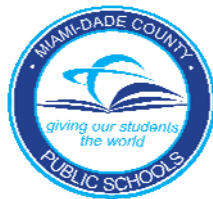


Miami-Dade County Public Schools

GUIDELINES FOR THE USE OF ANIMALS IN SECONDARY SCIENCE ACTIVITIES



Curriculum and Instruction
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MIAMI-DADE COUNTY PUBLIC SCHOOLS GUIDELINES FOR THE USE OF ANIMALS IN SECONDARY SCIENCE ACTIVITIES

PHILOSOPHY

The study of biological sciences typically includes opportunities to observe living animals and to study preserved specimens. These studies are intended to foster an appreciation for the animal's intrinsic value, its place in the ecosystem and its complexity of form and function. The District believes that professional educators are in the best position to select appropriate instructional strategies for achieving educational goals. When animals are used in the classroom, the following four criteria need to be addressed by teachers and schools. These criteria can be remembered as the Four R's.

1. **RESPECT** for all living things is emphasized. This includes a respect for different views presented by students on the use of animals in the classroom. Teachers should model respect for animals by taking time to address the proper treatment and careful handling of both live and preserved animals.
2. **REFINE** teaching strategies to ensure the activity has relevant and clearly defined outcomes with appropriate activities. Use dissections to develop understanding not facts. Teachers should continually consider refinements that reduce stress on living animals, reduce waste of preserved specimens and increase learning for the student.
3. **REDUCE** the number of animals (living or preserved) used whenever possible. A significant way to reduce the number of animals is to eliminate the duplication of dissections at different grade levels. Increasing the number of students working in groups can also be helpful.
4. **REPLACE** animal dissections with animals that are less endangered or use lower order animals when appropriate. Teachers should reexamine traditional dissections to assure that they are aligned with current professional guidelines and standards. Use a variety of dissection support activities to develop the factual base necessary to allow dissections to focus on higher order thinking.

GENERAL GUIDELINES

Observation and experimentation with living organisms give students unique perspectives on life processes that are not provided by other modes of instruction. This study, however, requires appropriate, humane care of each organism. Teachers are expected to be knowledgeable about the proper care of organisms under study and the safety of their students. This guide will review the planning and management of dissections, and the ways of integrating dissection laboratories with other instructional materials*.

**This guide is adapted from Planning and Managing Dissection Laboratories developed by the Florida Association of Science Teachers and published by the National Science Teachers Association, 1994.*

These are the general guidelines concerning the responsible use of organisms in a school classroom or laboratory:

- Acquisition and care of organisms must be appropriate to the species.
- Student classwork and science projects involving animals must be under the supervision of a science teacher or other trained professional.
- Teachers sponsoring or supervising the use of animals in instructional activities, including acquisition, care, and disposition, will adhere to local, state, and national laws, policies, and regulations regarding species of organisms.
- Teachers must instruct students on safety precautions for handling organisms, plants, live animals, or animal specimens.
- Plans for the future care or disposition of animals at the conclusion of the study must be developed and implemented.
- Laboratory and dissection activities must be conducted with consideration/appreciation for the organism.
- Laboratory and dissection activities must be conducted in a clean and organized work space with care and laboratory precision.
- Laboratory and dissection activities must be based on carefully planned objectives.
- Laboratory and dissection objectives must be appropriate to the maturity level of the student.
- Student views or beliefs sensitive to dissection must be considered; the teacher will respond appropriately.

USE OF LIVING ORGANISMS IN THE CLASSROOM

In addition to specifics of Florida State Statute 1003.47 - "Biological Experiments on Living Subjects" (See "Legal Considerations", page 7) the following guidelines should be followed when live animals are used in the classroom:

- A. Biological experimentation should be consistent with a respect for life and all living things. Humane treatment and care of animals should be an integral part of any lesson that includes living animals.
- B. Exercises and experiments with living things should be within the capabilities of the students involved. The teacher should be guided by the following:
 1. Laboratory activities should not cause the loss of a vertebrate's life. Bacteria, fungi, protozoans and invertebrates should be used in activities that may require use of harmful substances or loss of an organism's life. These activities should be clearly supported by an educational rationale and should not be used when alternatives are available.
 2. A student's refusal to participate in an activity (e.g., dissection or experiments involving live animals, particularly vertebrates) should be recognized and accommodated with alternative methods of learning. The teacher should work with the student to develop an alternative for obtaining the required knowledge or

experience. The alternative activity should require the student to invest a comparable amount of time and effort.

C. Vertebrate animals can be used as experimental or organisms in the following situations:

1. Observations of normal living patterns of wild animals in their natural habitat or in zoological parks, gardens or aquaria.
2. Observations of normal living functions such as feeding, growth, reproduction, activity cycles, etc.
3. Observations of biological phenomenon among and between species such as communication reproductive and life strategies behavior, interrelationships of organism, etc.

D. If live vertebrates are to be kept in the classroom the teacher should be aware of the following responsibilities (See Appendix 2, page 21, for state regulations):

1. The school, under the science teacher's leadership, should develop a plan on the procurement and ultimate disposition of animals. Animals should not be captured from or released into the wild without the approval of both a responsible wildlife expert and a public health official. Domestic animals and "classroom pets" should be purchased from licensed animal suppliers. They should be healthy and free of diseases that can be transmitted to humans or to other animals.
2. Animals should be provided with sufficient space for normal behavior and postural requirements. Their environment should be free from undue stress such as noise, overcrowding and disturbance caused by students.
3. Appropriate care, including nutritious food, fresh water, clean housing, and adequate temperature and lighting for the species - should be provided daily, including weekends, holidays and long school vacations.
4. Teachers should be aware of any student allergies to animals.
5. Students and teachers should immediately report to the appropriate school official all scratches, bites and other injuries, including allergies or illnesses.
6. There should always be supervised care by a teacher competent in caring for animals.

E. Animal studies should always be carried out under the direct supervision of a teacher competent in animal care procedures. It is the responsibility of the teacher to ensure that the student has the necessary comprehension for the study.

