

SCIENCE
GRADE 5
CURRICULUM



NEWTOWN SCHOOLS
NEWTOWN, CT.
June, 2001

PHILOSOPHY

The following belief statements represent the philosophy of the K-12 Science Curriculum.

- It is essential for all learners to apply and communicate scientific principles.
- The primary goal of science education is the understanding of scientific concepts through decision-making, problem solving, and critical thinking.
- The study of science empowers students to set goals, make plans, and assess achievement of their goals.
- Science is connected to everything in life.
- All sciences are interconnected.
- It is essential that students recognize that there are common themes and processes that are at the core of science.
- It is essential that students work together to become actively involved in discovering connections between science and other aspects of human experience.
- It is essential that students experience science as engagement, exploration, explanation, elaboration, and evaluation.
- It is essential that students understand scientific knowledge as constantly changing through discovery and investigation.
- It is essential that students through active engagement acquire and apply the knowledge and skills necessary to seek answers to their questions.
- It is essential that science education prepare students for a changing world and environment.
- It is essential that students should continuously recognize the interconnections between science, technology and society.
- It is essential that students use technology as a tool for understanding science.
- It is essential that students demonstrate their mastery of scientific knowledge and processes through a variety of assessments.

GOALS

Upon completion of the Newtown Science Curriculum, students will be able to:

- Make informed decisions about themselves and their environment through understanding science.
- Apply scientific reasoning and knowledge to address societal and technological problems.
- Explain the interconnectedness and interdependence among all areas of science.
- Extend their science problem solving skills to future education and life.
- Evaluate scientific inquiry and investigation through the process of solving relevant and challenging problems.
- Communicate scientific understandings through words, graphs, charts, and equations.
- Describe, explain, and make predictions based on previous knowledge and observations.
- Demonstrate mastery of scientific knowledge and processes through a variety of assessments.

Science Themes

Kindergarten: Scientific Inquiry
"Me and My World"

1st Grade: Scientific Inquiry/Patterns of Change
"Connections"

- Learning Through Nature
 - Plant and Animal Habitats
 - Weather
 - Sun, Moon and Stars
- States of Matter
- Balance & Structure

2nd Grade: Diversity & Variation/Scale & Structure
"Forces"

- Animal/Plant Dependency (Extinct & Endangered Animals)
- Earth's Magnetic Force
- Energy Variations (Light, Heat, Sound)
- Physics of Toys

3rd Grade: Systems & Interactions/Patterns of Change
"Cycles"

- Growth & Stages of Animals & Plants
- Earth and its Atmosphere
- Efficiency of Construction
- Properties of Matter

4th Grade: Stability & Equilibrium/Scale & Structure
"Resources"

- Food Webs & Animal Adaptation
- Soil, Rocks and Minerals
- Oceanography
- Pneumatics

5th Grade: Systems & Interactions/Evolution & Equilibrium
"Interconnections"

- Animal Complexity
- Ecosystems
- Solar System
 - Rocketry
 - Solar Energy

Content Standards

It is essential that students understand systems and how the interactions of their components affect their equilibrium and evolution.

- Students will be able to interpret and use organized data to construct a model of an ecosystem and to explain the interrelationships and balance within the systems.
- Students will be able to classify and compare a variety of materials by observing how they react to heat, inferring why the reaction occurred, and predicting reactions in other materials.
- Students will be able to sort and categorize a variety of living animals into groups, using various features to decide which things belong to which group.
- Students will be able to construct and utilize models and simulations (e.g. model rocket, paper airplane, balloon rocket, rocket car) and evaluate the success of their rocketry system design as it relates to Newton's laws of motion.
- Students will be able to select and use an appropriate tool which will enhance their ability to study the material at hand.

Essential Question:

It is essential that students understand systems and how the interactions of their components affect their equilibrium and evolution.

Content Standard:

Students will be able to interpret and use organized data to construct a model of an ecosystem and to explain the interrelationships and balance within the systems.

