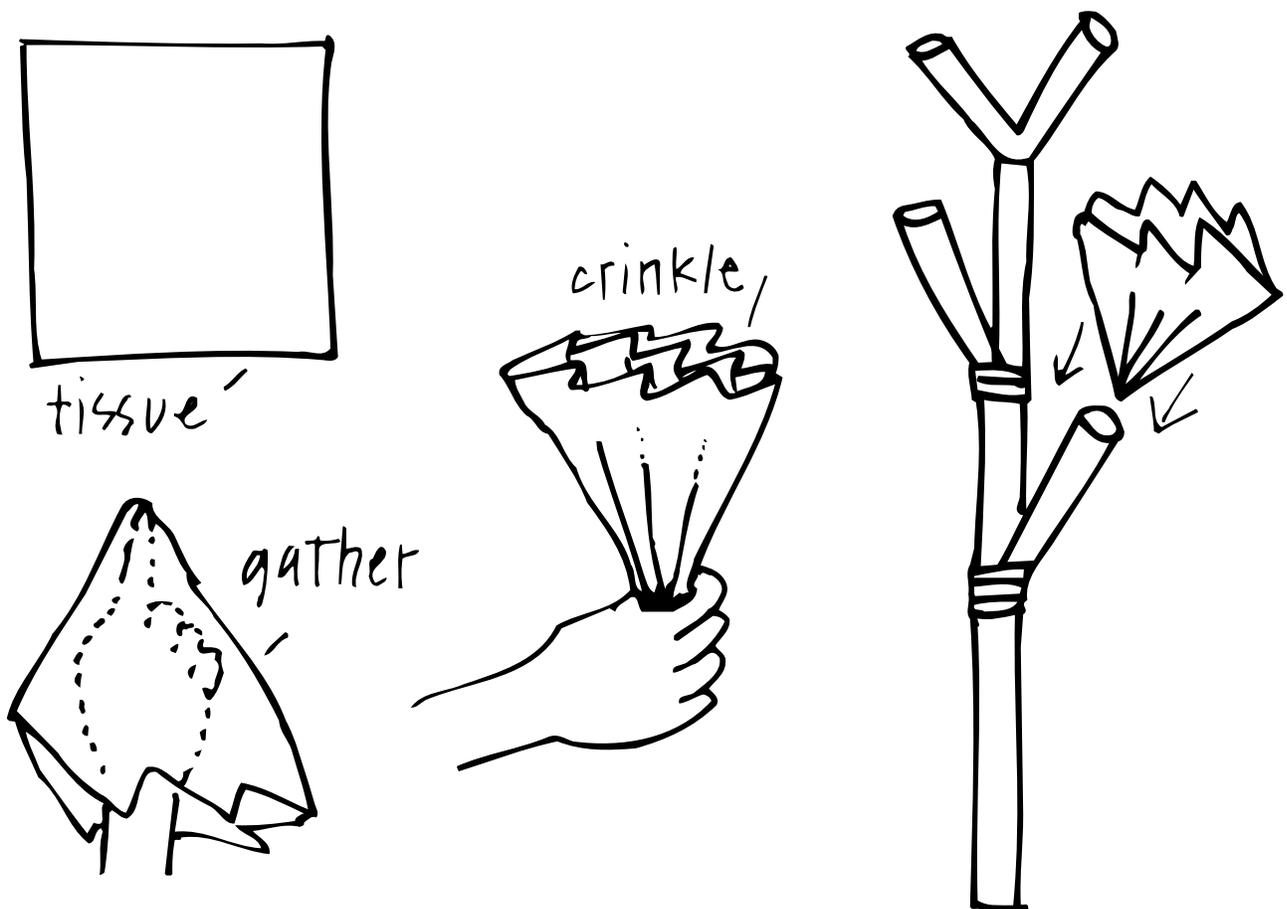
- 5 Roll one of the paper bag panels you had set aside using the same method. Tape it shut. Bend it in half and insert it into the top of the trunk to make a branch (see picture).

# BUILD A TREE

## Part One: Build a Tree (cont'd)

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. Stuff it into a tube (branches) and tape it in place. (See below for an example).



**Congratulations, your rain forest tree is complete!**

# BUILD A TREE

## Think It Over

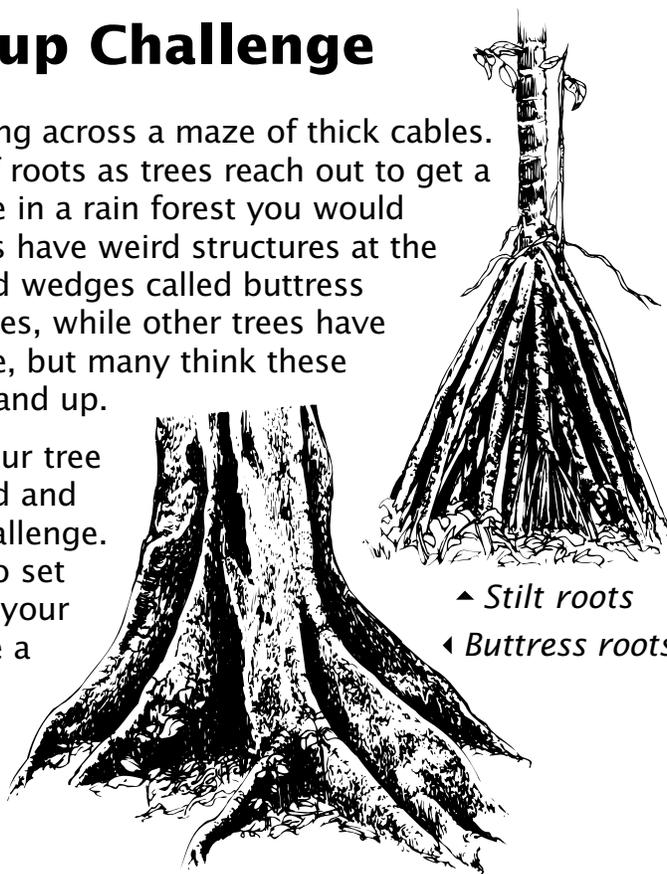
What are the problems of being a big  
tall tree?



