



# STRATEGIES ON STANDARDS: ACCESS TO SCIENCE FOR EVERYONE! CLOSING THE GAP 2006

Science Content Standards: National Science Teachers Association (NSTA) <http://nsta.org/standards>

## Standard for all K-12

1. **Unifying concepts and processes:** *As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes:*
  - a. Systems, order, and organization
  - b. Evidence, models, and explanation
  - c. Constancy, change, and measurement
  - d. Evolution and equilibrium
  - e. Form and function



## Standards for all K-4

*As a result of activities in grades K-4, all students should...*

2. **Science as inquiry:** develop: a) Abilities necessary to do scientific inquiry b) Understanding about scientific inquiry
3. **Physical science:** develop and understanding of: a) Properties of objects and materials, b) Position and motion of objects and c) Light, heat, electricity, and magnetism
4. **Life science:** develop understanding of: a) The characteristics of organisms, b) Life cycles of organisms and c) Organisms and environments
5. **Earth and Space Science:** develop understanding of: a) Properties of earth materials, b) Objects in the sky and c) Changes in earth and sky
6. **Science and Technology:** develop: a) Abilities of technological design, b) Understanding about science and technology and c) Abilities to distinguish between natural objects and objects made by humans
7. **Science in Personal and Social Perspectives:** develop understanding of: a) Personal health, b) Characteristics and changes in populations, c) Types of resources, d) Changes in environments and e) Science and technology in local challenges
8. **History and Nature of Science:** develop understanding of: Science as a human endeavor (through the use of short stories, films, videos, and other examples)

## Standards for all 5-8

*As a result of activities in grades 5-8, all students should...*

2. **Science as inquiry:** develop: a) Abilities necessary to do scientific inquiry b) Understanding about scientific inquiry
3. **Physical science:** develop and understanding of: a) Properties and changes of properties in matter, b) Motion and forces and c) Transfer of energy
4. **Life science:** develop understanding of: a) Structure and function in living systems, b) Reproduction and heredity, c) Regulation and behavior, d) Population and ecosystems and e) Diversity and adaptations of organisms
5. **Earth and Space Science:** develop understanding of: a) Structure of the earth system, b) Earth's history and c) Earth in the solar system
6. **Science and Technology:** develop: a) Abilities of technological design and b) Understanding about science and technology
7. **Science in Personal and Social Perspectives:** develop understanding of: a) Personal health, b) Populations, resources, and environments, c) Natural hazards, d) Risks and benefits and e) Science and technology in society
8. **History and Nature of Science:** develop understanding of: a) Science as a human endeavor, b) Nature of science and c) History of science

## Science Resources

Gen Ed Software	Sped. Software	Virtual Manipulatives	Teacher Supplies
Riverdeep <a href="http://www.k12software.com">www.k12software.com</a> Tom Snyder <a href="http://www.tomsnyder.com">www.tomsnyder.com</a> DK <a href="http://www.edresources.com">www.edresources.com</a> *Digital Frog International <a href="http://www.digitalfrog.com">http://www.digitalfrog.com</a> *Tool Factory <a href="http://www.toolfactory.com/">http://www.toolfactory.com/</a>	*Slater Software <a href="http://www.slatersoftware.com">www.slatersoftware.com</a> *IntelliTools <a href="http://www.intellitools.com">www.intellitools.com</a> Mayer-Johnson <a href="http://www.mayerjohnson.com">http://www.mayerjohnson.com</a> Soft Touch <a href="http://www.softtouch.com">http://www.softtouch.com</a>	Science Online <a href="http://classroom.jc-schools.net/sci-units/living-things.htm">http://classroom.jc-schools.net/sci-units/living-things.htm</a> Virtual Science Resources <a href="http://www.lane.k12.or.us/insttech/vtc/science_interactive.html">http://www.lane.k12.or.us/insttech/vtc/science_interactive.html</a>	*Beacon-Ridge <a href="http://www.beacon-ridge.com">www.beacon-ridge.com</a> Learning Resources <a href="http://www.learningresources.com">www.learningresources.com</a>

