



# Mathematics, Science & Technology

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**NOTE: This document is a work in progress. Parts II and III, in particular, are in need of further development, and we invite the submission of additional learning experiences and local performance tasks for these sections. Inquiries regarding submission of materials should be directed to: The Mathematics, Science, and Technology Resource Guide, Room 681 EBA, New York State Education Department, Albany, NY 12234 (tel. 518-474-5922).**



<http://www.nysed.gov>

## Appendix A

# Guidelines for The Use of Animals in Elementary and Secondary Schools

The Science Teachers Association of New York State (STANYS) recommends these guidelines for use by science educators and students. They apply primarily to the use of non-human animals in instructional activities planned and supervised by teachers at the pre-college level.

STANYS believes that the study of living organisms and their life processes is essential to effective and meaningful instruction in the life sciences. STANYS also believes that students learn best through active participation in the learning process. Hence, if students are not given the opportunity to directly study living organisms, they will be deprived of experiences necessary to comprehend and appreciate life and life processes. Therefore, STANYS recommends the prudent and responsible use of animals in the classroom as a means of:

- fostering a respect for life, both human and non-human
- teaching the proper care and handling of animals
- providing a realistic framework upon which to organize biological knowledge
- observing the similarities and differences that exist between species
- understanding the relationship between biological form and function
- experiencing personal discovery.

Classroom experiences involving animals range from observation to dissection. Opportunities to observe live animals and to examine preserved specimens provide active learning situations with immediate feedback. STANYS supports these activities as long as they manifest sound educational objectives, convey substantive knowledge of biology and are conducted in compliance with appropriate guidelines established by the scientific com-

munity and Section 809 of New York State Education Law. Classroom teachers are in the best position to determine the appropriateness and educational value of such activities.

STANYS also takes the position that no alternative can fully substitute for the appropriate use of live animals and the dissection of animal specimens in the classroom. In every instance, these specimens should be obtained from a reputable source such as a science supply company, a university, or a grocery store. Educators should be aware of the educational limitations of computer simulations and other alternatives presently being marketed. STANYS supports the use of these materials as enhancements to the educational process but not as exclusive replacements for the use of actual organisms. At the same time, life science educators must be sensitive to student objections and respond to them in accordance with Section 809 of New York State Education Law.

The abuse of any living organism for experimentation or other purpose is intolerable in any segment of society. Because biology deals specifically with living organisms, life science educators must be especially aware of their responsibility to prevent the inhumane treatment of any living organism in the name of science teaching and research. This responsibility should extend beyond the confines of the teacher's classroom to the rest of the school and community. Therefore the care of any live animal in the classroom should not only be overseen by the teacher but, in the case of vertebrates, a veterinary professional should be consulted when appropriate.

The following are guidelines recommended by the National Science Teachers Association (NSTA) concerning the responsible use of animals in a school classroom/laboratory. They are endorsed by STANYS as well.

Source: Science Teachers Association of New York State (STANYS), Newsletter, Spring 1997.

The guidelines follow.

- Acquisition and care of animals 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 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 dissection objectives must be appropriate to the maturity level of the student.
- Student views and beliefs sensitive to dissection must be considered; the teacher will respond appropriately.

*Adopted by NSTA Board of Directors, in July, 1991.*

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## Education Law §809

**§809. Instruction in the humane treatment of animals and birds (Eff. until July 1, 1995. See also §809 post.)**

### Historical and Statutory Notes

*§809. Instruction in the humane treatment of animals (Eff. July 1, 1995, as amended by L.1994, c. 542. See also §809 ante.)*

1. The officer, board or commission authorized or required to prescribe courses of instruction shall cause instruction in every elementary school under state control or supported wholly or partly by public money of the state, in the humane treatment and protection of animals and the importance of the part they play in the economy of nature as well as the necessity of controlling the proliferation of animals which are subsequently abandoned and caused to suffer extreme cruelty. Such instruction shall be for such period of time during each school year as the Board of Regents may prescribe and may be joined with work in literature, reading, language, nature study or ethnology. Such weekly instruction may be divided into two or more periods. A school district shall not be entitled to participate in the public school money on account of any school or the attendance at any school subject to the provisions of this section,

if the instruction required hereby is not given therein.

2. Study and care of live animals. Any school which cares for or uses animals for study shall ensure that each animal in such school is afforded the following: appropriate quarters; sufficient space for normal behavior and postural requirements of the species; proper ventilation, lighting, and temperature control; adequate food and clean drinking water; and quarters which shall be cleaned on a regular basis and located in all areas where undue stress and disturbance are minimized.

3. Application. The provisions of this section shall not be construed to prohibit or constrain vocational instruction in the normal practices of animal husbandry, or prohibit or constrain instruction in environmental education activities as established by the Department of Environmental Conservation.