## Part Two: The Stand-up Challenge

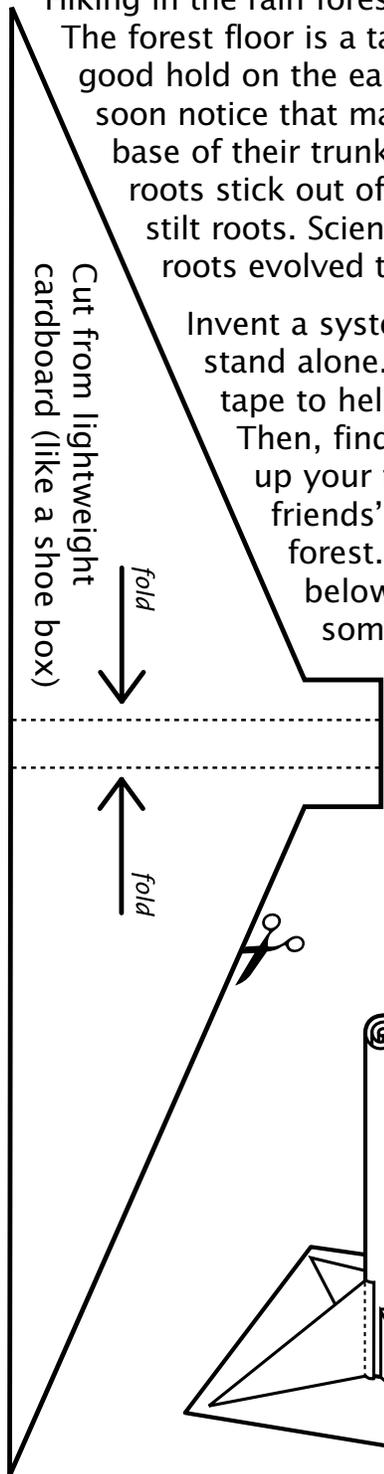
Hiking in the rain forest is like stepping across a maze of thick cables. The forest floor is a tangled mess of roots as trees reach out to get a good hold on the earth. If you were in a rain forest you would soon notice that many of the trees have weird structures at the base of their trunks. Wing-shaped 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.

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 friends' trees to create a forest. The ideas below suggest some solutions.

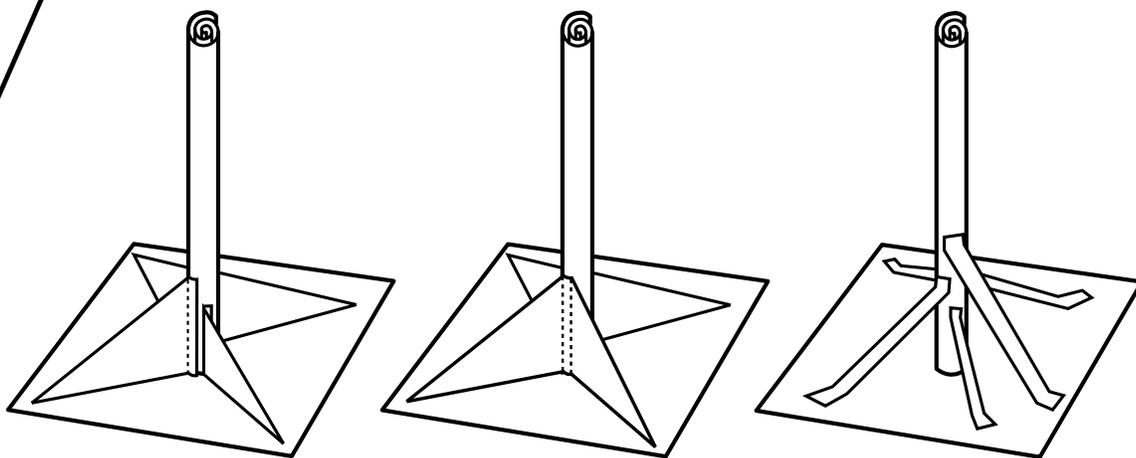


▲ Stilt roots

◀ Buttress roots



- 1 If your tree will not stand alone, try another idea or ask someone to help you.
- 2 If there is time, come together as a group. Talk about what worked and what didn't.



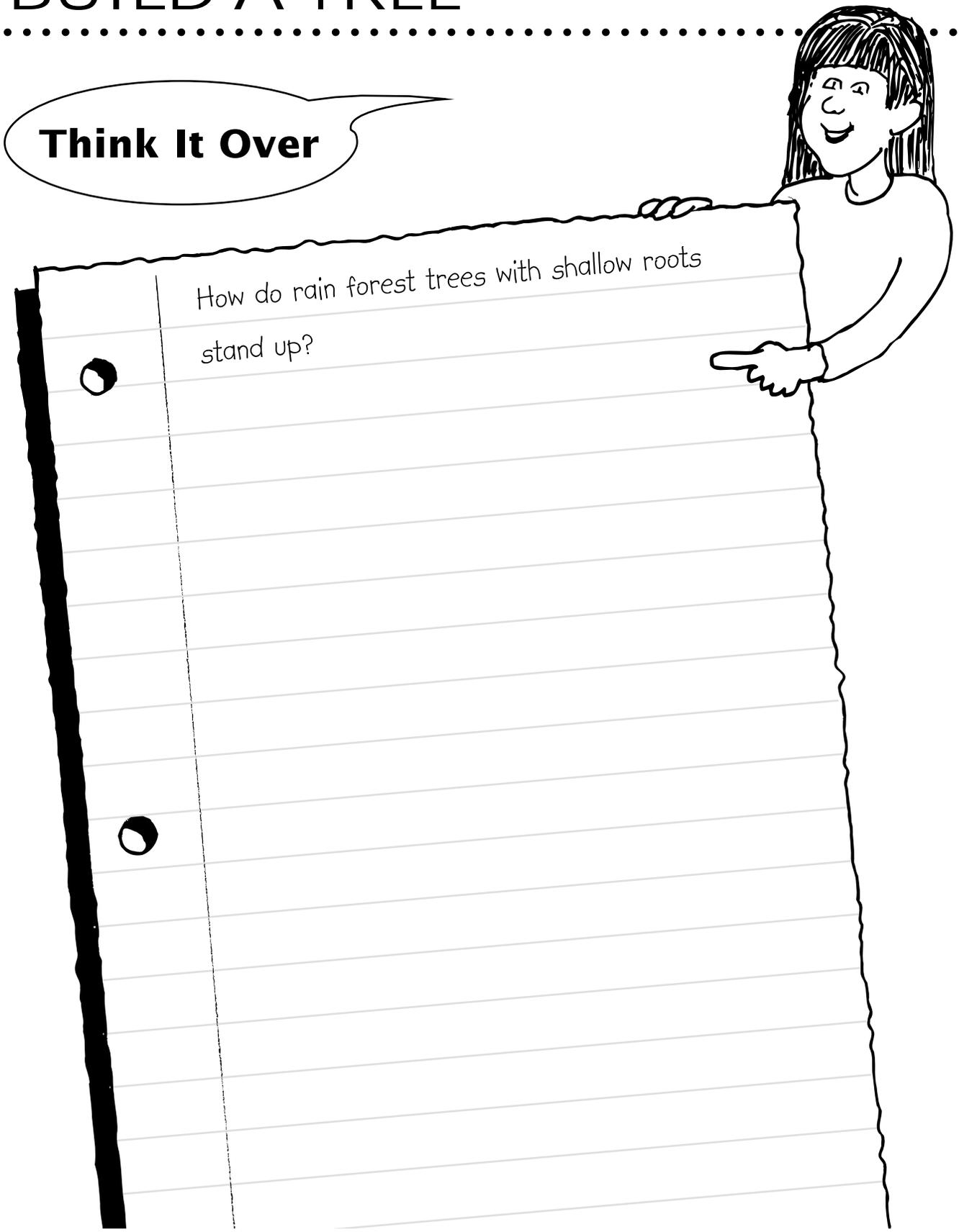
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# BUILD A TREE

ACTIVITY  
THREE

## Think It Over

How do rain forest trees with shallow roots  
stand up?



