

## NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Reinstein Woods Environmental Education Center

93 Honorine Drive, Depew, NY 14043

P: (716) 683-5959 | F: (716) 686-0210 | [ReinsteinWoods@dec.ny.gov](mailto:ReinsteinWoods@dec.ny.gov)

[www.dec.ny.gov](http://www.dec.ny.gov)

Dear Educator:

Thank you for your interest in Reinstein Woods' environmental education programs. You have scheduled the program "Fantastic Frogs" as an in-school program. In this packet, you will find an overview of the "Fantastic Frogs" program and post-visit activities to supplement your program. Please try to go over the vocabulary list (found in the overview) with your students before the program.

We feel that our program will be of more value to students if related classroom activities are done after the lesson. The enclosed activities are designed to reinforce concepts learned during the program as well as help align your lesson to the new NYS Science Standards.

The New York State Department of Environmental Conservation is currently sponsoring educational workshops for teachers. These workshops include Project WILD—a program that emphasizes awareness, appreciation, and understanding of wildlife—and Project WET, an education program that teaches about water resources. We also offer Project Learning Tree trainings for educators in grades PreK-12. To learn how you can attend a workshop to obtain these materials for use in your classroom, please contact Reinstein Woods or visit <http://www.dec.ny.gov/education/1913.html>.

We hope that this information is helpful to you and your students, and feedback is encouraged. Please take some time to complete and return the program evaluation following the lesson. We look forward to seeing you soon!

Sincerely,

Reinstein Woods Environmental Education Center Staff

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Reinstein Woods Environmental Education Center

93 Honorine Drive, Depew, NY 14043

P: (716) 683-5959 | F: (716) 686-0210 | ReinsteinWoods@dec.ny.gov

www.dec.ny.gov

# FANTASTIC FROGS

Grades: Prek – 3

Length: 45 min.

Maximum Students: 25

## Standards

State learning standards addressed through our program are listed below. Any standard marked by an asterisk is best met by completing the included post-lesson activities.

### 2017 NYS Science Learning Standards

#### Science and Engineering Practices

- Developing and Using Models
- Analyzing and Interpreting Data

#### Disciplinary Core Ideas

- **ESS3.A:** Natural Resources
- **ESS3.C:** Human Impacts on Earth Systems
- **\*ETS1.A:** Defining and Delimiting Engineering Problems
- **\*ETS1.B:** Developing Possible Solutions
- **LA1.A:** Structure and Function
- **LS1.B:** Growth and Development of Organisms
- **LS3.C:** Adaptation

#### Cross Cutting Concepts:

- Patterns
- Structure and Function
- Influence of Engineering, Technology, and Science on Society and the Natural World

### ELA/Literacy

Speaking and Listening (K-3)

### Excellence in Environmental Education:

#### Guidelines for Learning (K-12)

**Strand 2.2**—The Living Environment  
Guideline A, B, C, D

## Objectives:

1. Frogs go through metamorphosis: a biological process that helps an animal change form. It usually, but not always, requires a change in habit.
2. The structure of frogs help them function in their environments. Frogs have specific adaptations that help them survive, including specialized feet, permeable skin, cold weather behaviors and species-specific calls.
3. Human activities can impact ecosystems. Frogs are bioindicators- population numbers tell us whether an ecosystem is healthy or unhealthy.

## Background

Frogs belong to the animal group amphibians. Amphibians are cold-blooded animals; they do not have the ability to regulate their body temperature which is determined by their surroundings. They are typically born in water and live their adult life on land. The skin of amphibians is porous and water and oxygen can pass in and out.

You can find frogs in water or near places that have water like ponds and streams. There are some kinds that live in trees and on land. Toads are one type of frog.

Frogs have many adaptations for survival. Strong hind legs enable them to leap forward a great distance. The front legs or arms are short and are used to prop the frog up when it sits. Feet vary among species—some may be webbed to help with swimming or have sticky disks to help the frog climb. Eyes are placed on the top of the head to spot predators. Toads have poison glands on their back. The substance is not poisonous to people but makes toads unpalatable to predators.