In addition to Florida State Statute 1003.47 - "Biological Experiments on Living Subjects", students and teachers should comply with the following:

1. Experimental procedures on vertebrates should not use pathogenic microorganisms, ionizing radiation, carcinogens, drugs, alcohol in any form, electric shock, exercise until exhaustion, or other distressing stimuli. No experimental procedures should be attempted that would subject vertebrate animals to pain or distinct discomfort, or interfere with their health in any way.

2. Behavioral studies should use only positive reinforcement techniques.
 3. Egg embryos may not be subjected to experimental manipulation.
 4. Students should not be allowed to take animals home to carry out experimental studies.
 5. Exceptional original research in the biological or medical science involving live vertebrate animals should be carried out under the direct supervision of an animal scientist, e.g., and researcher, in an appropriate research facility. The research plan should be developed and approved by the animal scientist and reviewed by a humane society professional staff person prior to the start of the research. All professional standards of conduct should be applied as well as humane care and treatment, and concern for the safety of the animals involved in the project.
- F. Science fair projects and displays should comply with the rules and regulations of the International Science and Engineering Fair (ISEF) and include the following:
1. The use of live animals in science fair projects shall be in accordance with ISEF rules and the above guidelines. In addition, no organisms shall be used in displays for science fair exhibitions.
 2. No animals or animal products for recognized endangered species should be kept.

OBSERVING LIVE ANIMALS

When appropriate, and prior to dissection laboratory, allow students to observe the behavior and the external anatomy of living animals. Behavioral research is fascinating to many students and can provide opportunities for them to explore and ask questions, both prerequisites to the active study of science. For example, students can investigate how the animals relate to their environment and note any special adaptations for several that they have developed.

Housing live animals in the classroom can provide wonderful opportunities to teach respect for them as well as the responsibility and dedication necessary to care properly for all animals. *Classroom Creature Culture*, a book from the National Science Teachers Association, contains guidance for the maintenance of animals in the classroom as well as providing some non-invasive activities. If you house animals in our classroom, be aware that the State Game and Fish Commission have guidelines for the housing of various species (see Appendix 2, page 21). Additional guidelines can be found in the *Guide for the Care and Use of Laboratory Animals*, 1983, revised 1985. Copies can be obtained by contacting the Superintendent of Documents, D.C. 20402. Finally, be sure that your room has adequate ventilation, and that your students do not have allergies to the animals.

If you cannot bring live animals into the classroom, you might schedule a field trip to a zoo, or show films and videotapes of live animals. You may also wish to contact a nearby zoo or another animal facility that promotes the study of live animals and make arrangements for bringing animals into the classroom through a classroom visitation program.

USE OF LABORATORY DISSECTION

The study of living things is an important part of science education, and their direct study is an appropriate and necessary part of good science instruction. Many different types of investigations contribute to knowledge of living things and the processes of life with dissection providing important resources for students. Each instructional tool - live specimens, preserved specimens, models, microscope slides, videotapes, computer simulations -- offers students information in different ways. All of these tools, plus others devised by teachers and students, contribute to the student's knowledge of organisms.

Students learn best through direct interaction with learning materials. Dissection laboratories are active and immediate, without the limitations imposed by simulations or written materials. Dissection laboratories remove abstraction from the learning process, giving students first-hand experience and data that is their own. The detailed, hands-on study of individual animals enables students to develop observational skills and make comparisons. As they carefully manipulate instruments and tissues, students gain techniques used in a variety of health science and biological science careers.

The biological concepts of structural adaptation and phenotypic diversity are made clear as students study individual animals. The detailed study of tissues reveals to students the minute changes of structure that can make large differences in biological functions. To master these points, students will learn to take careful measurements, make estimates and inferences, and select appropriate equipment. These detailed observations give students an appreciation for the unity, interrelationships, and complexity of life.

Observing preserved specimens in a dissection laboratory provides an opportunity to view the organism as a complex, integrated whole rather than as a collection of body parts and systems. The arrangement of organs, the appearance and texture of tissues,

and the relationships of structures are best seen and understood as students explore a complete specimen in a dissection laboratory.

Dissection laboratories, like other instructional methods, must be carefully planned and integrated into the general scheme of study. Precede dissection laboratories with studies of the behavior of living animals, a review of the function of their organs, and with activities to introduce the techniques that will be used in the laboratory.

Before engaging in the actual dissection, encourage students to consider the ethical implications of this activity. Discussion on this topic provides a valuable opportunity for students to recognize that everyone has a personal set of ethical values and that science and society are linked by these values. Through such a discussion you can impress upon students the importance of treating the specimen with care and respect.

LEGAL CONSIDERATIONS

State laws regulate the circumstances under which animals can be included in biological instruction in grades K to 12. State laws also provide that "Students may be excused from such experiments upon written request of the parent or guardian." Before you conduct a dissection in your class, you should read and understand Florida State Statute 1003.47 - "Biological Experiments on Living Subjects." For your convenience, the current (2008) version of this statute is reprinted on the next page. Clarification of this law and additional laws regarding laboratory safety that you should consider are also included.

Current State Statute:

Title XLVIII

Chapter 1003

[View Entire Chapter](#)

K-20 EDUCATION CODE PUBLIC K-12 EDUCATION

1003.47 - Biological experiments on living subjects.

1). It is the intent of the Legislature with respect to biological experiments involving living subjects by students in grades K through 12 that:

(a) No surgery or dissection shall be performed on any living mammalian vertebrate or bird. Dissection may be performed on nonliving mammals or birds secured from a recognized source of such specimens and under supervision of qualified instructors. Students may be excused upon written request of a parent.

(b) Lower orders of life and invertebrates may be used in such experiments.

(c) Non-mammalian vertebrates, excluding birds, may be used in biological experiments, provided that physiological harm does not result from such experiments. Anatomical studies shall only be conducted on models that are anatomically correct for the animal being studied or on nonliving non-mammalian vertebrates secured and from a recognized source of such specimens and under the supervision of qualified instructors. Students may be excused from such experiments upon written request of the parent.