# RAIN FOREST IN YOUR ROOM ACTIVITY FOUR

**Big trees are only one part of the rain forest. Make models of living things to add diversity to your forest.**

## **Before You Begin**

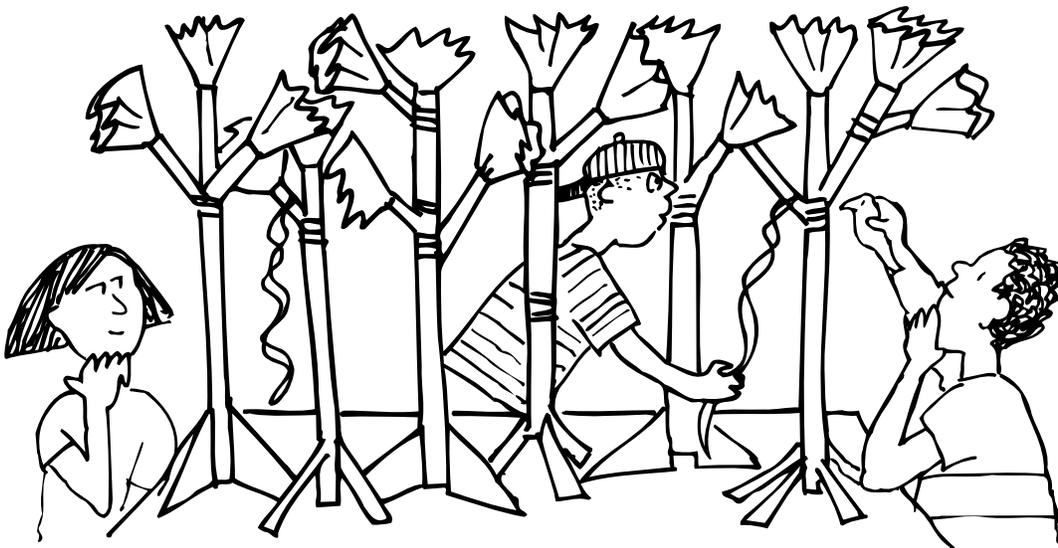
**Teams of 2**

Length:  
Part I - 30 mins.  
Part II - 45-60 mins.

## **What You Need**

**For each team of 2:**

- tape
- 2-3 grocery bags or brown construction paper
- several sheets of different shades of green tissue paper
- scissors
- pencil
- crayons, colored pencils or paint
- ruler



**What We Know.** Scientists estimate that half of the 50 million life forms on Earth live in rain forests. This is amazing considering that rain forests cover only 7 percent of land. The rain forest is not only crowded with life, it is crammed with more different kinds of life than anywhere else on Earth. For example, one acre of tropical rain forest may have over 100 different species of trees while the same acre of land in a North American forest would have only four.

So what is going on? Why are rain forests such excellent habitats for plants and animals? Rain forests are crowded neighborhoods for many reasons. The weather is mild and the temperature is constant. There is plenty of moisture and sunlight year round. Life forms do not have to deal with ice, drought or long dark winters. These conditions make it easy to survive and thrive.

## Part One: Layers Upon Layers

There is a huge diversity of living things in the rain forest. Biologists divide the rain forest into four separate neighborhoods or layers. Each layer gets different weather and amounts of light and moisture. Each layer is home to different plants and animals. Read below to see who lives where.

### **The Emergent Layer (40 to 50 meters)**

This layer is formed by a few of the tallest trees. It is home to harpy eagles (one of the rain forest's deadliest hunters), howler and spider monkeys, and many other animals.

### **The Canopy Layer (20 to 40 meters)**

The majority of the rain forest creatures live in this crowded treetop level. Some that are common to this layer include scarlet macaws, emerald tree boas, fruit bats, leaf-cutter ants, katydids and two-toed sloths. Plants that live up here include lianas and bromeliads.

### **The Understory Layer (0 to 20 meters)**

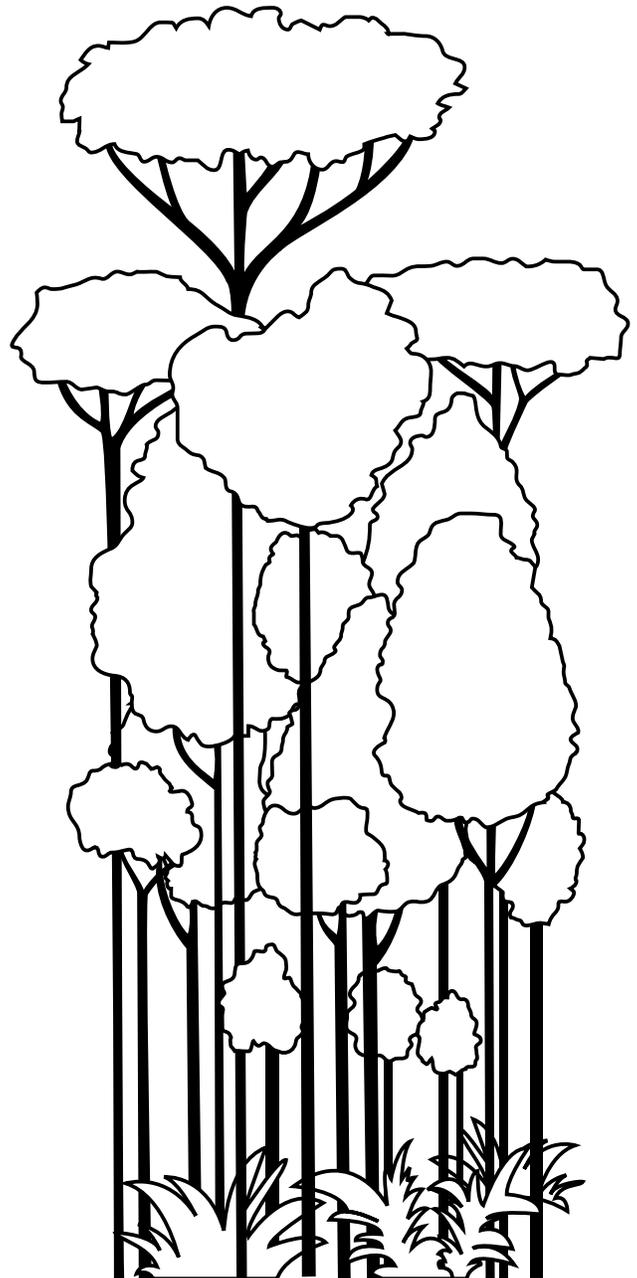
This layer is home to small trees, palms, shrubs, ferns, and vines. Opossums, ocelots, woolly monkeys, poison frogs, and iguanas are animals common here.