Department of  
Environmental  
Conservation

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Reinstein Woods Environmental Education Center

93 Honorine Drive, Depew, NY 14043

P: (716) 683-5959 | F: (716) 686-0210 | ReinsteinWoods@dec.ny.gov

www.dec.ny.gov

## Importance of Frogs

Frogs are an important part of the ecosystem. Within the food web they act as both predator and prey, holding the role of a population balancer. Additionally, frogs have smooth, moist skin that is very permeable to substances in water or the atmosphere. Adult frogs absorb part of the oxygen they need (and most of the water) through their skin, making them vulnerable to pollutants. To complete their lifecycle from egg to adult, frogs need a healthy environment both on land and in the water. Because of this, they are considered bio-indicators (able to tell us whether an environment is healthy or unhealthy).

Frog eggs, larvae, and adults are food for many fish, birds, and mammals. When amphibians are contaminated, they pass toxins along to their predators. When amphibians disappear, this can affect the animals that eat them to survive. A decline in amphibians is like a red flag, warning us that something is wrong with the environment we all share.

## Spelling/ Vocabulary List

**Algae:** any plant or plantlike organism (as a seaweed) that includes forms mostly growing in water, lacking a system of vessels for carrying fluids, and often having chlorophyll masked by brown or red coloring matter.

**Amphibian:** a cold-blooded vertebrate animal of the class Amphibia. There are five classes of vertebrates: fish, amphibians, reptiles, birds, and mammals. There are three living orders of amphibians: frogs and toads, salamanders and newts, and limbless amphibians.

**Bio-indicators:** a living organism that is able to tell us about our environment, particularly if it is healthy or unhealthy.

**Cold-blooded:** having a body temperature not internally regulated but approximating that of the environment.

**Froglet:** a stage in the lifecycle of the frog in which all parts of the frog have developed but its stumpy tail still remains.

**Metamorphosis:** a biological process that helps an animal change form. It usually, but not always, requires a change in habit.

**Tadpole:** the larva of a frog or toad that has a rounded body and a long tail, breathes with gills, and lives in water.

**Toad:** any of numerous tailless leaping amphibians that lay their eggs in water and are distinguished from the related frogs by living on land more often, by having a build that is shorter and thicker with weaker and shorter hind limbs, and by having skin that is rough, dry and warty rather than smooth and moist.

**Vertebrate:** Vertebrates have an internal skeleton formed of cartilage, bone, or both. The skeleton consists of a backbone.

# FEATURED RESOURCE: THE FROG FILES

Grades: K - 6

[HTTPS://WWW.NATUREWATCH.CA/WP-CONTENT/BIGUPLOADS/JUNIOR\\_GUIDE\\_K6.PDF](https://www.naturewatch.ca/wp-content/biguploads/junior_guide_k6.pdf)

This resources includes **25** excellent activities that highlight the life cycle of frogs, frog adaptations and human impact on frog ecosystems. The activities include the following:

## THE FABULOUS FUNCTIONS OF FROG FEET

FROG MODELS:  
TRANSFORMING PUPPET

FROG CONFERENCE:  
READER THEATRE

*THE AMAZING WORLD OF FROGS:  
TEACHER READ/COMPREHENSION*

FOOD CHAINS  
AND  
FOOD WEBS

CAMOUFLAGE  
IN THE  
CLASSROOM:  
CONSCIOUS COLORING

# FROG SKIN EGGS-PERIMENT

Grades: 1 – 3

Length: 20 min.

Subjects: Science

## Collect

- 2 hard-boiled eggs
- 2 cups filled halfway with water
- Dark colored food coloring
- Butter knife

## Set up the experiment

1. Carefully remove the shell from one of the hard-boiled eggs.
2. Place each of the eggs in a cup filled halfway with water.
3. Add about 20 drops of food coloring to each cup.
4. Find a spot for the cups to sit, undisturbed, for 24 hours.

## Examine the results!

5. Remove the eggs from the cups and carefully peel off the shell from the second egg.
6. Use a butter knife to cut the eggs vertically.
7. Examine how far the food coloring seeped into each egg.

