Teach Kind SCIENCE
PETA's Humane Science Education Division

Kind Frog™ Dissection:
Teacher's Guide

Contents

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Product and Safety Guidelines

About This Product

The Kind Frog™ is silicone-based and is shelf-stable at temperatures from minus 65 degrees Fahrenheit to 400 degrees Fahrenheit. Silicone can be properly disposed of in the trash or at a silicone recycling facility.

⚠ WARNING

The Kind Frog contains small, detachable parts, which pose a choking hazard. Please keep it away from children under 3 years of age and animals.

Avoid exposing the Kind Frog to temperatures that exceed 400 degrees Fahrenheit in order to prevent melting.

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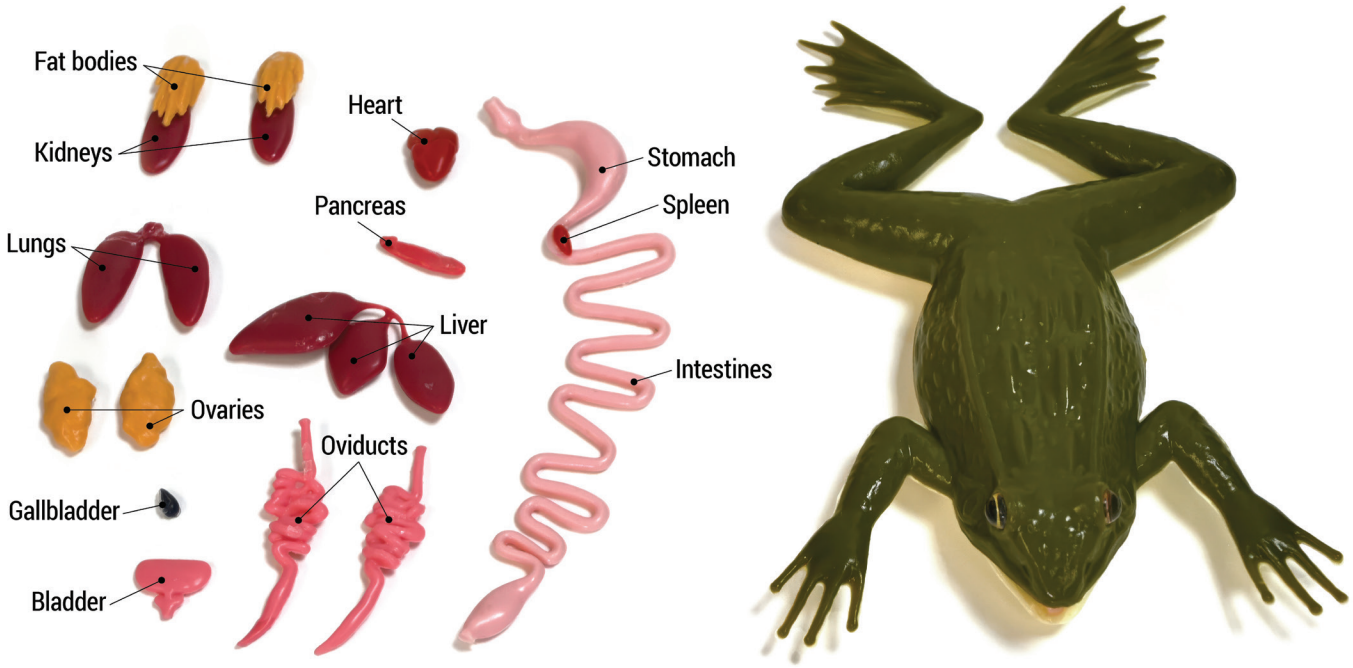

Expected Learning Outcomes

This is a comparative introduction to the differences between frog and human anatomy. Students will identify and describe the organs inside a synthetic frog model, gaining an in-depth understanding of these structures and the bodily processes in which they are involved. An optional warm-up lab, in which students talk through the ethical issues related to dissecting real animals, is included to help them learn about the benefits of animal-free research and understand the role that ethics plays in scientific methods.