### **The Forest Floor (0 meters)**

Here the temperature is constant and light is dim. The ground is covered with roots, rotting leaves, streams and pools of water. Agoutis, poison frogs, toads, damsel flies and mosquitoes are just a few of the many animals that live here.

Transplant all the trees to one area to create a rain forest (use a spare table or the corner spot. You may find that you need additional tape or a wall to lean the trees up against to keep the forest standing.

Now you can populate your rain forest with plants and creatures.



# RAIN FOREST IN YOUR ROOM ACTIVITY FOUR

## Think It Over



Which rain forest trees get the most light?

Which rain forest trees get the most protection?

## Part Two: Creating Rain forest Critters & Plants

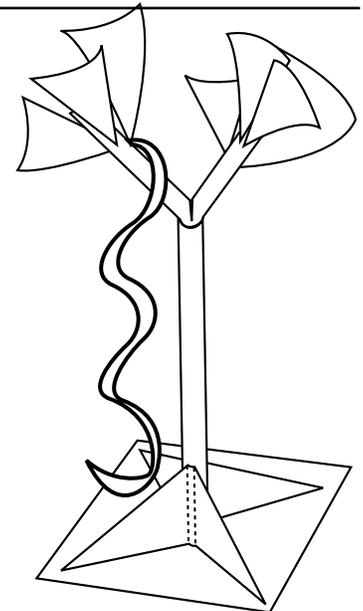
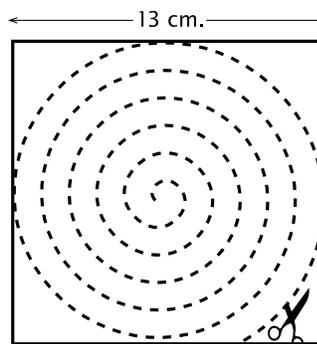
Get together with the same person you worked with on the Build a Tree activity. Create plants and animals for your rain forest. Check the information in Part one to determine where to place them in the rain forest. See the examples below for suggestions.

### Make a Liana

Lianas (lee ah nahs) are vines that live attached to trees. Some are tough and woody, some are flexible. They begin life high in a tree and grow down toward the ground.

Gather your materials: brown or green paper and scissors.

1. Cut a circular shape 10-13 cm. wide from the paper.
2. Cut the shape into a spiral.
3. Pull the spiral at opposite ends to stretch it into a vine shape.
4. Hang the liana on one of the rain forest trees.
5. Make more and hang them on other trees.

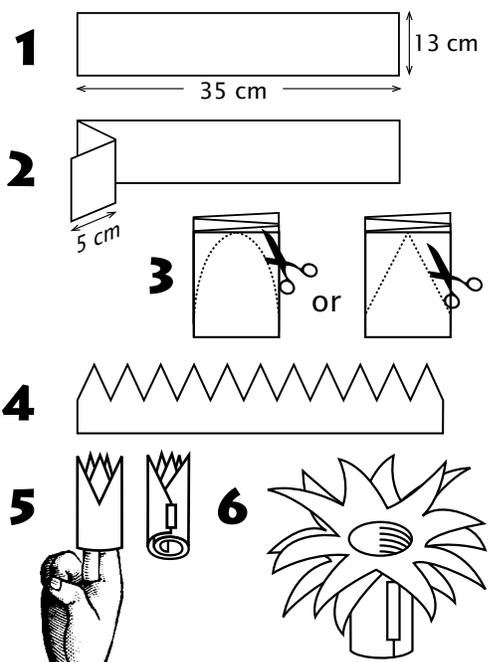


### Build a Bromeliad

Bromeliads are plants with stiff, waxy leaves clustered around a hollow center. The hollow acts as a tank for catching rainwater and dust. These plants grow on tree surfaces and live in all levels of the forest except the emergent layer.

Gather your materials: green tissue paper, tape, scissors

- 1 Cut the tissue into a strip (see diagram).
- 2 Fold the strip into 4 cm segments, as if you were making a fan.
- 3 Cut the folded strip into a leaf shape.
- 4 Open the strip. Roll it around 2 fingers.
- 5 Slip it off your fingers and pinch the base together. Tape it shut.
- 6 Pull the leaves open starting with the outside layer.
- 7 Plant your bromeliad on a rain forest tree.
- 8 Make a few more and tape them to other branches.



## Part Two: Creating Rain Forest Critters & Plants

### Hang an Animal

These animals hang out mostly in the emergent and canopy layers of the rain forest.

- 1 Color and cut them out or draw your own.
- 2 Tape to or hang from a tree or branch.

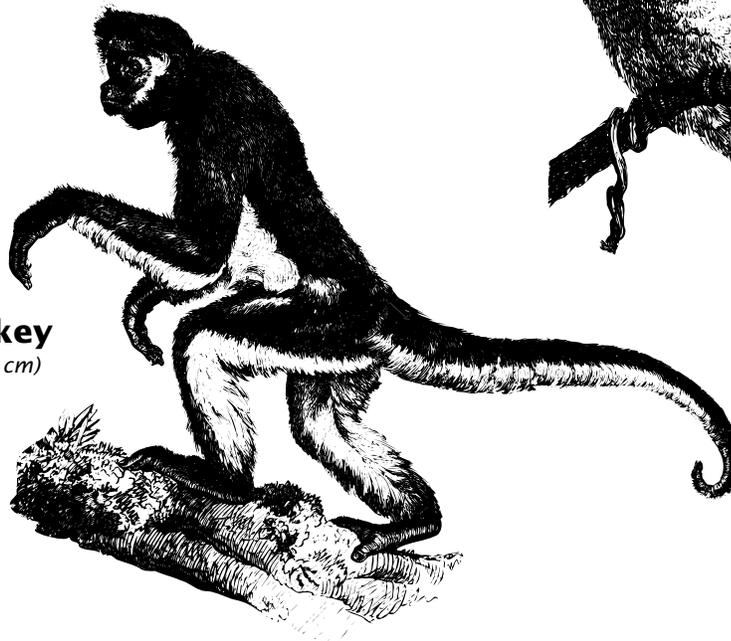
### Fruit bat with young

(Actual size 8 - 10 cm)