## How does this relate to frogs?

Amphibians, like frogs, have permeable skin. This means that gas and liquid molecules can pass back and forth from the environment and into the animal's body more easily. Having permeable skin allows amphibians to breathe more easily and soak up more water through their skin. However, if the animal is living in a polluted environment, this unique characteristic can allow harmful chemicals to contaminate its body. In our experiment, the unshelled egg represented an amphibian. How did it compare to the results of the shelled egg?

The shelled egg represented animals like reptiles, birds, and mammals that do not have permeable skin. These animals could be living in the same environment and not be affected as much by the pollutant. This April, do your best to keep garbage, chemicals, and non-native species out of the natural environment to protect our amphibians.



601 Light Street Baltimore, MD 21230 • [www.marylandsciencecenter.org](http://www.marylandsciencecenter.org)



# FUNCTIONAL FROGS

Grades: 1 – 3

Length: 20-40 min.

Subjects: Science, ELA,  
Engineering

## Materials:

- Paper
- Markers
- Journals (optional)

## Background:

Adaptations are special features or behaviors that help an organism survive in its environment. Many adaptations are part of an organisms' body structure. Frogs have long legs that allow them to jump far to escape predators. By studying these adaptations, engineers can design solutions to a variety of human problems. This is called **biomimicry**.

## Procedure:

Older students can create these charts in a science journal while younger students may benefit from filling out the chart as a class.

1. Starting with the tadpole stage in a frogs' lifecycle, list some of the structures of the organism's body.
2. For each structure, list the function of the body part.
3. Brainstorm as a class to see if there are any human inventions that mimic the structure and function of frog body parts.
4. Use the chart to model existing or potential applications of biomimicry. Students could draw the frog structure and the corresponding human invention. Students could be asked to create an invention that uses the features of a frog's body and write an explanation of what their invention is, what human problem it solves and how it incorporates frog adaptations.

Organism	Structure	Function	Human Invention
Tadpole	Tail	Swim	
Newt	poison	protection	
Frog	legs - long	jump far	Pogo stick
Frog	jelly surrounds egg	protection	
Frog	webbed feet	Swim	flipper
Frog	suction cups on feet	Stick to climb	
Frog	tongue	Catch food	Sticky hands-toy
Frog	eyes on head	See front, back sides	
Frog	eyes	see	
Salamander	colorful skin	Warning - Protects	
Frog			

Figure 1

<http://love2.betterlesson.com/lesson/resource/3228293/anchor-chart-structures-and-functions-amphibians>

## Biomimicry Resources and Extended Lessons:

Wild Ideas, Wild Inventions. (Minnesota Conservation Volunteer)

[http://files.dnr.state.mn.us/mcvmagazine/young\\_naturalists/young-naturalists-article/wild\\_ideas/wild\\_ideas.pdf](http://files.dnr.state.mn.us/mcvmagazine/young_naturalists/young-naturalists-article/wild_ideas/wild_ideas.pdf)

Biomimicry in Youth Education: A Resource Toolkit for K-12 Educators. (Biomimicry Institute)

[http://biomimicry-static.s3.amazonaws.com/digital\\_toolkit/index.html#p=1](http://biomimicry-static.s3.amazonaws.com/digital_toolkit/index.html#p=1)

# DESIGN A FROG

NAME: \_\_\_\_\_

**Step 1:** Draw your frog's feet. Will it be a climber, swimmer or a digger?



climber



swimmer



digger

**Step 2:** Color your frog. Will it blend in or **camouflage**? Will it be bright colors to warn animals that it is poisonous?

**Step 3:** Draw the habitat around your frog. Does it live in the forest or in a pond?

**Step 4:** Draw the food that your frog eats.





# STRIPES AND SPOTS, LINES AND DOTS

*ADAPTED FROM AMPHIBIAN ALERT!*

Grades: 2 – 3

*(Can be adapted for Pre-K-1)*

Subjects: Science,  
Visual Arts

## Materials:

- Books and magazines with color pictures
- Two large bed sheets (one single color, one bold color pattern)
- Numerous copies of a frog outline to trace

## **Background:**

Amphibian skin may be brightly patterned or dully colored. Whether striped, spotted, or a flash of color, the patterns on an animal's body serve a vital function in nature. These body patterns are a survival technique, helping to hide predators and prey from each other. Animals that are hunters or predators want to hide from their prey for as long as possible. Prey animals also want to hide from predators or at least make it difficult to catch them quickly. When a body pattern looks like something else, it is called camouflage.

