Amphibian Awareness

Teacher Packet

Rio Grande Community Farm
1701 Montano Road NW, Los Ranchos de Albuquerque, NM 87107 (Maize Maze location); 505-345-4580
www.riograndefarm.org

ABQ BioPark Zoo
903 10th St SW, Albuquerque, NM 87102; 505-764-6200
www.abqbiopark.com

Dear Educator:

Thank you for scheduling your class to come visit the Rio Grande Community Farm 2012 Maize Maze: *Leap'n Maze*!

We welcome your visit and want to help you make the most of your experience. The Maize Maze has become a public celebration of our natural environment, and this year Rio Grande Community Farm has partnered with the ABQ BioPark Zoo to develop amphibian-themed educational resources for your classroom. It is our goal to raise awareness of the threatened state of amphibians in our region and across the globe, beginning with the basic understanding of what an amphibian is to what your students can do to help conserve amphibians and their habitats.

Enclosed you will find activities listed in order of grade level, from PreK-12th grade (see standards note below). Please feel free to copy these activities for your students.

If you have any other questions regarding your trip, please visit www.riograndefarm.org and go to the Group Page or call Rio Grande Community Farm at 505-345-4580. If you have questions regarding these activities, or would like additional information on other educational resources from the ABQ BioPark, please visit www.abqbiopark.com. You can also call either Zoo Education at 505-764-6214 or Aquarium/Botanic Garden Education at 505-848-7180.

We look forward to seeing you and your students at the *Leap 'n Maze*!

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Frog Olympics

These are instructions for two active “frog” games.

Suggested Grades: PreK-3

Note: a similar jumping activity will be available on-site at the Maize Maze

Goal

To be physically active while learning about amphibians.

Objectives

By the end of this activity, participants will be able to:
Frog Jump: Practice your jumping skills and see how far you can jump compared to a frog.
Bugs for Me!: Play a game about frogs and their prey (insects).

Main Message

Frogs and toads have many fascinating physiological features that allow them to survive and thrive in their environment.

Conservation Action/ Behavior Addressed

Look, **listen, and learn: educate yourself and your family about amphibians**.
With more than 6,000 frogs, toads, newts, salamanders, and caecilians worldwide, there’s a lot to learn. Pick up a book, hop around the Internet, or watch your favorite animal television show to educate yourself and your family about amphibians.

Frog Olympics 1: FROG JUMP

Background Information

Just like humans, frogs have big, strong muscles in their thighs. But, for their size, these muscles are immense! This allows frogs to jump much further relative to their small size than a human could. For example, the bullfrog can jump a distance of 10 times its body length. For an adult man that is 6 feet tall, this would be equal to going 60 feet in a single jump!

Materials Needed

- 100 feet of rope, marked at 5-foot intervals.
- 3 signs to be placed at various points along the rope to show how far particular species of frogs can jump. The signs should state the name of the frog, their body length, their maximum jump length, and how many times their body length they can jump.
- Examples to use (images are included):

Bullfrog: length of frog = 20.3 cm; maximum jump = 213 cm (>10 times body length)
Leopard Frog: length of frog = 12.5 cm; maximum jump = 162.5 cm (13 times body 2 length)
South African Sharp-Nosed Frog (world record holder!): length of frog = 7.6 cm; maximum jump = 334 cm (44 times body length)

Length of Activity

5-10 minutes

Set up

Ahead of time: Prepare the rope and signs (possibly laminated).
Day of: Lay out the rope (possibly secure it to the ground). Lay out the frog signs along one side of the rope showing how far certain frogs can jump (possibly secure to the ground). On the other side of the rope, create a “Start” line for students to jump from (as to not disturb the frog signs).

Procedures

1. Ask students if they would like to see who is a better jumper: a student or a frog?

2. Explain how it is very important for frogs to be able to jump quickly in order to escape predators and that jumping also helps them catch a meal in mid-air (insects).