### Macaw

(Up to 91 cm)

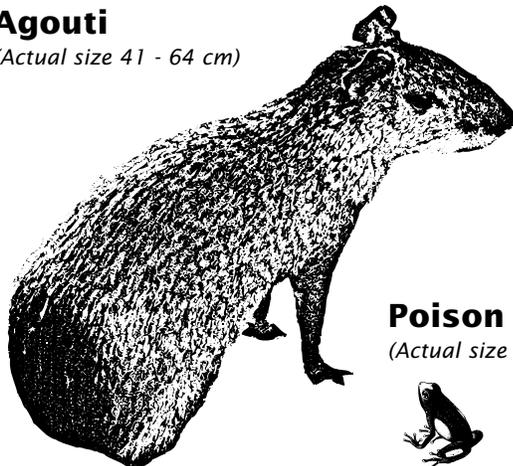


### Spider monkey

(Actual size 38 - 61 cm)

### Agouti

(Actual size 41 - 64 cm)



### Poison frog

(Actual size 5 cm)



### Ground an Animal

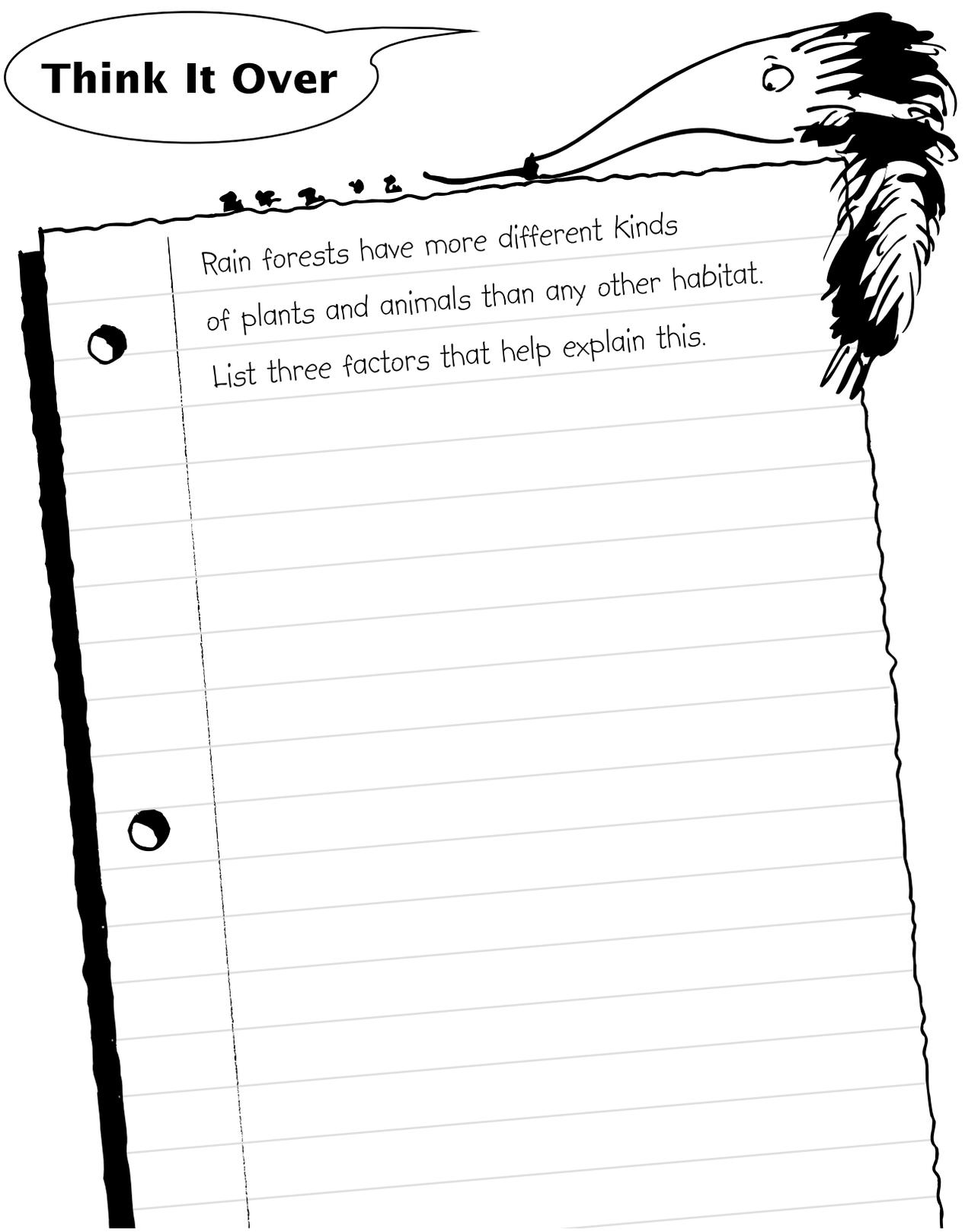
These animals spend most of their time in the understory layer or on the forest floor.

- 1 Color and cut out or draw your own.
- 2 Place in the appropriate habitat.

# RAIN FOREST IN YOUR ROOM ACTIVITY FOUR

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## Think It Over



Rain forests have more different kinds of plants and animals than any other habitat. List three factors that help explain this.

# LIFE IN A NUTSHELL

ACTIVITY  
FIVE

**Play a game that shows what happens to the creatures of the Brazilian nutshell community as they grow from egg to adult. This game is a race to get big. Your mission is to make it around the game board, grow faster than your competition, and leave the nutshell nursery before your neighbors eat you. Be quick, and don't forget, it's a jungle out there. Good luck.**



## **Before You Begin**

**Teams of 4**

Length:  
Part I - 60 mins.  
Part II - 30 mins.

## **What You Need**

**For each team of 4:**

- 1 die for each game board
- scissors, pencils
- tape
- markers: green, yellow, red and orange
- *copy Chance Cards (p.32) on stiff colored paper*
- *cut, fold, and tape Critter Game pieces (p.28)*
- *cut out scorecards (p.31)*

**What We Know.** Kaboom!!! Imagine tossing a bowling ball out the window of a building 12 stories high. The ball would fall about as fast as a ripe Brazil nut pod when it drops off the tree. These melon-sized pods are packed with 20 to 30 heavy, woody seeds. Each seed is rich in protein and fat, making it a favorite food of any animal with the tools to break it open. Macaws with their huge beaks, agoutis with their sharp teeth, and humans armed with long machete knives break open the tough shells, take the seeds and toss the shells to the ground. The rains drip into the broken shells, making small pools of water on the forest floor.