NGSS Alignment

MS-LS4-2: Students apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

HS-LS1-2: Students develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Duration

50–90 minutes

Background Knowledge Required

Organ systems (digestive, respiratory, and circulatory) and their function

Materials

- Scalpel and blades
- Gloves (optional)
- Dissection pins
- Dissection tray
- Dissection scissors
- Tweezers
- Kind Frog
- Kind Frog student lab worksheet (included below)
- Pre-lab warm-up reading (optional, included below)
- Pencil

Safety

Review the safety guidelines and precautions for using dissection tools in a lab setting.

Warm-Up Exercises

- Print out a copy of the animal-free dissection lab warm-up reading (p. 5) for each student.
- Have students read and discuss the text (10–15 minutes, see p. 7). This can be done during the lab period or as homework the previous night.

Lab Instructions

1. Print out a copy of the student guide worksheet (pp. 9–10) and the lab worksheet (pp. 11–12) for each student.
2. Have students watch the Kind Frog dissection video to help define the terms on the Kind Frog lab worksheet (10 mintues).
   Kind Frog Video Link:
   https://www.youtube.com/watch?v=CbHbnfFkv7o
3. Have students read the dissection fun facts at the top of the lab worksheet and define the listed vocabulary words (15 minutes). This can also be a pre-lab homework prompt if class time is too short.

4. Have students dissect the Kind Frog according to the directions in the student guide. Have them locate each of the internal organs: bladder, gallbladder, heart, oviducts, ovaries, fat bodies, intestines, pancreas, stomach, spleen, lungs, kidneys, and liver.
5. Have students use the diagrams provided in the lab guide to compare frogs' anatomical structure with that of humans. Then have a class discussion about their findings (15 minutes).
6. Have students fill out the lab worksheet comparing frog anatomy with human anatomy (20–40 minutes).

Cleanup

If the Kind Frogs will be reused, either the students or you should place the organs back inside the Kind Frogs in the appropriate order. Store them in a container or plastic bag. The Kind Frog is silicone-based, making it shelf-stable in temperatures up to 400 degrees Fahrenheit.

If the Kind Frogs won't be reused, dispose of them and their organs in the trash or at a silicone recycling facility. Check your local listings to determine whether silicone recycling is available in your area.

Animal-Free Dissection Lab Warm-Up Reading

Thank you for choosing to participate in our humane dissection pilot program! Please review this document carefully before beginning the animal-free dissection activity.

Key Vocabulary

Nonprofit organization	A group that uses the money it receives to advance a social cause
Animal dissection	Cutting open an animal (excluding humans who have donated their bodies to science) or an animal organ in order to view the internal anatomy
Animal-free dissection	Using software or a model of an animal or an animal organ to study anatomy without harming real animals

About TeachKind Science

TeachKind Science is part of the humane education division of the nonprofit organization People for the Ethical Treatment of Animals (PETA). We work to replace misguided teaching techniques with superior, modern animal-free methods. As part of our commitment to humane science, we offer animal-free dissection resources to educators so that cutting-edge materials for teaching lessons on animal anatomy can be accessible to every classroom, allowing students to learn using the best available tools while also protecting animals and the environment.

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The Educational Advantages of Non-Animal Dissection

- A systematic review published in the journal *The American Biology Teacher* examined 20 published studies from 2005 to 2020, comparing the educational value of animal dissection with that of non-animal teaching methods. In 95% of the studies, students at all educational levels who used animal-free methods performed as well as—and in many cases better than—those who dissected animals.
- Education standards, including Advanced Placement and International Baccalaureate courses, don't require or even mention animal dissection.
- U.S. and Canadian medical schools no longer use animal dissection to teach students, and no U.S. medical schools expect or require that incoming students have participated in animal dissection.