(d) Observational studies of animals in the wild or in zoological parks, gardens, or aquaria, or of pets, fish, domestic animals, or livestock may be conducted.

(e) Studies of vertebrate animal cells, such as red blood cells or other tissue cells, plasma or serum, or anatomical specimens, such as organs, tissues, or skeletons, purchased or acquired from biological supply houses or research facilities or from wholesale or retail establishments that supply carcasses or parts of food animals may be conducted.

(f) Normal physiological and behavioral studies of the human animal may be conducted, provided that such projects are carefully selected so that neither physiological nor psychological harm to the subject can result from such studies.

(g) All experiments shall be carried out under the supervision of a competent science teacher who shall be responsible for ensuring that the student has the necessary comprehension for the study to be undertaken. Whenever feasible, specifically qualified experts in the field should be consulted.

(h) Live animals on the premises of public and private elementary, middle, and high schools shall be housed and cared for in a humane and safe manner. Animals shall not remain on the premises of any school during periods when such school is not in session, unless adequate care is provided for such animals.

(2) The provisions of this section shall not be construed to prohibit or constrain conventional instruction in the normal practices of animal husbandry or exhibition of any

livestock in connection with any agricultural program or instruction of advanced students participating in advanced research, scientific studies, or projects.

(3) If any instructional employee of a public high school or career center knowingly or intentionally fails or refuses to comply with any of the provisions of this section, the district school board may suspend, dismiss, return to annual contract, or otherwise discipline such employee as provided in s. 1012.22(1)(f) in accordance with procedures established in chapter 1012. If any instructional employee of any private school knowingly or intentionally fails or refuses to comply with the provisions of this section, the governing authority of the private school may suspend, dismiss, or otherwise discipline such employee in accordance with its standard personnel procedures.

Clarification of Florida State Statute 1003.47 Reference

While not a legal interpretation of Florida law, you can use the following information to clarify Florida State Statute 1003.47 Consult your school administration if you need additional information about the law.

- (1 a) It is illegal to collect any specimens from the wild for students to dissect.
- (1 c) Mammals, amphibians, fish, reptiles, and poultry may be used as specimens for dissections, but only if they come from a recognized supplier of biological specimens and they do not die as a result of the dissection.
- (1 e) No student blood sampling may be conducted. Human blood samples can be used but must be purchased from a recognized supplier of biological specimens where it has been verified that a reliable laboratory screened the blood for possible HIV infection and certified that the samples are "HIV negative."
- (2 h) Be aware of state and federal laws that regulate endangered and protected species. **CAUTION: Do not bring venomous organisms, living or dead, into the classroom. The venom can still be poisonous even after the animal dies.**

ALTERNATIVE ASSIGNMENTS FOR STUDENTS EXCUSED FROM DISSECTION

In compliance with state law, you must provide alternative assignments to a student if you receive a written request from a parent or guardian asking that the student be excused from a dissection laboratory. Many alternative assignments are excellent pre- and post-dissection activities, and may be done by all students. Students who do not participate in the laboratory while in the classroom, could pursue one of these activities more extensively than the rest of the class or use free and purchased online and software resources to complete a simulation of the actual dissection.

Although alternative assignments may approach but not fully accomplish the same instructional objectives as dissection laboratories, they should be carefully designed learning experiences. Alternative assignments must not be punitive but still provide an opportunity to learn the content necessary to fulfill curriculum requirements. You may want to involve students as you develop a learning plan designed to accomplish the objectives.

Excused students should not be present in the classroom during dissections.

Appropriate alternative assignments might include any of the following instructional tools:

- computer simulations
- online virtual dissections
- observations of live organisms
- library research
- work with illustrated dissection manuals
- review of anatomy using slides, film strips, or video
- artwork based on models, classroom charts, or diagrams
- work on review sheets and transparencies

You can find excellent ideas for alternative assignments in the following resources.

Daniel, Alice (ed.) Alternatives to Biology Education. Biology Methods Review Project, 333 Washington Street, Suite 850. Boston, MA 02108. (617) 523-1137.

Fleck, Earl “Virtual Pig Dissection” Whitman College,
<http://www.whitman.edu/biology/vpd/>

National Association of Biology Teachers. The Responsible Use of Animals in Biology Classrooms. Including Alternatives to Dissection. NABT, 11250 Roger Bacon Drive, #19. Reston, VA 22090. (703) 471-1134.

TeachKind. “TeachKind: human teaching resources”,
http://www.teachkind.org/humanesci_dissection.asp

PREPARING FOR THE LABORATORY

PLANNING FOR SAFETY

All laboratory activities include hazards that teachers and students must recognize and avoid. Whenever this guide mentions safety issues of which you should be aware, the text will use bold-face type. Remember to immediately notify school officials of any injuries and to completely document what happened.

Because of the possibility of splashing irritating chemicals, teachers, students, and any classroom visitors should wear chemical resistant safety goggles during dissection laboratories where such exposure is probable. (See Appendix 1, Chapter 1006.063 of the Florida Statute)

Negligence

Students must be under your direct supervision at all times! Never leave the room during a dissection, unless another certified and qualified teacher can supervise your students. **Lack of supervision is automatic grounds for initiating charges of negligence.**

State law may not allow you to conduct some of the activities published in state-adopted texts and laboratory manuals. Contact your school administration if you have any questions about laboratories published in the books your school uses.

Teacher Preparation

You should conduct dissections in your classroom only if you are fully certified to teach the course and if you have previous hands-on experience in courses or in-services that included dissections. You must have a thorough knowledge of relevant state and local laws, school district. **Never expect substitute teachers to conduct dissections.**

If you are using the instructional strategy of dissection for the first time, consult your peers and observe their instructional management techniques. You might use several of your conference/planning periods to observe other teachers conducting dissections in their classrooms. Also consult various professional journals, films, and videotapes that discuss dissection activities, or participate in a professional workshop or in-services about dissections. Above all, **practice, practice, practice!** You must be able to instruct your students in the safe and proper use of dissection tools and techniques.