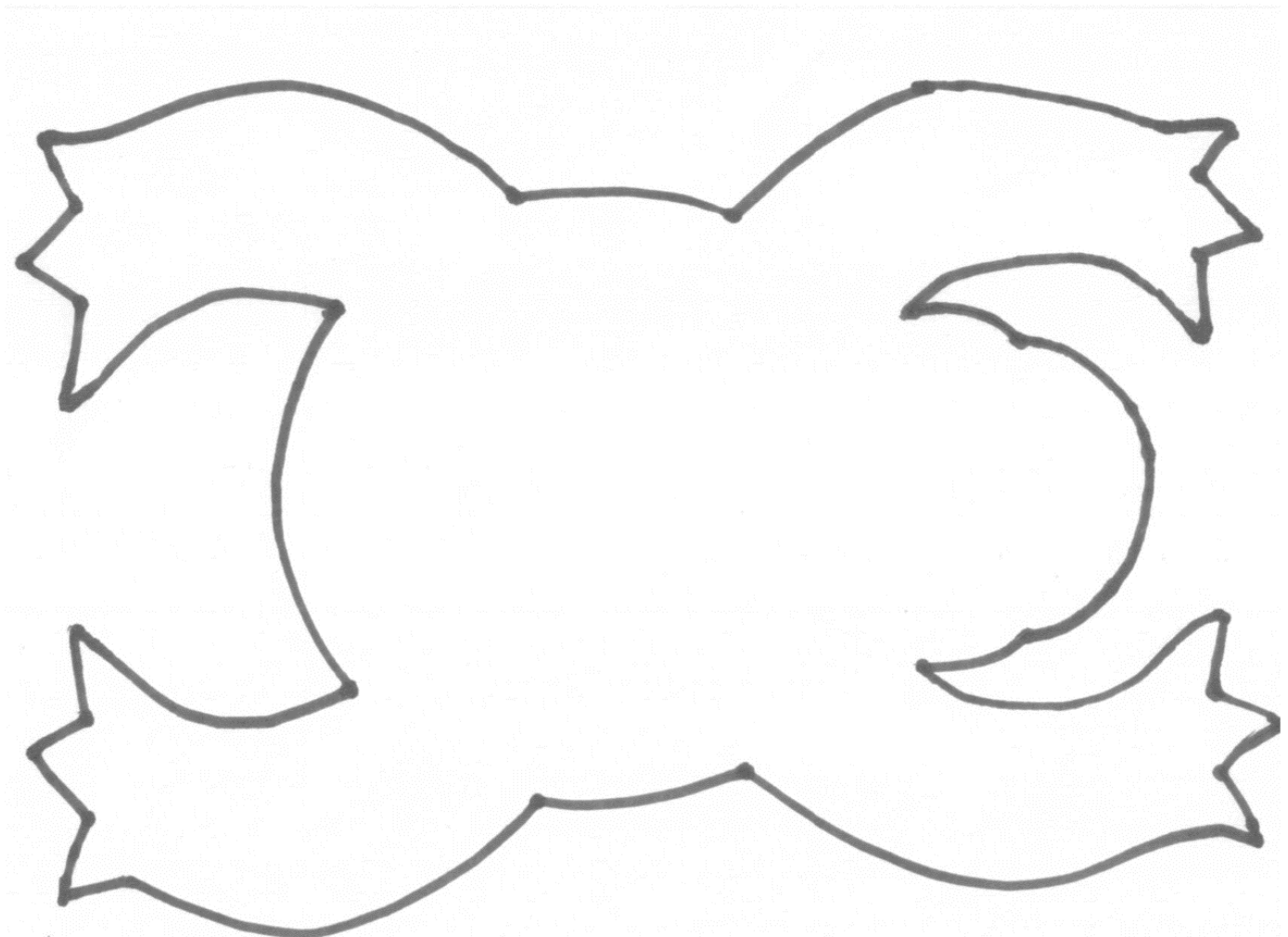
**Objective:** To identify various coloration patterns (stripes, spots, dark colors, and disruptive patterns) and understand the function of these patterns as a survival technique, serving to help animals blend into their environment.