Objectives:

Students will be able to:

- Create an ecosystem with two interactive habitats: an aquarium and a terrarium.
- Control and describe the variables which may impact the ecosystem: temperature, sunlight, water, soil quality, pollutants
- Record and measure the changes which occur in their ecocolumns.
- Predict, test, observe, and draw conclusions on the impact of a variable on the ecocolumn.
- Accurately illustrate and label the model.
- Communicate the results of their data collection through a variety of methods: graphs, data tables, graphic organizers-, written narratives, etc.
- Explain the relationships between the different organisms and how they affect each other.
- Formulate questions

Suggested Resources:

STC Ecosystems Kit: This unit requires a great deal of preparation. Please see your math/science specialist (required resource)
STC Discovery Deck
Ranger Rick, NatureScope, "Pollution"
www.epa.gov (Long Island Sound Study)

Literature Ideas:

Four Against the Odds (expository)

Who Really Killed Cock Robin by Jean George

If I Touched an Eagle

The Pill Bug Troll. Let's Read and Find Out Science

The Lorax by Dr. Suess

My Side of the Mountain by Jean George

The Missing Gator of Gumbo Limbo by Jean George

Chirping Crickets Troll

Lost Man's River

Sign of the Beaver by E. Spear

Oil Spill Troll

Blue Willow by Doris Gates

Waterman's Boy

Julie of the Wolves by Jean George

The Talking Earth by Jean George

Performance Assessment:

1. Apply acquired knowledge to another ecosystem. Examples: "Dragonfly Pond", researching another ecosystem, and "Chesapeake Bay project from STC manual, and/or
2. Complete a journal detailing the course of the project. (Students should be encouraged to make predictions and ask questions.)

Performance Standards:

For Journal Assessment

The entries include dates and times of observations.

The entries are detailed and accurate and reflect the changes in the two systems and their interdependency.

**For "Dragonfly Pond" and "Chesapeake Bay", see copies or manual.
An additional suggested assessment is attached.**

Name _____

Science Quiz

1. When you connected your aquarium and terrarium, you formed a(n) _____

2. What are the names of two out of the three plants that you put in your aquarium?

3. Name two of the types of seeds you planted in your terrarium.

4. What are the names of the two animals that you put in your terrarium?

5. List two reasons why plants are important in your ecocolumn.

6. Give an example of a fossil fuel. _____

7. A(n) _____ is anything that can harm living organisms when too much of it is released into an ecosystem.

8. Acid rain is formed when _____ is/are burned and the sulfur dioxide and nitrogen oxide that are released mix with _____ and eventually fall to earth.

9. A(n) _____ scale is used to measure acids and bases.

10. If algae is overfed a(n) _____ will occur.

MATCHING:

- ___ 14. Fertilizer/manure
- ___ 15. Salt
- ___ 16. Acid deposition

- ___ 17. Type of acid
- ___ 18. Type of base
- ___ 19. Neutral substance
- ___ 20. Aquatic animal
- ___ 21. Terrestrial animal
- ___ 22. Scavengers
- ___ 23. Consumers
- ___ 24. Producers
- ___ 25. Gravid spot