CHEMICAL HAZARDS

Many specimens prepared for dissection are embalmed with formalin before being placed in formalin-free holding fluid. Because formalin (formaldehyde) is a suspected carcinogen and some traces of it may remain in the tissues, you and your students should avoid touching the specimens with ungloved hands. You and your students should wear inexpensive, disposable latex or vinyl gloves. Laboratory aprons should be provided to protect the students' skin and clothing from holding fluid.

Students, teachers, and visitors to the classroom should always wear safety goggles during dissections when risk of caustic or irritating liquids is present. Students who wear contact lenses are at a greater risk for eye injury from splashed chemical than are other

students. The material, of which contact lenses are made, tends to absorb chemicals and/or hold chemicals against the cornea. Explain the additional risk to students who wear contact lenses. If any students wear contact lenses on laboratory days, place a sticker on the goggles of these students so you can immediately identify them as contact lens wearers and notify medical personnel if they splash chemicals into their eyes. Remember to follow school procedures and notify school officials of any injuries and to document the incident as completely as possible.

The classroom in which you conduct dissections must have an exhaust fan that remove fumes to the outside of the building. Opening doors, opening windows, operating fans, or using spaces where air conditioners re-circulate air to other rooms is not acceptable. If necessary, trade classrooms with another teacher who has an adequately ventilated laboratory.

STUDENT BEHAVIOR

After each laboratory session, instruct students to wash their hands thoroughly with soap and water. Students should clean under their fingernails.

If you have students who have been warned, counseled, and referred to the administration for chronic misbehavior, you might consider excluding them from the dissection laboratories where they may be a danger to themselves or others.

SPECIMEN SELECTION

When you choose to use dissections, you should carefully select the species your students will study. Your choice of whether to dissect fetal pigs, fish, frogs, grasshoppers, starfish, or other animals must depend on many factors. You should consider the prior experiences of your students, their capabilities, your course standards, and how your course articulates with other classes and schools. You should also consider the cost, time, and facilities you have available.

Before you place an order for specimens, however, you should ask how the supplier obtains the specimens, how the supplier euthanizes the specimens, and how the supplier embalms the specimens. You will need this information for several reasons. Students, parents, and community members might want to verify that the animals were handled humanely. You or your students might be more comfortable using specimens that were destined for euthanasia, as byproducts of the food industry or as a result of pet overpopulation problems, than those collected from wild populations for the purpose of dissection. Some teachers prefer using specimens preserved in alcohol than using specimens embalmed with formalin and then placed in a holding fluid.

SAFETY AGREEMENTS AND DRILLS

Require the students to follow proper safety practices.

You can do this by asking them to review, sign, and date personal safety contracts. You might have the student's parents and guardians read and sign the contract. See the appendix for sample forms.

Organize student participation in drills to practice various emergency procedures. For example, students can act out the procedure to use in case they splash chemicals in their eyes, or if they cut themselves with a dissecting tool.

Prior to each laboratory, review the appropriate safety rules with students to reinforce the importance of following those procedures.

Stress the importance of not eating or drinking in the laboratory and of washing hands after dissection.

Wearing safety goggles, aprons and gloves are required by state law.

Become a role model for your students by following all rules yourself

SELECTING AND MAINTAINING EQUIPMENT

Selection of appropriate dissection equipment depends on the specimen, the level and preparation of the student, and the laboratory objectives. Whenever possible, **substitute scissors for scalpels and single-edged reinforced razor blades. - Dull dissection instruments can be dangerous**, because students must use more force with dull tools. By using greater force, students are more prone to slip or break the instrument. Use only sharp dissection tools.

When students complete the dissection, have them sanitize the equipment by rinsing the tools in a **10 percent solution of chlorine bleach in water**. Have students dispose of broken or dull blades by dropping them into a "sharp can" or narrow-mouthed bottle you can throw away. **Keep the safety of the custodial staff in mind**. Use of and disposal of the "sharp can" varies from district to district. Sanitize safety goggles by soaking them in a 10 percent solution of bleach in water or by using a sterilizer cabinet.

MANAGING FACILITIES

Schedule all dissection laboratories in a room with adequate ventilation. The number of students in a dissection lab should not exceed the design capacity of the room.

Arrange student workstations to minimize crowding and bumping. Plan to distribute materials and equipment in a manner that limits movement of students around the classroom. Setting out trays at each workstation is an effective strategy for many teachers. Some teachers also utilize a "service counter" where they can distribute extra materials and collect broken equipment. The height of classroom laboratory tables will probably determine whether you have students sit or stand during dissections. Whether students stand or sit is not as important as whether students conduct themselves properly during the laboratory. Instruct the students in proper laboratory behavior before beginning any dissection.

Make sure students will have access to sinks, water, and an eyewash during the dissection. Students should know the location of safety equipment and be able to reach

the safety equipment within five seconds. Drill students in the proper use of safety equipment and make sure they know to flush their eyes with water for 15 minutes if they accidentally splash chemicals in their eyes. Students will also need to rinse their specimens and equipment and wash their hands after each laboratory session. Place a piece of fiberglass screen over the sink drain to catch any debris from the specimens. The screen will help to keep the drain open. Dispose of the screen debris as you do the specimens.

Do not permit any specimens or dissection equipment to leave the classroom.