3. Point out the frog signs on one side of the rope. Explain that this shows how far particular frogs could jump compared to their body length. Make comparisons about how far a human would have to jump to do the same.

4. Have each student approach the “start” line and practice their frog jumping. Compare how far they can jump (based on their size) compared to the various frogs.

5. You could also mark each student’s jump with pegs or lengths of string. Find out which student could jump the furthest during your event!

Activity Extensions/Modifications

If available, gather life size pictures of the various frogs featured in the frog signs (a few samples are provided). Use the pictures to demonstrate visually how many body lengths the frog can jump by copying the picture and laying them side-by-side along the rope.

American Bullfrog

Rio Grande Leopard Frog

South African Sharp-nosed Ridge Frog

Frog Olympics 2: BUGS FOR ME!

Background Information

Frogs and toads have good eyesight, which they depend on to catch moving insects. Insects that stay very still are usually passed over and not caught. Depending on the species, frog diets typically consist of the following: Small invertebrates including ants, spiders, termites and centipedes.
Fun Fact: Ants in the diet of poison dart frogs are the source of some of the alkaloid compounds found in the frog's poisonous skin secretions. Frogs in captivity can lose their toxicity if fed crickets instead of ants.

Materials Needed

Images of insects (some are provided).

Length of Activity

5-15 minutes

Procedures

1. This game is based on the game "Red Light, Green Light."

2. Find an area large enough to play the game: classroom or open area at least 30ft in length.

3. Designate one person to be the frog or toad. The rest of the game participants are insects. The area that they are playing around is the pond where the frog and insects live.

4. The insects should all stand at one end of the playing area (lined up facing the other end), while the frog stands at the other end (~20-30 feet away from the insects).

5. The area behind the frog is considered the "safe" zone.

6. The idea behind the game is that the insects are trying to make it across the "pond" or playing field without being eaten by the frog. When the frog's back is turned to the insects, they can quickly walk across the pond. When the frog turns around, they must immediately freeze in place. If the frog sees them move, they get eaten.

7. Once you explain the rules of the game have the frog turn around and count out loud "One-Two-Three, bugs for me!" Then the frog turns to face the insects (which can then be eaten if they move).

8. Any insects that get eaten during the course of the game must sit down and wait for the next round of play.

Extensions

Find images of insects common in frog diets (a few samples are included), laminate and have students pick which insect they are going to be. The students hold their insect card in front of them while playing the game. If the bug is eaten, the student has to give his/her card to the "frog" or teacher.

Fly

Termite

Ant

Moth

What Color Am I?

Suggested Grades: 2 - 6

Concepts
Adaptation, camouflage, defense, predators

Time
30-45 Minutes

Objectives
After completion of this activity students will be able to:
1. Identify various species of anurans by their skin coloration
2. Describe how coloration contributes to survival.

Catalyst Question
How does the color of a frog help its survival?

Materials
Black and white sketches of frogs, available on the Thousand Friends of Frogs website, listed below.

Background
The skin of amphibians is important to their survival. It performs many functions including camouflage, protection, and a warning to predators. Many frogs and toads are dark green, brown, or black. This tone is produced by melanin, a dark pigment. These frogs usually blend in with their surroundings and their skin serves as a camouflage. Other anurans are brightly colored. If the bright colors alternate with dark splotches the coloring may serve as a warning to predators that the frog or toad is poisonous. Other frogs and toads are not poisonous but have a colorful skin that the predators associate with the poisonous varieties. Consequently, predators will often avoid these species. Other anurans have bright red or yellow markings on the undersides of their limbs that they display when in danger. The fire-bellied toad has this ability called the "unken reflex" to flash a colorful spot at a predator.

Amphibians have two kinds of color responses. Amphibians in the larval stage will blanch in darkness. The second other color response is when amphibians shift colors to match their backgrounds as a form of protection. In a couple of hours a Tree Frog can change from a vivid green, through a pattern of gray and green blotches, to a pale ash gray with dark markings. These changes don't necessarily harmonize with the frog's surroundings. Usually, they are a reaction to temperature. Other frogs, such as the gray tree frog, can adjust their color according to changes in light, moisture, chemicals and temperature.