## **Procedure:**

1. Introduce the concept of coloration patterns to students. Ask them to discuss and give examples they can think of. Look around the room and find examples of patterns that draw attention or hide the item.
2. Divide the class into teams to explore the room/library/school yard to find patterns in nature and man-made articles. These can be patterns that help the animal or item stand out, or blend into their surroundings. Provide magazines, books to look through. Allow 10 minutes to gather data.
3. Re-gather the group to present findings to the rest of the class. What types of patterns did they find? Discuss definitions of camouflage.
4. Pose the question “How do amphibians hide in their environment?” Solicit answers and ideas from students. Keep list on board.
5. Have class prepare the pieces for the game. Trace frogs onto the construction paper and cut out frog shapes from a variety of colors. Some should be all one color, others should be cut out from paper with patterns and many colors. You should now have two types of frogs: half that are all single colors, half that are colored with patterns.
6. Spread two large bed sheets (or pieces of poster board) on the classroom floor or outside in the yard. Have the class turn their backs (or close eyes) while you spread the frogs over the two sheets. The colors on the frogs should match the colors on the bright pattern cloth.
7. Class members have only 10 seconds to pick up as many frogs as they can see from where they are standing. They can only pick up one frog at a time, not scoop up a handful!



8. Discuss the results of the game. Which sheet background successfully hid which frogs? Which frogs were harder to find? When did the frogs seem to “disappear?”
9. Now, turn the class discussion back to amphibians. How could various patterns be helpful for frogs, toads, and salamanders in the wild? Discuss definitions of predator (hunting animal) and prey (animal that is hunted). Which animals might want to hide from others? What types of patterns can they think of on animals they have seen
10. Play another round of the game, but this time, the brightly colored frogs are toxic. Predators that catch them may become sick or even die. The bright colors serve as a warning - as if to say, “watch out!” In nature, the most common warning colors are patterns of red, orange, yellow, and black, but dart poison frogs come in all colors. A predator may never know, so it’s best to find something with duller colors. After the game, discuss the results with the students. How did they change from the first round?
11. Pose the question... “If a habitat changes drastically, how could that affect the amphibians, or any animal?” What types of habitats do amphibians live in? Scientists have seen dramatic declines in certain amphibian populations. Can the class think of some reasons? List their answers on the board, or a sheet of paper that can be kept for later activities



# TADPOLE HABITAT: AN ENGINEERING DESIGN CHALLENGE

ACTIVITY FROM STATE OF FLORIDA CPALMS

Grades: 2 - 3

Subjects: Science, ELA,  
Engineering

Length: Multiple class  
periods

## Materials:

- Small branches
- Lettuce leaves for food
- Small rocks, stones
- Flat branches
- Clear tank or bin

## LESSON CONTENT

- **Learning Objectives: What will students know and be able to do as a result of this lesson?**
  - Students will be able to conduct investigations involving materials that float.
  - Students will design and construct a structure for froglets, or young frogs, to swim onto and sit upon.
  - Students will correctly use the terms "tadpole", "froglet", and "amphibian" in their discussions and writings.
  - Students will determine the total cost of using materials that are valued at 1¢, 5¢, 10¢, and 25¢.
  - Students will keep careful records as they test the prototypes, analyze the results, and modify their designs based on this analysis.
  - Student teams will present the prototype to the rest of the class, discussing the successful parts of their design, and citing evidence from their tests in support of their design.
  
- **Prior Knowledge: What prior knowledge should students have for this lesson?**
  - Students should have prior knowledge about life cycles and know the stages in the life cycle of a frog
  - Students should have prior knowledge of the basic needs that all living things have for survival
  - Students should have prior knowledge about habitats and know that living things are only able to live in habitats that meet their basic needs
  - Students should know how to count coins to find the total value of a combination of coins.
  - The remainder of the lesson provides students with an opportunity to apply these concepts and Nature of Science concepts within a Design Challenge.
  