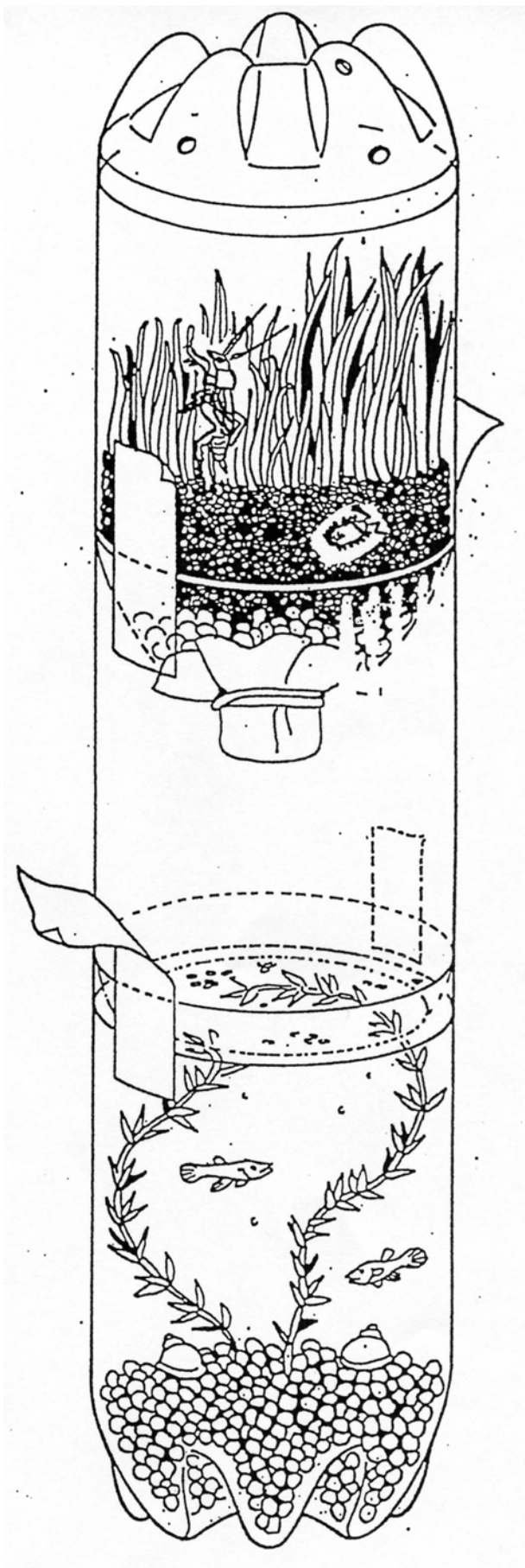
- A. Vinegar
- B. Animal living in water
- C. Found in following forms - snow, sleet, rain, fog, dry particles (damages animals, plants, and/or buildings)
- D. Distilled water
- E. Ammonia
- F. Animal living on land
- G. Make food that animals need to live
- H. Cannot produce own food
- I. Eaters of dead and decaying plant matter
- J. Overproduction of and run off from produce algae bloom
- K. Used on roads to melt ice, burns plants as it runs off
- L. Appears on female mosquito fish body to indicate pregnancy

Name _____

Date _____

Directions: Below is an illustration of your ecocolumn.
Follow the directions below as I read them aloud.

1. Color 2 consumers brown.
2. Color 2 producers green.
3. Draw a red arrow to something that depends on the producer.
4. Draw a blue arrow to and from 2 things that depend on each other.
5. Label 6 things, 3 non-living and 3 living and indicate whether they are living or non-living.



Essential Question:

It is essential that students understand systems and how the interactions of their components affect their equilibrium and evolution.

Content Standard:

Students will be able to classify and compare a variety of materials by observing how they react to heat, inferring why the reaction occurred, and predicting reactions in other materials.

Objectives:

Students will be able to:

- Observe and compare temperature changes of different materials over time due to solar energy.
- Relate the rate and amount of temperature change to properties of materials.
- Observe and compare the effect of different colors and covers on solar water heaters.
- Relate the surface area of a solar collector to energy transfer.
- Organize information and communicate results of the investigation.

Suggested Resources:

FOSS Solar Energy Kit (required resource)(now published by Delta Science)
Media resources on other sources of energy
"Souper Bowl" activity
AIMS Primarily Physics

Extension:

Students will be able to demonstrate their understanding of the sun's relationship to other sources of energy.