One day when herpetologist (frog scientist) Janalee Caldwell was taking a walk in the rain forest, she stumbled upon a Brazil nut pod. She noticed water trapped in the empty shell. Janalee knew that no space in the rain forest stays empty for long, and so she wasn't surprised to find small animals swimming inside. As she poked around the forest, she found the same set of creatures occupying other nutshells. She decided to study them by setting up an experiment. She hoped to discover some interesting things about this tiny wet world.

Her experiment was to leave cups of water on the forest floor to see if life would come to them. It wasn't too long before life appeared. Usually the eggs of damsel flies, mosquitoes and toads showed up. Poison frogs appeared as tadpoles. Soon the eggs hatched into tadpoles or larvae. These hungry larvae ate each other, with the bigger ones dining on the smaller ones. Because the competition for food and space is fierce in the tiny nutshell nursery, only one or two larvae survive to become adults.

Janalee's experiments showed that damsel flies, mosquitoes and frogs eat each other, including their own kind. The toad tadpoles eat only dead organic material, then mature to the adult stage and promptly leave the pod. Janalee found that each animal had a different growth rate. Animals that arrived in the pod first and grew the fastest ate up the competition.

So how do vegetarian toads survive this vicious competition? Janalee found that the toads lay large numbers of eggs and have a much faster rate of development. Surviving the nutshell nursery is a combination of timing and luck.

## Part One: A Race to Get Big

### Game Set-up

1 Tape the two sides of the game board together. Follow the color code below to color your game board spaces. Color all spaces for each animal the same color. For example: for Toad, color in the TOAD start space as well as any other spaces having to do with toad. Do the same for Damsel Fly, Poison Frog and Mosquito.

Color code:

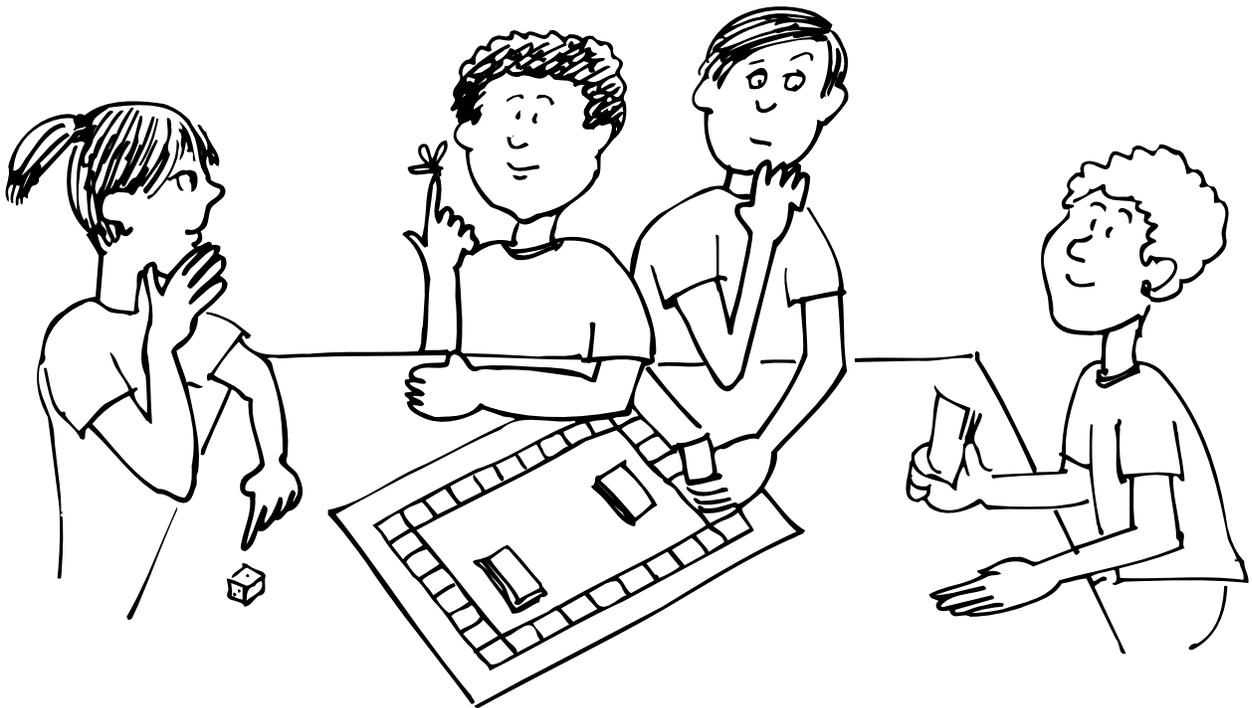
- Damsel Fly - red
- Mosquito - orange
- Toad - green
- Frog - yellow

2 Color the Critter Playing Pieces according to the color code above. Cut them out along the solid lines. Fold the Critter Playing Pieces along the dotted lines to form a cube. Tape to close.

3 Set each playing piece on its matching starting space with the name facing up.

4 Cut out the Chance Cards. Stack them face down inside the game board.

5 Obtain a Scorecard. Toad will be the scorekeeper for all four games.



## Part One: A Race to Get Big (cont'd)



### Playing the Game

- 1 Each player starts from his or her corner of the game board.
- 2 Most critters grow from egg to adult as they travel around the game board. The only exception is the Poison Frog. In real life, the adult male poison frog carries one tadpole at a time to the water-filled nut capsule. So in the game, the Poison Frog begins life as a tadpole. Each space on the game board equals three days of real development.
- 3 Read the squares on the game board to understand when you will develop (morph) from one stage to another. As you pass each square that changes your development, turn your game piece with the most current stage of development pointing up (you do **not** have to land on a square to change your development). Tell Toad (the scorekeeper) each time you morph to a new stage.
- 4 All critters are predacious (they eat others) except the Toad, who doesn't eat anyone.
- 5 Two critters cannot share the same space. If two critters land on the same space the critter that arrives first eats the other, who then must return to begin the game again.
- 6 The first critter to reach the adult stage wins. Note: When Toad develops into an adult, it leaves the board but continues keeping score on the scorecards for the other players. Critters continue playing until the next one metamorphoses (changes) into an adult. This critter wins second place. Toad keeps track of who wins first and second places on each scorecard.
- 7 Play four games according to the following guidelines:
  - Roll the die to determine order of play. Highest scorer begins the game. Highest scorer also has first pick of the critter that he or she would like to play.
  - Rolling the die determines the number of squares you travel each turn.
  - Play four games as the same critter. At the end of the four games obtain your scorecard from Toad and go on to Part IV.