Procedure
1. Have the students color the sketches of various frogs.
2. When they are finished the students should share their pictures with their classmates.
3. Students can practice identifying the various frogs and toads by their coloration.

Evaluation/Review Questions
What type of area would you find the frogs and toads you just colored?
Did you color them the same as they actually appear? Why or why not?
Why are frogs and toads colored the way they are?

Extensions
Students can research and compare the coloration of frogs from different biomes. Is there a correlation between habitat conditions and the coloring of the anurans?

Resources
Thousand Friends of Frogs, http://cgee.hamline.edu/frogs/teachers/activity/color.html

Introduction to Amphibians

Suggested Grades: 2 - 8

Goal
To introduce students to amphibians

Objectives
By the end of the activity, students will be able to:
Recognize the characteristics of amphibians
Distinguish an amphibian from a reptile
Identify the three types of amphibians

Big Idea/Main Message
Amphibians make up a distinct group of vertebrate animals. They are diverse in habitat, natural history and range.

Conservation Message
There are many different types of amphibians, each with a specific set of adaptations which uniquely suit them for survival in their habitat.

Background Information
At one time, naturalists thought reptiles and amphibians were close "cousins," which is one reason the two groups were originally put together under the zoological umbrella of *herpetology*. *Herpetology* is derived from the Greek word *herpeton*, meaning "crawling things." But, although there is a definite connection – reptiles and amphibians evolved from a common ancestor millions of years ago – the two groups are not closely related.

Still, reptiles and amphibians have several things in common. For example, both are ectothermic (body temperature is regulated by external factors), both have a backbone, and both usually shed their skin several times a year. Herps also have an organ in the roof of the mouth, called a Jacobson's organ, which senses odor particles and other chemicals.

There are three orders of amphibians:
- Frogs and Toads
- Salamanders and Newts
- Caecilians (legless amphibians that look like worms)

There are four orders of reptiles:
- Snakes and lizards
- Crocodilians
- Turtles
- Tuataras

Characteristics of each group:

Amphibians	Reptiles
Skin is moist and smooth. Skin is permeable and glandular (granular glands produce toxins, mucous glands keep skin moist)	Skin is dry and scaly
Eggs do not have shells, are often laid in water	Eggs have shells
Breathe with gills as young (usually); breathe with lungs as adults (usually)	Breathe with lungs
Most amphibians must undergo metamorphosis before becoming an adult	Young are born with the same body form as adults

Materials

Images of Tiger Salamander and Leopard Gecko (provided); additional photos of other amphibians and reptiles are also helpful.

Procedure

1. Set up images on a table in the classroom.

2. Let the students see the images of the tiger salamander and the leopard gecko. Tell them that one of the animals is an amphibian, and the other one is a reptile. Ask them if they know which is which.

3. Use the tiger salamander to teach the basic characteristics of amphibians. Compare and contrast those characteristics with the leopard gecko, a reptile.

4. Use the photos to explain the other types of amphibians and reptiles, looking for characteristics in the photos.

Additional Resources

Visit the Association of Zoos & Aquarium's (AZA) website for more amphibian-themed lessons and activities (http://www.aza.org/amphibian-education-resources/).