PRE-LABORATORY DISCUSSION

A pre-lab discussion with your students is extremely important for the success of dissection laboratory, as it sets the proper academic atmosphere for the dissection and diffuse potentially negative situations. Students are often anxious and apprehensive about participating in dissections. Discuss these feelings with your class. Impart a caring and empathetic tone, but approach the discussion as a professional. Discuss the reasons you have chosen to use this instructional strategy. Emphasize that looking inside a real organism will be quite different from looking at models, films, or photographs. For example:

- Genetic variation often produces arrangements of organs inside an actual specimen that may be quite different from the arrangement of organs in a textbook drawing.
- Students can relate what they observe about the animals to the adaptations and variations within their own bodies.
- Many of the structures within the animals are similar to structures in humans, yet there are significant differences that can be found.
- Learning by observing an actual animal is a more concrete experience than learning by reading an abstract textbook.
- Plan an adequate amount of time for dissection laboratories so that students can receive the full educational value of the specimen.
- Clearly define what is to be done each day and allow students to go only to that stage.

Impress students with the need to show respect for the animal specimens. To help students understand the "no nonsense" approach they should take with the specimens, some teachers have students read and sign forms, similar to the sample in Appendix 3. Customize the sample forms to suit your classes.

PRACTICE WITH DISSECTION INSTRUMENTS

Using dissection instruments properly requires skills that students might not have. Yet, to ensure their safety, students must use dissection tools properly. You can help students develop the necessary motor skills by allowing them to practice with the tools prior to conducting the dissection laboratory. Let students practice dissecting bananas, oranges, or other fruit with the scissors, scalpel or single-edged razor blades.

Demonstrate the proper technique for holding the tools and the correct direction for cutting. Instruct students to cut away from their own bodies and to keep their unoccupied hands away from the cutting edge of the blade.

By practicing on fruits, students will learn to handle the tools, vary the cutting pressure, separate tissues, and refine other necessary dissection skills. **Practice your own technique so you can better instruct your students more effectively.**

USE OF RESOURCES

Students need a variety of experiences to help them become familiar with the animals they will dissect. Prior to the laboratory, provide a variety of resources to help students learn about the organisms. You can use films, videodiscs, computer programs, models, and other instructional technologies. You might also invite a local expert, such as a veterinarian, to speak to your class about the animals.

INSTRUCTIONAL OBJECTIVES

To be sure dissection is used effectively as an instructional strategy; your school should develop a laboratory dissection plan. This should include an evaluation of facility safety, a budget, and most importantly, a description of the work scheduled for all grade levels and courses where dissection is used. This may require dialogue with other schools your students have attended or will be attending to eliminate duplication of learning experiences.

The size of the specimen and the student's motor skills development should also be considered. For instance, dissection activities for grade 10 honors biology would not be appropriate for a grade 6 middle school program. Inform students of the instructional objectives you will use to assess their laboratory performance. Your objectives might require the following.

Find and identify the major organs and the systems.

- Compare the sizes and shapes of organs among different specimens, and explain the variations.
- Identify the structures within the specimen that have a high surface to volume ratio and give possible explanations for this characteristic.
- Relate the position and structure of various organs to the function of the organs.
- Explain how the anatomy of the specimen gives evidence that the animal is adapted for its environment.
- Compare the similarities and differences between the anatomical structures of various species.

To accomplish these objectives, students must use their problem-solving, critical-thinking, and science-process skills. By accomplishing objectives such as those listed above, students will meet many of the performance standards included in the Florida Science Course Frameworks. Dissections can help students practice observing,

classifying, predicting, inferring, measuring, and selecting appropriate scientific equipment. Dissections can also help students learn about the structure and function of body systems, adaptations, and genetic variations.

SAFETY CONTRACTS AND DRILLS

Demand that students follow proper safety practices. You can do this by requiring students to review, sign and date a personal safety contract. You might have the students' parents and guardians read and sign the contract too. See Appendices for sample forms you can adapt for this purpose.

Have students participate in drills to practice various emergency procedures. For example, you might have students act out the procedure to use in case they splash chemicals in their eyes, or if they cut themselves with a dissecting tool.

Prior to each laboratory, review the safety rules with your students to reinforce the importance of following the procedures. Emphasize that safety goggles, aprons, and gloves are worn as required. Stress the importance of not eating or drinking in the laboratory and of hand washing after the dissection. Become a role model for your students by following all safety rules yourself

GENERAL LABORATORY PROCEDURES

PRE-LABORATORY ACTIVITIES

When you are ready to begin the laboratory, assign students to teams. The size of the teams will depend on your class size and room size. Using larger teams will help you reduce the number of animals needed for dissections. If you use groups of three, four, or more, you can assign cooperative learning roles to the students. By assigning each student to a role, such as materials manager, recorder, safety reviewer, or principal investigator, you ensure that each student must take part in the principal investigators for their team. Students who feel less comfortable with dissection techniques might make better recorders or safety reviewers. If the laboratory takes several sessions, students can rotate the jobs among the members of their teams.

Distribute a laboratory activity guide to each team. Expect teams to read and follow the directions in the activity guide.

Review procedures for obtaining specimens and for cleaning up workstations.

Circulate among the students as they complete the dissection. Observe the technique of each team. Ask probing questions to help keep students focused on the task. Include questions that require students to use higher-order thinking skills. You might want to prepare in advance a set of possible questions.

Plan for appropriate stopping points in case the class needs more than one session to complete the dissection. You should also be prepared to make mid-course changes in the procedure if needed. Identify several good stopping points to use if the class seems to have common questions with the activity. If necessary, stop the class, make announcements, or lead a discussion to help make the laboratory more successful.

POST-LABORATORY ACTIVITIES

Follow the appropriate procedure to dispose of the specimens and the excess holding fluid. (See page 19 of this guide for more information about disposal of specimens.)

If you plan to give a laboratory practical exam, you may need to save several specimens.

Clean and disinfect all safety goggles and dissection equipment. (See page 13 of this guide for more information.)

Assess student learning by using one or more of the following procedures.

- Answer written questions.
- Answer oral questions.
- Draw and label diagrams.
- Prepare and present a laboratory report.

- Complete a laboratory practical exam (an authentic assessment test).
- Construct a label or a model
- Make comparisons with other organisms.