**Chance Cards.** When a player lands on a chance card space, he or she must draw a card. Read and follow the directions on the card. Some of the chance events will work in your favor, others will not.

**Scorecards.** Toad is always the scorekeeper. Toad must watch the game carefully and make a check mark on each scorecard as the critters develop through each stage of their life cycle.

# LIFE IN A NUTSHELL

ACTIVITY  
FIVE

**TOAD**

Toad Eggs



Toad Tadpole



Adult Toad



**MOSQUITO**

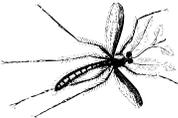
Mosquito Egg



Mosquito Larva



Adult Mosquito



**DAMSEL FLY**

Damsel Fly Eggs



Damsel Fly Larva

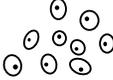


Adult Damsel Fly



**POISON FROG**

Poison Frog Eggs



Poison Frog Tadpole



Adult Poison Frog



## CRITTER GAME PIECES

*Cut out on solid lines, fold on  
dotted lines and tape.*

# LIFE IN A NUTSHELL

ACTIVITY  
FIVE

**CHANGE CARD?**

**MOSQUITO BEGINS LIFE AS AN EGG**

**START**  
MOSQUITO

**MOSQUITO LARVA MORPHS INTO ADULT EATS POD PALS**

**CHANGE CARD?**

**LIFE IN A NUTSHELL**

**POISON FROG BEGINS GAME AS A TADPOLE**

**CHANGE CARD?**

**TOAD MORPHS INTO ADULT HOPS OFF THE GAME BOARD**

**DAMSEL FLY HATCHES INTO LARVA**

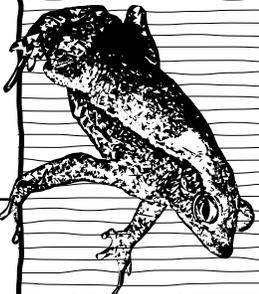
**CHANGE CARD?**

**POISON FROG START**

# LIFE IN A NUTSHELL

ACTIVITY  
FIVE

Scissors icon

TOAD START	CHANGE CARD?	MOSQUITO EGG HATCHES INTO LARVA
TOAD BEGINS LIFE AS AN EGG		
CHANGE CARD?	CHANGE CARD?	
TOAD EGG HATCHES INTO TADPOLE		
DAMSEL FLY MORPHS INTO ADULT EATS POD PALS		
DAMSEL FLY START	DAMSEL FLY BEGINS LIFE AS AN EGG	POISON FROG TADPOLE MORPHS INTO ADULT EAT POD PALS
		CHANGE CARD?

Glue to other half of Game Board so that ▶s line up.

# LIFE IN A NUTSHELL

TOAD

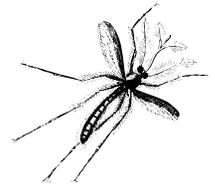


<b>Game</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Winner</b>				

<b>Egg</b>				
<b>Larva</b>				
<b>Adult</b>				

*Scorecard*

MOSQUITO



<b>Game</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Winner</b>				

<b>Egg</b>				
<b>Larva</b>				
<b>Adult</b>				

*Scorecard*

DAMSEL  
FLY



<b>Game</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Winner</b>				

<b>Egg</b>				
<b>Larva</b>				
<b>Adult</b>				

*Scorecard*

POISON  
FROG



<b>Game</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Winner</b>				

<b>Egg</b>				
<b>Larva</b>				
<b>Adult</b>				

*Scorecard*

# LIFE IN A NUTSHELL

## **CHANCE CARDS**

*Copy on stiff colored paper  
and cut out on dotted lines*

<p>An agouti was hunting for nuts and tipped over your nutshell.</p> <p>Most of the water spilled.</p> <p>Go back one space.</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p>You have plenty of food and plenty of space.</p> <p>You are thriving.</p> <p>Move ahead three spaces.</p>
<p>An entomologist collected all the larva in your nutshell.</p> <p>You miss a meal.</p> <p>Go back two spaces.</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p>The summer has been very dry.</p> <p>Much of the water evaporated in your nutshell.</p> <p>This sets you back one space.</p>
<p>New eggs are laid in your capsule.</p> <p>That means plenty of food soon.</p> <p>Go ahead two spaces.</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p>A herpetologist came through the forest and collected many amphibians. No eggs were laid.</p> <p>If you are a frog or toad, miss a turn.</p>
<p>Mosquito larvae hatch.</p> <p>That means more food.</p> <p>Move ahead two spaces.</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p>Fresh rain fills your nutshell.</p> <p>Move ahead one space.</p>
<p>The land was sold to loggers who cut all the trees, leaving your nutshell in the hot sun.</p> <p>The water begins to dry up.</p> <p>Go back two spaces</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p><b>CHANCE</b> ? CARD ?</p>	<p>You bumped into a big larva, but lucky for you it ate someone else.</p> <p>Move ahead two.</p>
<p></p>	<p></p>	<p></p>	<p>It rains so hard you are washed out of your shell.</p> <p>You must start over.</p>

# LIFE IN A NUTSHELL

ACTIVITY  
FIVE

## Think It Over

Why do you think there is competition in the nutshell between the mosquito, the damsel fly, the poison frog and the toad?