Tiger Salamander

Leopard Gecko

Extensions

Learn more about amphibian characteristics with the Body Part table, below.
Visit the Association of Zoos & Aquarium's (AZA) website for more amphibian-themed lessons and activities (http://www.aza.org/amphibian-education-resources/)

BODY PART	STRUCTURAL ADAPTATION	REASON
body	small waist no neck broad, flat skull	Small waist streamlines body shape for swimming; no neck keeps head stablie during swimming; broad, flat skull allows ease when swimming through water and while holding prey
skin	thin and moist	allows for gaseous exchange (cutaneous respiration); allows for water exchange (osmosis)
front legs and feet	short, with 5 toes	used to keep the front part of the body off the bottom or ground
hind legs and feet	long, powerful, with 5 toes	able to jump great distances, and change direction quickly; webbed toes aid in swimming
color	upper body green with many spots light under belly	upper body green with many spots conceals the frog in its natural habitat, it also forms a disruptive color pattern, which tends to obscure the shape of the frog; light under belly where there is normally a shadow reduces the appearance of solidity or mass when viewed from the side or underneath
eyes	positioned on top of head lower eyelid transparent large and bulging	positioned on top of head gives the frog a wide angled visual field; allows frog to remain in water with only part of head exposed; lower eyelid transparent enables to see under water; large and bulging aids in swallowing, and detecting movement and velocity of an object
ears	a flat disk-like tympanic membrane	streamlines the body; prevents water from entering ear canal
mouth	very large and broad	able to catch and eat large prey
tongue	attached at front of mouth long and sticky	attached at front of mouth enables it to be flicked out quickly; long and sticky so prey sticks to it when caught
eggs	laid in masses sticky gelatinous covering	laid in masses; eggs on the outside protect the eggs on the inside; sticky to adhere to plants, so they are not carried away; coated in gelatinous covering for protection from mechanical injury, infections and disease, and dehydration; it conserves heat produced by metabolism of the embryo

Our Actions Matter
Why Care About Amphibian Population Decline and Malformations?

Suggested Grades: 5 - 12

Objective
Students will understand several arguments why preservation of wildlife is important.

Procedure
View the background information on amphibian population declines and malformed amphibians.

Read your students the following quotations:

> "When extinctions occur among species whose roots on this planet surpass ours by millions of years, we should be listening to what they have to say." – scientist, North American Amphibian Monitoring Program

> "What's driving this whole issue is not deformed frogs. It's the potential for effects on human health." – toxicologist, Minnesota Department of Health

Do your students agree with the statements from the scientists? What do they think are important reasons for preserving frogs and other amphibians.?

Next, have your students brainstorm arguments for the preservation of endangered animals. Some reasons they may come up with are summarized below.

Have your students discuss or write an essay about the ethical issues related to amphibian malformations.

Reasons for Protecting Amphibians
Amphibians have a lot to teach us about science and biology – They are great examples of evolutionary success over a long period of time. They have thrived through 350 million years of dinosaurs, meteors, and humans. They have evolved fascinating adaptations to a wide range of environments, including oceans, deserts, ponds, and forests. They have efficient metabolisms. For example, about 95 percent of what a salamander eats becomes energy or gets stored as fat.

Amphibians play important roles in ecosystems – They are very abundant and often dominate ecosystems in terms of numbers and total weight, particularly in wetland and forest ecosystems. They are also integral parts of food webs. Amphibians are popular food items for many predators and important predators themselves.

Amphibians may be a measure of the health of the environment – It is possible that amphibian declines are a response to environmental pollution and degradation. Thus, amphibians may be showing us how our activities affect our shared biosphere.

Amphibians contain chemicals that may benefit humans – Amphibians have foul-tasting chemicals in their skin and glands that protect them from predators. Some of these chemicals can be used in medicine as, for example, heart stimulants, painkillers, and organ glues.

Amphibians can be used to control insect pests – In Australia, a tree frog is used to control insects.

Amphibians are fascinating and beautiful creatures – Many amphibians, such as tree and poison dart frogs, are beautiful beyond description. Many others are fascinating to children and adults. This fascination is illustrated by the role amphibians have played in literature, including children's stories, myths, the Bible, the Koran, and the works of Shakespeare.

Resources
Amphibian Population Declines: http://www.teachervision.fen.com/amphibians/resource/8736.html
Malformed Amphibians: http://www.teachervision.fen.com/reptiles/resource/8713.html