Continue to refer to the laboratory experience throughout the remainder of the course. You can make connections to the dissection activity by:

- Discussing the relationship between evolution, physiology and anatomy.
- Having students complete comparative studies of other species.
- Conducting laboratories where students analyze the stomach contents of different animals and use the data to construct food webs.
- Identifying sexual dimorphism in various species.
- Studying the reproductive strategies and developmental sequences of different animals.

FREQUENTLY ASKED QUESTIONS

Why should I obtain specimens from a recognized supplier?

State law requires this to ensure that you and your students do not come in contact with specimens contaminated by parasites, pathogens, or toxins. Road Kills, unpreserved animals, and animals of questionable origin could transmit diseases to you or your students or expose you and your students to poisons.

Where do suppliers obtain their specimens?

Commercial suppliers of biological specimens obtain specimens from many sources. Many animals, such as fetal pigs, cows, perch, sheep, rabbits, and squid are byproducts of the food industry. Other animals, such as dogs or cats, might come from animal shelters or are byproducts of the dog-racing industry. These animals were destined for euthanasia at an animal shelter before being intercepted for educational purposes. A few growers raise animals, such as rats and earthworms, for laboratories and bait dealers. Other animals, such as reptiles, grasshoppers, starfish and frogs might be collected from wild populations. Some people question whether collectors are putting too much pressure on some wild populations.

How do suppliers euthanize animals?

Vendors are expected to euthanize animals by using the most humane method. The choice of anesthetic depends on the physiology of the species. Some animals, such as invertebrates and some types of aquatic vertebrates are immersed in an alcohol solution. Other vertebrates are injected with lethal doses of anesthesia or exposed to toxic concentrations of carbon monoxide.

How do suppliers embalm specimens?

Insects and invertebrates are usually embalmed in alcohol and shipped in jars, tubes, or

other packages. Perch, frogs, rats, pigs, and animal parts are usually embalmed with formalin. Formalin is a 37 percent solution of formaldehyde gas in water (a 37 percent aqueous solution of formaldehyde). Formalin is used only as the initial embalming fluid. Then the specimens are soaked for two or more weeks in a formalin-free holding fluid. Specimens are shipped in vacuum bags or buckets of the holding fluid. Cats, rabbits, and dogfish are initially embalmed with formalin, and then injected with dyes and a chemical that is a "formaldehyde scavenger." The injected chemical bonds with the formaldehyde forming a non-carcinogenic substance. The specimens are then placed in a holding fluid, such as 20 percent ethylene glycol and 80 percent water. The specimens are shipped in plastic bags or buckets of the holding fluid.

How do I order specimens?

There are several recognized suppliers of biological specimens. The types of specimens, preservation methods, packaging, prices, and quality vary by vendor. When you place an order for specimens, you should specify a delivery date on the purchase order. Keep in mind that **most specimens have a shelf life of one year**, as long as the seal is not broken on the package or the specimens are kept immersed in a holding fluid. Plan to use the specimens you order within one year. Order only as many specimens as you have the facilities to store. You can delay delivery dates on some orders to facilitate storage and shelf-life problems.

What do I do with the specimens I receive?

Before the dissection unpack all specimens, and then rinse the specimens with water. You might want to soak the specimens in a solution of water and mild detergent, such as commercial borax. Soaking will help to reduce odors. During extended laboratory periods, you might need to rinse the specimens again and spray them with a commercial disinfectant, such as Lysol, to kill microorganisms. You may also refrigerate or freeze the specimens for short of periods of time.

How do I dispose of specimens?

If the holding fluid is not on the Hazardous Materials List, it is usually acceptable to dilute excess holding fluids with ten parts water and pour the solution into a sewage system. Do not pour the solution into a septic system because some septic systems cannot handle the addition of chemicals. Follow M-DCPS disposal procedures.

APPENDIX 1

Eye-protective devices required in certain laboratory courses.

Chapter 1006.063 of the Florida Statute

(1) eye-protective devices shall be worn by students, teachers, and visitors in courses including, but not limited to, chemistry, physics, or chemical-physical laboratories, at any time at which the individual is engaged in or observing an activity or the use of hazardous substances likely to cause injury to the eyes. Activity or the use of hazardous substances likely to cause injury to the eye includes:

- (a) Heat treatment; tempering or kiln firing of any metal or other materials;
- (b) Working with caustic or explosive materials; or
- (c) Working with hot liquids or solids, including chemicals which are flammable, caustic, toxic, or irritating.

(2) District school boards shall furnish plano safety glasses or devices for students, may provide such glasses to teachers, and shall furnish such equipment for all visitors to such classrooms or laboratories, or may purchase such plano safety glasses or devices in large quantities and sell them at cost to students and teachers, but shall not purchase, furnish, or dispense prescription glasses or lenses.

APPENDIX 2

Florida Game and Fresh Water Fish Commission - Sale and Exhibition of Wildlife Chapter 379.304 of the Florida Statute

1) Permits issued pursuant to this section and places where wildlife is kept or held in captivity shall be subject to inspection by officers of the commission at all times. The commission shall have the power to release or confiscate any specimens of any wildlife, specifically birds, mammals, amphibians, or reptiles, whether indigenous to the state or not, when it is found that conditions under which they are being confined are unsanitary, or unsafe to the public in any manner, or that the species of wildlife are being maltreated, mistreated, or neglected or kept in any manner contrary to the provisions of chapter 828, any such permit to the contrary notwithstanding. Before any such wildlife is confiscated or released under the authority of this section, the owner thereof shall have been advised in writing of the existence of such unsatisfactory conditions; the owner shall have been given 30 days in which to correct such conditions; the owner shall have failed to correct such conditions; the owner shall have had an opportunity for a proceeding pursuant to chapter 120; and the commission shall have ordered such confiscation or release after careful consideration of all evidence in the particular case in question. The final order of the commission shall constitute final agency action.