Animal Dissection Facts

- In the U.S., approximately 10 million animals are used for dissection each year.
- Animals used for dissection don't die of natural causes. They're usually obtained from fur farms, animal shelters, slaughterhouses, or their homes in nature. Some of them are stolen or abandoned companion animals.
- Each year, millions of frogs are captured in their natural habitats to be used for dissection, and the U.S. Department of the Interior has determined that this practice is contributing to the decline in these amphibians' population.
- Dogfish, crayfish, starfish, and other coastal sea life are often used for dissection even though they're keystone species of their habitat, which means their families and neighboring species rely on them for survival and maintenance of a healthy ecosystem.
- Animals used for dissection are preserved in harmful chemicals such as formaldehyde, which is carcinogenic to humans, meaning that it can cause them to develop cancer. In addition, studies have shown that formaldehyde exposure from dissecting preserved animals is associated with various other health conditions, has a negative impact on students' circulatory systems, and can cause genetic mutations within cells. There is little to no data available on how other chemicals used for preserving animals affect humans, and exposure to them poses unknown risks.

Student Activity

Directions: Read the passage below.

> One landmark study investigated the conditions of the capture and housing of frogs bound for dissection .... The researchers found that the frogs, [who] were taken from a network extending thousands of miles throughout North America, were captured and stored in large sacks, up to 100 frogs per sack, for a week or more until they were transported to a supply company. ... Upon arrival at the supply company, the frogs were placed in large tubs of water, where they were kept for weeks to months, with no food, until a request came in for their shipment. When a request came, the frogs were sorted—at a rate of 25 frogs per minute per sorter—on the basis of size (small, medium, or large), while badly damaged, "broken," and dead frogs were discarded. [The researchers] ... describe high mortality rates at each stage of the process, as frogs would perish from being crushed during capture, from overheating, from exposure to unsanitary holding tanks, and from starvation. Today, frogs [who] are bound for dissection are killed prior to shipment. This is done by dropping them in a solution of alcohol and water; on average, it takes 15–20 minutes for a frog to die this way .... A second, undercover investigation into the treatment of animals bound for dissection was conducted by employees of the organization People for the Ethical Treatment of Animals, who were hired to work for the Carolina Biological Supply Company and WARD's biological supply company for over a year. ... In total, it is noted that the investigators documented 181 violations of the American Animal Welfare Act and 99 violations of Carolina anti-cruelty statutes during their investigation.[1]

[1]Oakley, J. (2014). Under the Knife: Animal Dissection as a Contested School Science Activity. *Journal for Activist Science and Technology Education, 1*(2). Retrieved from https://jps.library.utoronto.ca/index.php/jaste/article/view/21182

Discussion

After you've read TeachKind Science's warm-up reading and the passage above, discuss them with your lab partner and answer the discussion questions below.

Discussion Prompts

1. Which facts stood out to you?

2. What does "responsible science" mean to you? What role does ethics play in science?

3. How do you feel about animal dissection vs. animal-free dissection?

4. Have you ever dissected an animal? If so, what are your memories of and thoughts about that experience?

5. Do you believe humans have the right to kill other animals for the purpose of dissection?

6. Do you think schools should switch to animal-free dissection? Why or why not?

Student Guide

Objective

Compare frog and human anatomy while identifying and describing the organs inside a synthetic frog.

Materials

- Scalpel and blades
- Gloves (optional)
- Dissection pins
- Dissection tray
- Dissection scissors
- Tweezers
- Kind Frog
- Lab worksheet
- Pencil/pen

Safety

Be sure to follow all safety procedures provided by your instructor.

Procedure

1. Read the dissection facts at the top of the lab worksheet, and provide definitions for the listed vocabulary words (15 minutes).
2. Gather all the necessary materials listed above for your dissection station (5 minutes).
3. Dissect the Kind Frog by creating an I-shaped incision vertically down its torso. One at a time, open each skin flap and pin it to the tray (5 minutes).
4. Locate the following organs inside the Kind Frog: bladder, gallbladder, heart, oviducts, ovaries, fat bodies, intestines, pancreas, stomach, spleen, lungs, kidneys, and liver.
5. Use the diagrams below to compare frogs' anatomical structure with that of humans. Your instructor will open a class discussion about everyone's findings (15 minutes).
6. Complete the rest of the lab worksheet comparing frog anatomy with human anatomy (20 minutes).

Cleanup

- If the Kind Frog will be reused, replace the organs inside in the appropriate order. Then place it in a container or bag.
- If the Kind Frog won't be reused, dispose of it and its organs as instructed by your teacher.