# LIFE IN A NUTSHELL

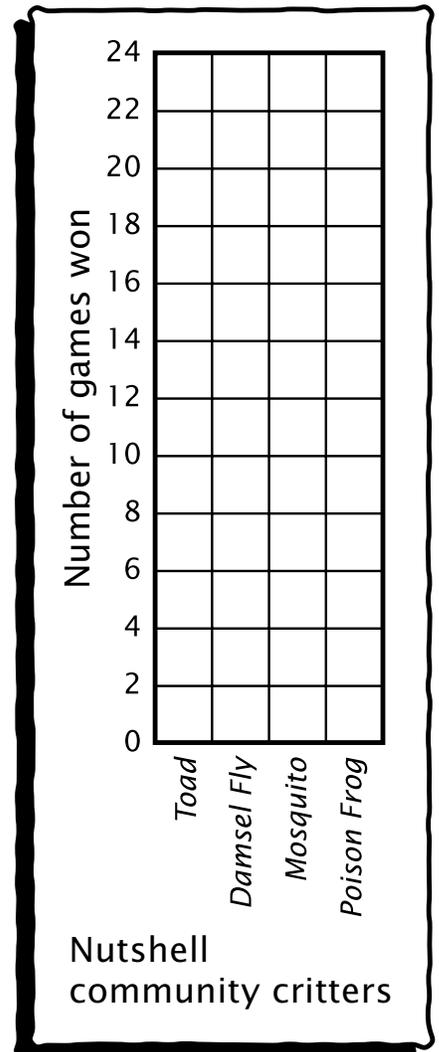
## Part Two: Graphing

1 Fill in the table below to show the results of all games played by your class. Record how many games each critter won.

	NUMBER OF GAMES WON
Frog	
Toad	
Mosquito	
Damsel Fly	

2 Use the data from the table above to complete the graph to the right.

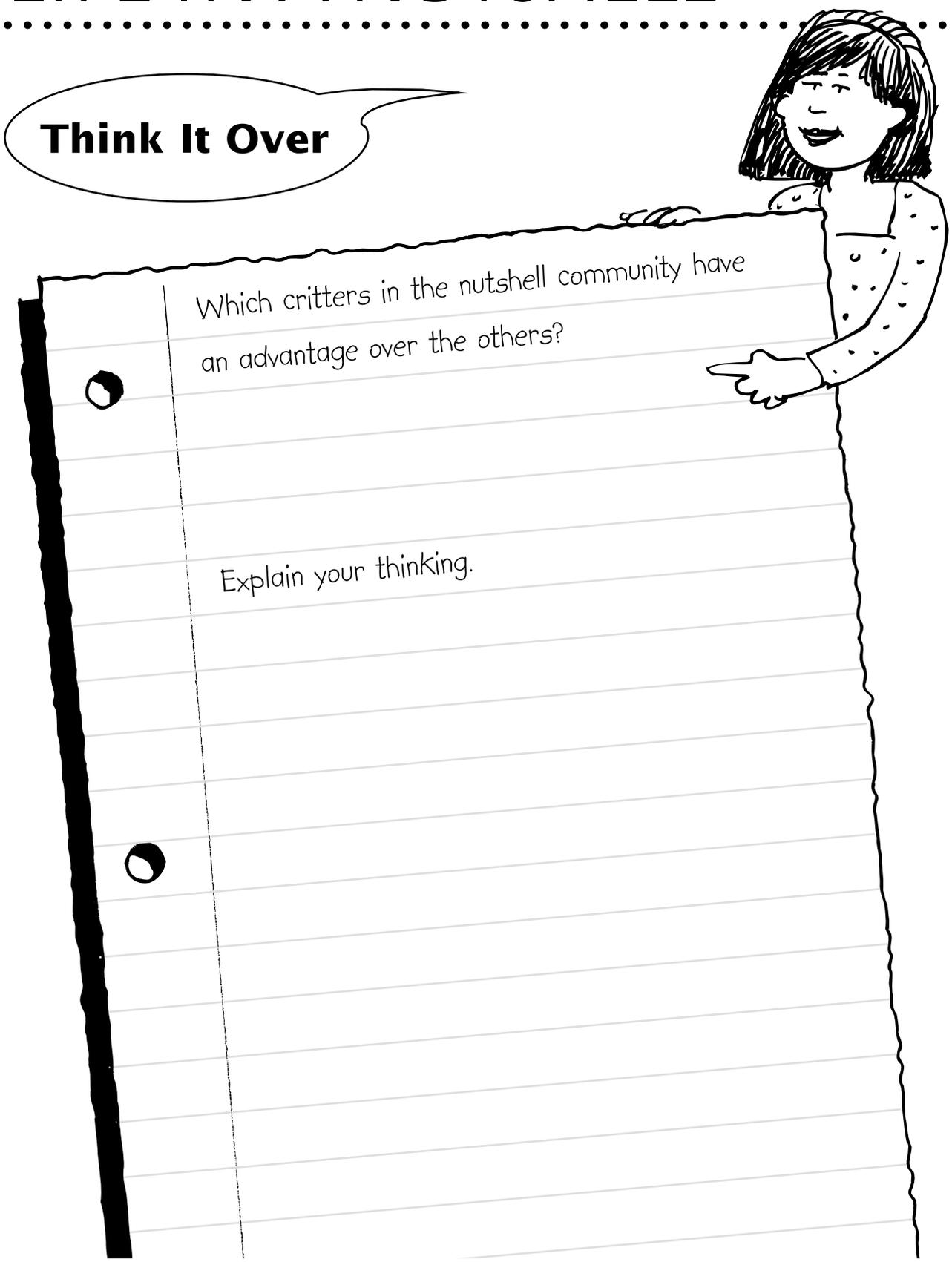
## NUTSHELL SURVIVOR GRAPH



# LIFE IN A NUTSHELL

ACTIVITY  
FIVE

## Think It Over



Which critters in the nutshell community have an advantage over the others?

Explain your thinking.

# PULLING IT ALL TOGETHER

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**Create a story  
about a scientist  
who studies the rain  
forest.**



# NEW WONDERS

**1.** During 1989, we lost more than 40,000 square miles of tropical rain forests. That is equal to an area about the size of Pennsylvania. If this rate continues, there will be very few rain forests in the world within 65 years. What does the loss of this special habitat really mean to life on Earth? Use a computer to access the Rainforest Action Network found on the Web. The address is:  
<http://www.ran.org/ran/>

Prepare a poster on one of the following topics (on the Web site click on the panel called Rain Forest Information to find these topics):

- Why Rain Forests are Important.
- World Rain Forest Report (Go to the most recent report)
- Rates of Rain Forest Destruction
- Sustainable Rain Forest Products

**2.** Prepare and conduct a survey to find out how other kids and their families rely on rain forest products. List the following tropical rain forest products on a separate sheet of paper. Make a space for recording tally marks to show how many people use each item.

**Woods:** teak, balsa, mahogany, sandalwood, rosewood

**Canes and Fibers:** bamboo, twine (jute), rattan (cane)

**Food Products:** bananas, avocados, limes, mangos, papaya, Brazil nuts, cashew nuts, nutmeg, pineapple, cinnamon, cloves, ginger, chocolate, vanilla, coconut, paprika and tapioca.

**Here are some ideas you might like to use for projects or exhibits.**



**3.** Investigate the Kids' Corner section of the Rainforest Action Network Web page: <http://www.ran.org/ran/> Look for the eight steps for kids to take to save the rain forests. Choose one step to do as a group project. Find a way to share these actions with family and friends.

**4.** One of the great ancient civilizations of the New World, the Maya, flourished for more than 600 years in the rain forests of southern Mexico and Central America. From A.D. 250 to about A.D. 900, this rich and complex society created many things that are still used today. These inventions include a 365-day calendar, a written language, and the use of the mathematical concept of the number 0.

Today, many Maya still live in Central American rain forests. Go to the library and search for additional information on the Maya. Find out how their lives have changed to meet the demands of today's world. If you have time, consider broadening your search to other native or rain forest people.