(2) In instances where wildlife is seized or taken into custody by the commission, said owner or possessor of such wildlife shall be responsible for payment of all expenses relative to the capture, transport, boarding, veterinary care, or other costs associated with or incurred due to seizure or custody of wildlife. Such expenses shall be paid by said owner or possessor upon any conviction or finding of guilt of a criminal or non-criminal violation, regardless of adjudication or plea entered, of any provision of chapter 828 or this chapter, or rule of the commission or if such violation is disposed of under s. 921.187. Failure to pay such expense may be grounds for revocation or denial of permits to such individual to possess wildlife.

(3) Any animal on exhibit of a type capable of contracting or transmitting rabies shall be immunized against rabies.

(4) The commission is authorized to adopt rules pursuant to ss. 120.536(1) and 120.54 to implement the provisions of this section.

(5) A violation of this section is punishable as provided by s. 379.4015.

Florida Administrative Code

Chapter 39

1. Personal pets do not require a license. We strongly suggest that your student's pets are brought in by a parent and then leave with that parent. In other words, only the parent handles the animal. Why? You, as the teacher, have no control over the health of the animal or its temperament. Yet, you can be held accountable for the animal's behavior if it harms one of the students. Animals that you have purchased and brought into the classroom can be kept for longer periods of time so long as they are housed appropriately and responsibly cared for.

2. Protected animals include animals on the endangered species list, the threatened species list, or any animal that has special legislation regarding its capture and handling. These animals do require a special permit from the Florida Fresh Water Fish and Game Commission. In general, unless your justification is very good, your application for a permit will be denied. If one of these animals does appear unexpectedly in your classroom (i.e., a student brings it) you should be aware that it is a protected animal and contact the appropriate authorities as soon as possible.
3. Unprotected animals are those animals that are not covered by any special regulations. See the list below for unprotected animals, that are exhibited on behalf of the public and animals in the classroom that do qualify, and then they are exempt from any fee permits or licenses. However, the housing for these animals must meet the requirements specified in Chapter 39-6 of the Florida Administrative Code.

Possession of Wildlife for exhibition or personal use, unless possession of a species is otherwise regulated by other rules of the Commission:

- | | | |
|---------------------|-------------------------------------|---|
| (a) Reptiles | (i) Squirrels;
chipmunks | (n) Finches |
| (b) Gerbils | (j) Ferrets (domestic;
European) | (o) Myna birds |
| (c) Amphibians | (k) Guinea Cockatiels | (p) Toucans |
| (d) Shell parakeets | (l) Hamsters | (q) Doves; ringed,
ruddy and diamond |
| (e) Rats and mice | (m) Parrots | (r) Button quail |
| (f) Canaries | | (s) Prairie dogs |
| (g) Moles; shrews | | (t) Chinchillas |
| (h) Rabbits | | |

No permit shall be required for the sale of poultry, hamsters, guinea pigs, domestic rats and mice, gerbils, or chameleons (*Anolis*). If you have specific questions or concerns, or you would like a copy of Chapter 379.3761 of the Florida Statutes concerning the sale and exhibition of wildlife, please feel free to contact: Florida Game and Fresh Water Fish Commission, Farris Bryant Building, 620 South Meridian Street, Tallahassee, FL 32309-1609 (904) 488-1960

Caging Requirements for Snakes, Lizards, Turtles, Birds, and Rodents

Chapter 39-6 Pen Specification and Caging Requirements for Captive Wildlife.

No captive wildlife shall be confined in any cage or other enclosure which contains more individual animals; or is smaller in dimension; or is not equipped as follows, except as provided for in rule 39-6:

REPTILES

1. Snakes

- a. For up to four snakes, a cage having a perimeter 1-1/2 times the length of the longest confined snake, with a resting limb or ledge, a large rock, shade, and

- water.
- b. For each additional snake, increase cage size 25% of floor area.
2. Lizards (anoles, fence lizards and skinks and other lizards two to six inches in length).
 - a. For one or two lizards, a cage 12 inches by 8 inches, 10 inches high, with branches and access to sun or ultraviolet light.
 - b. For each two additional lizards, increase cage size by 2 inches in length and width.
 3. Lizards seven to 12 inches in length
 - a. For one or two lizards, a cage 20 inches by 10 inches, 15 inches high, with branches and access to sun or ultraviolet light.
 - b. For each two additional lizards, increase cage size by 4 inches in length and width.
 4. Lizards 13 to 24 inches in length
 - a. For one or two lizards, a cage 36 inches by 15 inches, 18 inches high, with branches and access to sun or ultraviolet light
 - b. For each two additional lizards, increase cage size by 6 inches in length and width.
 5. Turtles and terrapins
 - a. For one turtle, a cage with an area five times body size of which 50 percent shall be a pool, with sun and shade. For soft-shelled turtles, a non-abrasive permit submersion of the largest turtle.
 - b. For each additional turtle, increase cage area by five times body size.

BIRDS

1. General requirements-Enclosures for flying birds shall be small enough to prevent flight or large enough to permit aerial maneuvering within the enclosure. Perching birds shall be provided with a perch of a diameter sufficient to prevent the meeting of a bird's claws, and of sufficient height to prevent floor contact
2. Parrots, large cockatoos
 - a. For each bird, a cage providing space sufficient to permit perching without touching cage sides.
 - b. For each additional birds, one perch for each bird. Community cages shall provide flight space.
3. Medium-sized parrots
 - a. For one or two birds, a cage 18 inches by 18 inches, 2 feet high, with a perch for each.
 - b. Community cages shall provide sufficient to provide flight space.

4. Small parrots, parakeets
 - a. For one or two birds, a cage 1 foot by 2 feet, 10 inches high.
 - b. For additional birds, community cages shall be sufficient to provide flight space.
5. Medium-size flight birds (Gays, starling, doves, pigeon, etc.)
 - a. For up to two birds, a cage 3 feet by 2 feet, 5 feet high.
 - b. For community groups, a cage at least 8 feet in diameter of sufficient size to permit flight.

MICE, RATS, HAMSTERS, GUINEA PIGS, ETC.