- **Guiding Questions: What are the guiding questions for this lesson?**
  1. What makes a good habitat for a tadpole?
  2. What makes a good habitat for a froglet?
  3. What are the needs of a tadpole? What are the needs of a froglet? What are the needs of a frog?
  4. What materials will stay below water and still provide a flat place for a frog to sit?
  5. How do you make this habitat for the least amount of money?

**LESSON PROCEDURE:** <http://www.cpalms.org/Public/PreviewResourceLesson/Preview/37026>

# MALFORMED METAMORPHOSIS

*Adapted from NSTA WebNews Digest*

Grades: 3-5+

Length: 40 min.

Subjects: Science, ELA

## Materials:

- Encapsulated sponge animals (four capsules per each student lab group; 12 capsules/\$2; Approximately \$28 for 5 classes of 30 students)
- Water (800 mL)
- Vinegar (800 mL)
- Optional: Bleach (800 mL)  
**Safety note:** Use of bleach requires proper ventilation, and students must wear gloves and goggles.
- Cooking oil (800 mL)
- Plastic spoons (one per group)
- 200 mL beakers or baby-food jars (four containers per lab group)
- Plastic wrap and rubber bands (one set per lab group)

## **Background:**

Amphibians have three distinct life stages: egg, larva, and adult. In frogs, the larval stage is a tadpole, which transforms into an adult by completing metamorphosis.

In nature, tadpole metamorphosis may be sped up when breeding areas become overcrowded or begin to dry up. However, human activities probably cause environmental cues that slow, speed up, or cause more negative effects on metamorphosis. For example, water pollutants disrupt the normal chemistry involved in tadpole development. These disruptions cause abnormal limb development, sexual organ development, and so on. For example, hind limb deformities of frogs were found in agricultural areas of Ontario, Canada.

Insecticides, herbicides, and fungicides are chemicals associated with agriculture. When human activities like agriculture, forestry, and urbanization are present near anuran populations, there is a chance that malformations may occur.

## **Detailed Lesson:**

<http://www.nsta.org/publications/news/story.aspx?id=53159>

## **Set-Up:**

- **Optional: Divide 800 mL of bleach among eight beakers or baby-food jars, one jar per student group. Cover each container with plastic wrap and secure with a rubber band.**
- Divide 800 mL of vinegar among eight beakers or baby-food jars, one jar per student group. Cover each container with plastic wrap and secure with a rubber band.
- Divide 800 mL of warm water among eight beakers or baby food jars, one jar per student group.
- Divide 800 mL of cooking oil among eight beakers or baby food jars, one jar per student group.

## Procedure

1. Pass out one capsule for each liquid to be tested. These capsules represent tadpoles waiting to go through metamorphosis. The water should be referred to as your control. Metamorphosis will proceed naturally in the water beaker.
2. Check that your beakers are labeled with: **Bleach (optional)**, Water, Vinegar, and Oil. Caution: Do not breathe the fumes of these liquids directly. Be careful handling the hot water.
3. Check that there is plastic wrap over the bleach and vinegar containers to prevent fumes in the lab area.
4. Have students record Start Time on the data sheet.
5. Drop in one capsule per container. Swirl the beakers at will to make sure the capsules don't stick to the sides. If using bleach, make sure to tell students NOT to put fingers in the liquids.
6. Watch for signs of metamorphosis; note these changes on your data table. (i.e., when it starts opening, when it's done opening, color changes, bubbling). Record your observations at two-minute intervals in the table.
7. After 30 minutes, use the spoon to remove all capsules/frogs.

## Answer key to questions for What Affects Anuran Metamorphosis? lab

*(available online)*

1. Which capsule was the control capsule?  
*Water.*
2. Which capsule opened first?  
*Vinegar.*
3. Did all of your capsules open? If not, which did not open?  
*No, oil did not open.*
4. Did you see any capsules change color? Which changed? How did it change?  
*Bleach capsule got darker with some spots.*
5. Your vinegar capsule should have completed the metamorphosis very quickly once it started opening. Do you think this would affect the adult frog in real life? How?  
*Yes, this would be equivalent to a very quick, unnatural metamorphosis. When this occurs, chemical signals in the brain can get disrupted. This could lead to malformations in the adult, as well as an adult of decreased size.*
6. Your capsule floating in oil did not open at all. What would this mean in the real world? In other words, how would this affect the tadpole in a real pond?  
*In a real-world situation, this means the frog would never have developed. The tadpole didn't complete metamorphosis in this case. This means that it probably would not survive because it couldn't survive in the pond as a tadpole forever. The pond could dry up and the tadpole could die that way, too.*

# LEAPING MATH:

ACTIVITY FROM: TORONTO ZOO

Grades: Pre-K - 3

Length: 20 min.