\*Thank you for providing materials for this presentation





## CLASSROOM SCIENCE MANIPULATIVES

### Inquiry

- Microscopes (magnifying, talking, digital)
- Slide strips
- Magnifiers
- Binoculars
- Test tubes (with clamps), flasks, plates
- Gyroscope
- Dissecting kit

#### *Measurements*

- Centimeter cubes
- Rulers
- Tape measures
- Thermometers
- Scales (various [platform, spring, simple] including electronic)
- Weights
- Graduated cylinders (with enlarged numbers), beakers
- Measuring cups, containers
- Balances
- Timers
- Funnels

### Physical Science

- Magnets, magnetic wands
- Iron fillings
- Atom, crystal, and molecular model
- Density cubes
- Force Pulleys
- Wimshurst Generator
- Wave apparatus
- Listening discrimination blocks
- Tuning fork
- Color peddles/color wheels
- Prisms, lenses
- Litmus paper
- Mirrors

### Life Science

#### *Animal Studies*

- Animals/insects
- Inflatable insects, frogs, butterflies

#### *Natural Science*

- Amoeba model
- Butterfly garden/tower
- Bug life tables
- Observational science stations (including bug viewers, jugs, etc.)
- Insect Parts
- Garden laboratories/grow windows
- Life cycle models
- Habitat models
- Nature blocks
- Flower, leaf model
- Frog model
- Eye dropper

#### *Human Anatomy*

- Anatomy apron
- Organs models (heart, brain, lung, kidney)
- Skull, torso models
- Skeletons

### Earth and Space Science

- Compass
- Rocks, minerals, fossils sets
- Globe (landforms; astronomy)
- Anemometer (measure wind)
- Barometer
- Fault model
- Erupting volcano model
- Tornado tube
- Telescope
- Sling Psychrometer/Humidity Detector
- Cloud forming apparatus
- Rain gauge
- Water cycle model
- Solar system model/simulator
- Rocket system
- Sun/earth models
- Solar system maps

### Machines and Technology

- Lego
- Rollercoasters
- Gear sets
- K?NEX



- Cell, DNA models

- Pulleys

### Science in Personal and Social Perspectives

#### *Health*

- Food pyramid
- Stethoscopes
- Blood pressure kit
- Blood typing kit
- Oral Hygiene kit

### General

- Mixtures, indicators, and chemicals
- Pocket charts
- Diagrams
- Stamps
- Science flashcards
- Puzzles



### Virtual Manipulatives/Activities for Science Teachers

- <http://www.wonderville.ca/support/index.htm> - science activities (3-7)
- <http://www.uen.org/3-6interactives/science.shtml> - interactive science activities (3-6)
- <http://www.medtropolis.com/VBody.asp> - interactive, 3-D presentations of human body
- <http://www.ibiblio.org/virtualcell/index.htm> - virtual cell tours
- <http://faculty.washington.edu/chudler/chgames.html> - Neuroscience for kids, interactive
- <http://faculty.washington.edu/chudler/chmemory.html> presentations/simulations of how brain works
- <http://frog.edschool.virginia.edu/> - virtual frog dissection
- <http://www.scholastic.com/kids/weather/> - interactive weather maker
- <http://classroom.jc-schools.net/sci-units/matter.htm> - virtual interactive manipulatives/activities
- <http://www.ga.k12.pa.us/curtech/interactive/interactive.htm> - interactive classroom
- <http://www.accessexcellence.org/RC/virtual.html> - list of virtual dissections, labs, and field trips
- [http://www.seed.slb.com/en/scictr/lab/index\\_virtual.htm](http://www.seed.slb.com/en/scictr/lab/index_virtual.htm) - virtual experiments for middle and high school
- <http://www.virlab.virginia.edu/FS/home.htm> - University of Virginia Virtual lab
- [http://www.iknowthat.com/com/L3?Area=L2\\_Science](http://www.iknowthat.com/com/L3?Area=L2_Science) – experiments and activities for elementary and middle school