Adapted from the Public Health Service's Guide for the Care and Use of Laboratory Animals, p. 11-14

The housing system should:

- provide space that is adequate, permits freedom of movement and normal postural adjustments, and has a resting place appropriate to the species;
- provide a comfortable environment;
- provide an escape-proof enclosure that confines animals safely;
- provide easy access to food and water;
- provide adequate ventilation;
- meet the biological needs of the animals,
- e.g., maintenance of body temperature, urination, defecation, and if appropriate, reproduction;
- keep the animals dry and clean, consistent with species requirements;
- avoid unnecessary physical restraint; and
- protect the animals from known hazards.

Animal	Weight (g)	Floor Area (sq. in)	Height (in)
Mice	15	12	5
	15	15	5
Rats	200	23	7
	300-500	40-60	7
	500	70	7
Hamsters	80	13	6
	80	19	6
Guinea Pigs	350	60	7
	350	101	7

APPENDIX 3

SAMPLE RESPONSIBLE USE OF ANIMAL SPECIMENS AGREEMENT FORM

Student's Name _____

I am aware that the purpose of any dissection laboratory is to advance my knowledge and appreciation of the form and organization of living organisms. If I do not learn from the experience, then the sacrifice of the organism is not justified. I also understand that it is my responsibility to complete the activity as directed in the laboratory guide, to review background in my notes and in resources available to me in class, and to follow all safety rules and procedures.

I understand that careless work on the specimen, disrespect for the specimen, or improper handling of the specimen will result in a lower grade for the laboratory. Deliberate mutilation of the specimen will result in disciplinary action.

I understand that I have the right to change my decision, and I accept responsibility for obtaining and submitting another form.

Student Signature _____ Date _____

Parent's/Guardian's _____ Date _____
Signature

APPENDIX 4

SAMPLE REQUEST FOR ALTERNATE ASSIGNMENT IN LIEU OF DISSECTION

Student's Name _____

In accordance with Florida Statute 233.0674, "Students may be excused from such experiments upon written request of a parent or guardian." My parent/guardian and I request that I be given relevant alternative learning activities in lieu of dissection activities.

I understand that I will be required to work on my alternate assignment in another area during animal dissections.

I understand that I have the right to change my decision, and I accept responsibility for obtaining and submitting another form.

Student Signature _____ Date _____

Parent's/Guardian's _____ Date _____
Signature

APPENDIX 5

SAMPLE PERSONAL RESPONSIBILITY AGREEMENT

Practice experience in the laboratory is invaluable in your science course.

In the laboratory, every student's actions can affect the safety of others more so than in any other classroom environment.

Every experiment can be performed safely by each laboratory student following the recommended safety procedures.

To do my part to provide a safe environment in the laboratory, I agree to:

1. Follow instructions exactly.
2. Perform only authorized experiment.
3. Protect eyes, face, hands, and body utilizing proper safety equipment and procedures.
4. Keep my work area tidy and clean up after each experiment.
5. Know where to get help fast.
6. Know where the safety equipment is and how to use it.
7. Report at once all accidents, even minor ones, and any unusual occurrence.
8. Never bring food or drink into the laboratory.
9. Never "play around" - unusual motions are distraction and dangerous
10. Ask questions if I do not understand what to do.

I have read the rules listed above and understand them.

Student Signature _____ Date _____

APPENDIX 6

SAMPLE PERSONAL RESPONSIBILITY AGREEMENT

This is to certify that

I, _____

have been instructed in the following safety components of this science class (check all that apply):

1. _____ Safety Rules
2. _____ Location and proper use:
 - a. _____ Fire extinguisher
 - b. _____ Fire blanket
 - c. _____ Eye protection devices
 - d. _____ Eyewash
 - e. _____ Deluge/drench shower
 - f. _____ Chemical dispensing containers
 - g. _____ Master shutoff for gas, electricity, and water
 - h. _____ Heat sources (Bunsen burner, hot plates, ovens, etc.)
 - i. _____ Electrical equipment
 - j. _____ Use of the intercom for emergency calls
3. Safety procedures for the following situations:
 - a. _____ Fire
 - b. _____ Chemical splash to the body
 - c. _____ Eye emergency
 - d. _____ Chemical spill

Student should initial next to each subsection to acknowledge each of the above safety components.

Teacher Signature _____ Date _____

APPENDIX 7

SAMPLE MEDICAL OR PHYSICAL PROBLEM FORM

To the parents or guardian of

Student Name

The parent or guardian has the responsibility of notifying the school of any physical or medical problems that could affect the student's performance in a science class.

1. Does your child have any medical or physical problems which may affect his or her performance in laboratory work?

2. To whom has information of physical or medical problems been furnished?

To: _____

I have read the above and discussed the Safety Rules with my child.

Parent's/Guardian's _____ Date _____
Signature

ANTI-DISCRIMINATION POLICY

Federal and State Laws

The School Board of Miami-Dade County, Florida adheres to a policy of nondiscrimination in employment and educational programs/activities and strives affirmatively to provide equal opportunity for all as required by law:

Title VI of the Civil Rights Act of 1964 - prohibits discrimination on the basis of race, color, religion, or national origin.

Title VII of the Civil Rights Act of 1964, as amended - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

Title IX of the Educational Amendments of 1972 - prohibits discrimination on the basis of gender.

Age Discrimination in Employment Act of 1967 (ADEA), as amended - prohibits discrimination on the basis of age with respect to individuals who are at least 40.

The Equal Pay Act of 1963, as amended - prohibits gender discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

Section 504 of the Rehabilitation Act of 1973 - prohibits discrimination against the disabled.

Americans with Disabilities Act of 1990 (ADA) - prohibits discrimination against individuals with disabilities in employment, public service, public accommodations and telecommunications.

The Family and Medical Leave Act of 1993 (FMLA) - requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons.

The Pregnancy Discrimination Act of 1978 - prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

Florida Educational Equity Act (FEEA) - prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

Florida Civil Rights Act of 1992 - secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulates categorical preferences for employment.

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