Name: _____ Date: _____

Student Lab Worksheet

Comparative Anatomy

Watch the 10-minute Kind Frog Dissection Lesson video to help define the vocabulary terms on page 2 of your student worksheet.

https://www.youtube.com/watch?v=CbHbnfFkv7o

List some differences between human anatomy and frog anatomy for each of the systems below.

Body System	Humans (Mammals)	Frogs (Amphibians)
Digestive		
Respiratory		
Circulatory		
Nervous		
Skeletal		

Name: _____ Date: _____

Facts About Frogs

1. A group of frogs is called an army.
2. Females remember exactly where they lay their clusters of eggs (called clutches).
3. Frogs have been hopping around on Earth for at least 200 million years, including as contemporaries of the dinosaurs.
4. There are more than 6,000 frog species.
5. They have superior night vision.
6. They are excellent bioindicators and can withstand extreme environmental stress by using a process known as **estivation**.
7. The females of Madagascar's climbing mantella and Ecuador's little devil frog species are nurturing and attentive mothers. They lay just a few eggs in pools of water that collect on leaves. Then they stay with their growing tadpoles and feed them until they're mature enough to venture off on their own.
8. Frogs—like many other amphibians—can exchange oxygen and carbon dioxide through their skin by a process called **cutaneous respiration**.

Define the terms below.