Websites that include a collection of links for virtual labs and activities:

- [http://www.nist.gov/public\\_affairs/kids/kidsmain.htm](http://www.nist.gov/public_affairs/kids/kidsmain.htm)
- <http://www.ofsd.k12.wi.us/science/frogdiss.htm>
- <http://www.hazelwood.k12.mo.us/~grichert/sciweb/misc.htm>
- <http://sciencepage.org/lessons.htm>
- <http://www.niehs.nih.gov/kids/links.htm>
- <http://scorescience.humboldt.k12.ca.us/fast/kids.htm>
- [http://www.iknowthat.com/com/L3?Area=L2\\_Science&COOK](http://www.iknowthat.com/com/L3?Area=L2_Science&COOK)
- <http://www.kidsolr.com/science/page2.html>

### Science Lesson Plans

- <http://www2.nsta.org/sciencesites/default.asp?category=14>



- <http://dev.nsta.org/ssc/>
- <http://science.education.nih.gov/>

# Adaptations to Pollination Parties! Lesson (Grade 4-6, Life Science Standards)

Lesson available on the Web at:

<http://school.discovery.com/lessonplans/programs/tlc-butterflies>

## Learning Disabilities

- Students may have difficulty with the Pollination Parties! worksheet. There are several ways you can adapt the worksheet.
  - Highlight every other row on the plant list so students can better track the rows and boxes.
  - Use a reading guide to help students reach across each row.
  - Adapt the worksheet by enlarging #2. This would provide more space for tracking what is read and for writing and checking the boxes.
  - Separate the individual questions within each numbered part of the worksheet so students can better know what is being asked without getting one question confused with another.
  - Provide websites and/or book resources on the sheet for students to use as references in #4.
  - Lengthen the worksheet with each question on a page so students have room to complete answers.
- Using a software program such as Microsoft Word or PowerPoint can serve as an adaptation
  - Teacher/Student can adjust font style, size, and color to meet student's needs along with adjusting the background color and screen magnification.
  - Use highlighting tool to draw attention to certain items, or help with visual tracking as discussed above.
  - Record/insert audio directions and/or insert comments throughout the worksheet to provide additional directions or hints.
  - Have direct hotlinks to websites as references.

## Visual Impairments

- Many of the adaptation described for students with learning disabilities work well for students with visual impairments.
- Additionally students with visual impairments may need the worksheet in large-print, printed in Braille, or to complete the worksheet online with text/screen reading software.

## Cognitive Disabilities/Autism

- Students with cognitive disabilities may benefit from the adaptations described above, but also may require additional modifications to help support their learning needs and academic level.
  - Provide students with a checklist with step-by-step directions of the individual tasks. Include picture symbols for students as needed.
  - Have students answer the questions using a communication board, communication device, expanded keyboard
  - Adapt the content/complexity by providing pictures of the plants, audio recordings of the lesson and/or resource information, and/or have pictures already available, having students sequence them correctly
  - Adapt the content/complexity by asking students to select between only a few number of plants and/or those most familiar to the student
  - For students who need a more simplified worksheet, reduce the number of questions. Limit #1 and #5 to one question. Let the student select which question they want to answer. Provide possible answers to questions for students to select. Provide the possible answers in picture form.
  - Instead of drawing the pollination process, have students use puzzles or puppets to show understanding.

## All Disabilities

- The ability for students to work with a partner or in groups not only provides the support for completing tasks, but encourages social interactions that may be of benefit to all students involved!

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To dos for presentation:

Alter worksheet

Make PowerPoint for worksheet

Augcom for sequencing

Overlay for plant selection – automatic to resource info

Puzzle

Puppets