4. Dissection of animals. Any student expressing a moral or religious objection to the performance or witnessing of the dissection of animals, either wholly or in part, shall be provided the opportunity to undertake and complete an alternative project that shall be approved by such student's teacher; provided, however, that such objection is sub-

stantiated in writing by the student's parent or legal guardian. Students who perform alternative projects who do not perform or witness the dissection of animals shall not be penalized.

5. Treatment of live vertebrate animals.

a) Except as provided for in this subdivision, no school district, school principal, administrator, or teacher shall require or permit the performance of a lesson or experimental study on a live vertebrate animal in any such school or during any activity conducted under the auspices of such school whether or not the activity takes place on the premises of such school where such lesson or experimental study employs:

- (i) microorganisms which cause disease in humans or animals
- (ii) ionizing radiation
- (iii) known cancer producing agents
- (iv) chemicals at toxic levels
- (v) drugs producing pain or deformity
- (vi) severe extremes of temperature
- (vii) electric or other shock
- (viii) excessive noise
- (ix) noxious fumes
- (x) exercise to exhaustion
- (xi) overcrowding
- (xii) paralysis by muscle relaxants or other means
- (xiii) deprivation or excess food, water or other essential nutrients
- (xiv) surgery or other invasive procedures
- (xv) other extreme stimuli
- (xvi) termination of life.

b. Notwithstanding any inconsistent provision of this section, the commissioner may, upon the submission of a written program

plan, issue to such school a written waiver of such restrictions for students subject to the following provisions:

- (i) the student shall be in grade ten, eleven, or twelve
- (ii) the students shall be under the supervision of one or more teachers certified in science
- (iii) the student shall be pursuing an accelerated course of study in the sciences as defined by the commissioner in preparation for taking a state or national advanced placement examination.

The commissioner shall issue a waiver of such restrictions for any teacher certified in science instructing such student. The written program plan shall include, but not be limited to:

- (i) the educational basis for requesting a waiver
- (ii) the objective of the lesson or experiment
- (iii) the methods and techniques to be used
- (iv) any other information required by the commissioner.

6. Report. On or before the first day of January next succeeding the effective date of this amended section, the commissioner shall annually submit a report to the governor and the legislature which shall include, but not be limited to, the number of written program plan proposals submitted by schools and the number of such proposals subsequently approved by the commissioner. In those cases where a program plan proposal has been approved by the commissioner, such plan shall be appended to become a part of the commissioner's annual report.

*(As amended L.1994, e. 542 §1)*

## Appendix B

# Laboratory Requirements

For Regents level coursework, students must complete a laboratory requirement. The following may be useful in addressing concerns regarding the laboratory requirement:

- All students in a Regents science course must complete the laboratory requirement of 1200 minutes of hands-on laboratory experiences, with satisfactory laboratory reports **prior** to entry into a Regents examination in science. (Teachers may wish to publicize a date when all labs must be completed.)
- The minimum laboratory requirement for each Regents science course is 1200 minutes. This may be found in statement form in each New York State Regents Syllabus in science, as well as the Commissioner's Regulations. Districts may set a higher time requirement, but it should be stated in school policy; students and parents should be informed of the school's requirements.
- The requirement is often stated as "thirty 40 minute sessions." This represents a **time** requirement, not a quantity requirement of thirty labs with thirty laboratory reports.
- All laboratories completed by students should be **hands-on**. Students should be actively engaged in laboratory work. While computers, library research papers, and worksheets may be a part of the laboratory experience, they should not comprise the sole experience. Teacher demonstrations, followed by student reports are also not considered to be a hands-on experience.
- Satisfactory laboratory reports must be completed by all students. The laboratory report format is set at the local level.
- By Commissioner's Regulation, laboratory reports must be kept on file for a minimum of six months. For students who transfer into a district, copies of labs completed by the student or a letter from the student's teacher or principal stating completion of labs to the date of transfer are acceptable and should also be kept on file for six months.

Teachers of science may wish to keep a log of labs with the date completed, minutes to complete, etc. Logs can be used to easily ascertain the time requirement for all students, including those who may transfer to other schools.

Some students, including those with disabilities, may require modifications, comparative laboratories, or replacement laboratories. For further information consult with your local special educators, the Special Education Training and Resource Center, or the New York State Education Department at (518) 473-9471.

## Appendix C

# Mentor Networks

New York mentors work through their local Board of Cooperative Educational Services (BOCES) to provide professional development for their peers in the areas of each discipline. Descriptions of the various mentor networks follow.