Amphibian: _____

Metamorphosis: _____

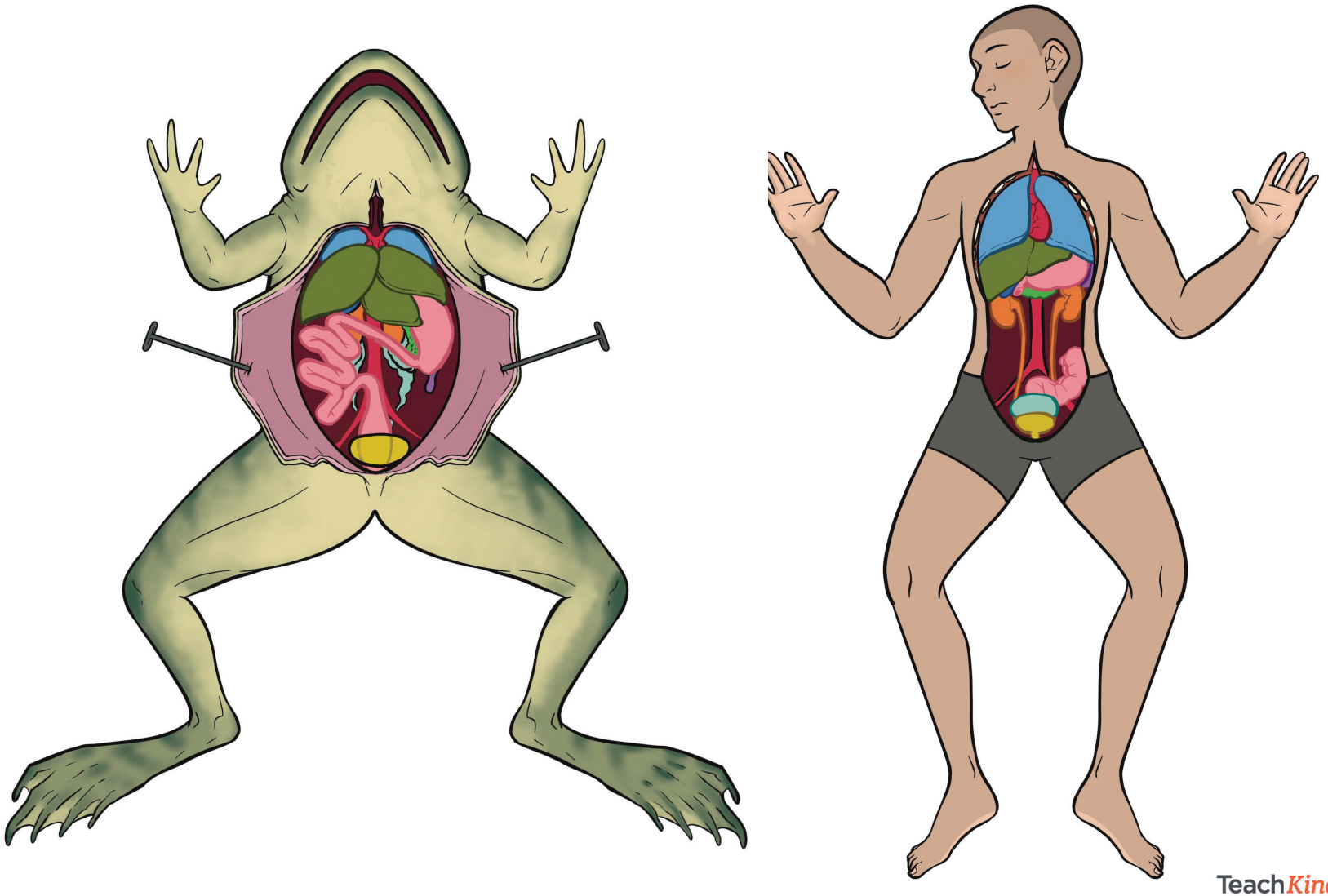
Ectothermic: _____

Cutaneous respiration: _____

Bioindicator: _____

Estivation: _____

Frog Anatomy vs. Human Anatomy



Student Lab Worksheet Answer Key:

Comparative Anatomy

Watch the 10-minute Kind Frog Dissection Lesson video to help define the vocabulary terms on page 2 of your student worksheet.

https://www.youtube.com/watch?v=CbHbnfFkv7o

List some differences between human anatomy and frog anatomy for each of the systems below.

Body System	Humans (Mammals) vs. Frogs (Amphibians)
Digestive	Mammals drink water through their mouths, but amphibians absorb it through their skin. Mammals have a longer small intestine, which is made up of three parts, while amphibians' small intestine is shorter and has only two parts. Mammals excrete through the rectum and urinate separately through the urethra, but amphibians excrete and urinate through the cloaca. And unlike mammals, they lack an appendix for protecting gut flora.
Respiratory	Both mammals and amphibians have lungs for breathing, but amphibians also use their skin to absorb oxygen from the environment and excrete carbon dioxide. Mammals have a diaphragm to help expand the rib cage while inhaling, but amphibians lack this adaptation.
Circulatory	Mammals' hearts have four chambers (two ventricles and two atria) to help circulate blood, but amphibians' hearts have only three chambers (one ventricle and two atria). Both types of animals have a circulatory system that pumps oxygenated blood throughout the body, but amphibians have an extra circuit that allows them to take in oxygen through both the lungs and the skin.
Nervous	Both mammals and amphibians have a central nervous system that includes a brain, a spinal cord, and nerves. They both have most of their sensory organs on the head. Unlike amphibians, mammals can change the focus of their eyes. And unlike most mammals (including humans), amphibians have excellent night vision and can see color in the dark. Although the ears and vision of amphibians and mammals differ, a nervous system, five senses, and the capacity to experience pain and other physical sensations.
Skeletal	Both mammals and amphibians are vertebrates, but amphibians lack several skeletal structures that mammals have, such as a pelvis, a tailbone, and ribs. Mammals have 24 bones in their spinal column, while amphibians have only nine. Mammals have both a tibia and a fibula in their lower legs, but not all amphibians do. For example, frogs have a single shinbone called the tibiofibula, which is an adaptation for leaping.

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8. Frogs—like many other amphibians—can exchange oxygen and carbon dioxide through their skin by a process called **cutaneous respiration**.

Define the terms below.

Amphibian: An ectothermic, four-limbed vertebrate who can live in various ecosystems and whose eggs are fertilized outside the body

Metamorphosis: A biological process in which an organism experiences a distinct physical transformation during the life cycle, such as a caterpillar's transformation into a butterfly or a tadpole's transformation into an adult frog

Ectothermic: Having a body temperature that is determined by environmental or external sources, such as air or water temperature

Cutaneous respiration: Breathing or transferring a gas, such as air, through the skin

Bioindicator: A species whose status within an ecosystem reflects that ecosystem's overall health

Estivation: The process of becoming dormant when temperatures are warm, including through a slowing of the metabolic rate, which is similar to hibernation but takes place in the summer