Subjects: Math

## Materials:

- Frog Outlines, enough and make enough to show each jump (e.g. Bullfrog - 11 copies - 1 for the frog and 10 to show body length)

Frogs are great jumpers! Many can jump as far at 10 times their body length. Here at the "leap lengths" for just a few frogs:

Frog	Length of Frog	Maximum Jump
Bullfrog	20.3 cm	213.5c cm ( $>10$ x body length)
Leopard frog	12.5 cm	162.5 cm (13 x body length)
South African sharp-nosed frog	7.6 cm	334.4 cm (44 x body length!)

Begin by asking the children to leap as far as they can from a standing position. Record the distance. Discuss how far they could jump. Now, ask them to sit around you in a circle and show them the cut-outs of the three frogs. You can explain that, just as people come in different sizes, so do frogs. Ask them what they know about frogs (e.g. eat flies, hop). Explain how important it is for frogs to be able to jump quickly to get away from animals that might eat them and how jumping helps them to snatch a meal from mid-air.

Lay the frog outlines down in a row to show how far a frog can jump compared to its body length. You may want to make some other comparisons (eg. if the bullfrog could jump as many times its body length as the S. African frog, how far could it jump?)

Have the children try leaping again. Have them compare the length of their jumps to their body length. They can do this by lying on the ground or by using a string. Then ask ten children to volunteer to lie down and show the length of their jumps if they were bullfrogs, add three to show a leopard frog's jump and then, if you want, try the sharp-nosed frog!

## LITTLE TADPOLE

Grades: Pre-K - K

*(To the tune of "Are You Sleeping?!")*

*Little tadpole, little tadpole,  
Lost his tail, lost his tail,  
Now he has two feet  
Now he has four feet  
Look a frog! Look a frog!*

## MOVEMENT: MERRY METAMORPHOSIS

Grades: Pre-K - K

1. Students huddle together as an egg mass.
2. Group begins to separate as eggs hatch.
3. Each student moves about alone with feet together and hands at their sides.
4. Legs start to grow – students now shake both legs and begin moving with legs apart, hands still at their sides.
5. Front legs appear – students wiggle arms from elbows down, upper arms still touching sides.
6. With big eyes bulging out and now breathing with lungs, students gather at the edge of the pond.
7. Metamorphosis is complete! The little froglets hop out of the pond.

# ADDITIONAL RESOURCES

[Frogs and Toads of New York Brochure](#)  
NYSDEC

[Grade 1 Literacy: My Report About Frogs](#)  
NYCDOE

[Grade 2: Listening & Learning Domain 6 Anthology  
"Cycles in Nature"](#)  
EngageNY

[Grade 3 module 2A, Bullfrog at Magnolia Circle](#)  
EngageNY

[Ribbit! Ribbit! A Thematic Unit on Frogs](#)  
(For ESL Students)  
EverythingESL.net

[How A Frog Becomes a Frog \(Video\)](#)  
PBS

[San Diego Zoo Kids: Frogs!](#) (Video)

[Pollywog in a Bog](#) by Barenaked Ladies (song, video)  
[Lyrics](#)

## FROGS IN THE CLASSROOM

- Review these frog-safe guidelines before deciding that raising tadpoles in your classroom is right for you:

<http://www.amphibianark.org/pdf/Husbandry/Tadpole%20care%20sheet%20with%20guidelines.pdf>

- **License to Possess Frogs**  
<http://www.dec.ny.gov/permits/28633.html>

We've done the  
searching for you!

Find links to these resources and  
additional activities on our  
Fantastic Frogs Pinterest Board.

Click the link below :