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## Biology Mentor Network

The Biology Mentor Network is an established, state-wide resource group organized to assist local science teachers, BOCES affiliates, large urban districts, and non-public schools in their efforts to implement the New York State mathematics, science, and technology learning standards for all students.

The Network has trained mentors to do the following:

- provide local districts with staff development workshops on the mathematics, science, and technology framework
- provide local districts with new instruction and assessment strategies for biology
- participate on national, State, and local committees
- serve as liaisons to mathematics, technology, and other networks
- serve as consultants for districts pursuing science variances
- facilitate in the establishment of consortiums
- present workshops at local, State, and national conferences
- act as contact persons for local resources
- solicit learning experiences from local district teachers to be submitted to MST Science Consultant, Sandy Latourelle (Email: latoursm@together.net)
- facilitate local peer review
- act as consultants in the writing of grant proposals which would generate improvements in science education.

The network has developed the following resource materials that can be used for local program development:

- **Regents Biology Program Guide** (an alternative biology program organized around six unifying themes that can be used in the development of a biology variance or in the modification of an existing program)
- **Regents Biology Assessment Guide** (provides guidelines for development of variance assessments or to design/improve local alternative assessments)
- **Regents Biology Program Improvement Process Guide** (outlines a process which integrates program evaluation with on-going program improvement)
- **Cornell Institute of Regional Bio Mentors Lab Manuals I and II** (open-ended laboratory experiences that develop student inquiry and science process skills)
- sample materials that provide models for planning and implementing diverse instructional and assessment strategies (portfolios, rubric design, performance assessment, concept mapping, cooperative learning, learning styles)
- instructional modules (themes include Structure and Function, and The Continuity of Life, Evolution, and Ecology).

For further information or assistance, contact: Linda Hobart , Finger Lakes Community College, Canandaigua, NY 14424 , Phone:716-394-3500 X326, Fax:716-394-5005 or Lee Drake, e-mail: drakela@snyflcaa.fingerlakes.edu or LeeADrake@aol.com

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## Earth Science, Chemistry, and Physics Mentor Network

Science Mentors at the high school level serve as a support network for fellow teachers. They promote Earth science, chemistry, and physics education by:

- developing workshops on curriculum related topics to assist in the teaching of an up-to-date science curriculum which addresses student needs as well as State mandates and requirements
- providing a personal contact for teachers who have individual curriculum concerns and needs
- sharing the knowledge of useful reference material based on teacher's expressed needs
- providing school districts, BOCES, and professional organizations with current and relevant information on Earth science, chemistry, and physics teaching, and assisting in the dissemination of information to teachers in the field
- modeling leadership in the field which promotes excellence in science education in the classroom and in the community
- serving as a liaison with the State Education Department so that Department staff receives feedback from the field on curriculum development and related issues, and so that teachers are informed of important issues as they occur.

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## Mathematics Mentor Network

The Mathematics Mentor Network provides collaborative staff development to experienced elementary teachers to help them change their classroom practices to better support their students in meeting the higher mathematics, science, and technology standards. In working with one another and with teachers in their home communities, mentors facilitate improved learning throughout the State. Mentors:

- engage teachers, supervisors, and others as appropriate in ongoing staff development that focuses on teaching and learning in mathematics education
- assist teachers to translate the State standards into projects, problem-solving activities, and extended tasks
- enable teachers to create learning environments conducive to a constructivist learning orientation and to use inquiry, manipulative hands-on-experiences, and the integration of calculators in learning mathematics.
- integrate other topics and real world situations, problem-solving, mathematical reasoning, and communication
- promote equity
- support local efforts in systemic change for good practice
- generate enthusiasm for new directions in mathematics teaching, focusing on both pedagogy and content
- communicate/disseminate information about mathematics, science, and technology frameworks, standards, and assessments; professional literature; and professional opportunities
- encourage the integration of mathematics, science, and technology with other subject areas
- attend network institutes and meetings.

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## Science Assessment Liaison (SAL) Network

The statewide network of regional science assessment liaison (SAL) professionals was created to provide technical assistance activities in alternative assessment and evaluation techniques. SAL members work with public and nonpublic classroom teachers of science at elementary, middle, and secondary levels, and their administrators, as well as with college faculty of preservice teachers.

Each BOCES and large city district will have one SAL for each level. The elementary portion of the network, trained during the 1996-97 school year, is available to provide assistance to districts beginning in the spring of 1997. Middle level SALs will be trained during the 1997-98 school year, and the secondary level SALs will be trained during the 1998-99 school year.

Assessment tasks developed by the State Education Department and through an NSF grant will be used as models for dissemination by the SALs to their regional clientele. SALs will share information with teachers and administrators on administering and scoring these tasks and using student performance data to improve local instructional programs.

Source: Steele, Rosanna M. Science Assessment Liaison Network.