Literature Ideas:

Myths and Legends from Native American unit
The Sun
Solar Energy, FOSS Science Stories, Delta Science
Arrow to the Sun by Gerald McDermott
The Librarian who Measured the Earth by Kathryn Lasky
The Way to Start a Day by Byrd Baylor

Performance Assessment:

1. Design and build a solar collector that will heat a substance. (See, for example, the solar powered hot dog cooker).

Performance Standard:

The collector will heat a substance.
The collector will be built solely by the student.
An explanation of why the collector works will accompany the project.

Essential Question:

It is essential that students understand systems and how the interactions of their components affect their equilibrium and evolution.

Content Standard:

Students will be able to sort and categorize a variety of living animals into groups, using various features to decide which things belong to which group.

Objectives:

Students will be able to:

- Identify attributes of invertebrates and vertebrates.
- Identify similarities and differences of invertebrates and vertebrates.

Suggested Resources:

AIMS, Critters.

Silver Burdett grade 5 science text

Extensions:

Squid and worm dissection

Acrostic poems

Literature Ideas:

Julie of the Wolves by Jean George

My Side of the Mountain by Jean George

Far Side of the Mountain by Jean George

The Incredible Journey by Sheila Burney

Island of the Blue Dolphins

Voyage of the Frog by Gary Paulson

G. Jurrell, Eyewitness Books, Zoobooks

Performance Assessments:

1. Construct a graphic organizer that properly classifies the animal kingdom, and/or
2. Research an animal, categorize it, and write a fictional story using that research.

Performance Standards:

Students will be able to state the attributes of each category.

There are accurate examples of each category.

The animal research is accurate and the animal is correctly categorized.

The story is original and creative.

Essential Question:

It is essential that students understand systems and how the interactions of their components affect their equilibrium and evolution.

Content Standard:

Students will be able to construct and utilize models and simulations (e.g. model rocket, paper airplane, balloon rocket, rocket car) and evaluate the success of their design as it relates to Newton's laws of motion

Objectives:

Students will be able to:

- Demonstrate their understanding of Newton's three laws of motion
- Demonstrate the importance of various factors influencing a rocket's flight path ie: fins, drag, thrust, staging, guidance, launch angle, recovery system
- Construct a rocket
- Launch a rocket
- Observe safety rules

Suggested Resources:

Estes, Science and Model Rockets - district supplied resource (activities excellent)

Handbook of Model Rockets

Gems, Experimenting with Model Rockets

Videos: "Space Basics", "Newton in Space" (by NASA) "Rocket Men" by Disney "What We Learn About Earth from Space" by National Geographic

Constructions for Children by Barbara Eichelberger

NASA (301)286-7207 or for teachers (301)286-8570 (free information)

Extension:

Altitude launcher

Literature Ideas:

Cold Zero by Jean George

Blast Off by Bruce Cassidy

Pioneer of Rocketry by Stoyko

To Space and Back by Sally Ride

Space Station Science by Marianne J. Dyson

Isaac Newton: The Greatest Scientist of All Time by Margaret J. Anderson

Performance Assessments:

1. Evaluate the success or failure of a rocket's launch as it relates to Newton's laws of motion
2. Use some type of model to illustrate or demonstrate Newton's three laws of motion (video, collage, graphic organizer, models, etc.)
3. Given limited materials, apply Newton's laws of motion to the construction of a moving vehicle.

Performance Standard:

The student accurately illustrates or demonstrates each law of motion

The application of the laws of motion is clear from the project

The explanation is detailed and fluent.

The project is neatly done.

Essential Question:

It is essential that students understand systems and how the interactions of their components affect their equilibrium and evolution.

Content Standard:

Students will be able to select and use an appropriate tool which will enhance their ability to study the material at hand.

Objectives:

Students will be able to:

- Given a particular task from one of the science content standards, demonstrate that they can select and use the tools that would be necessary to complete that task successfully.
- List the appropriate uses for the following tools: hand lenses, balance scale, thermometer, weather instruments, microscope, camera, video camera, and a computer.

Suggested Tools:

Hand lens
Balance scale
Thermometer
Weather instruments
Microscopes
Protractor
Compass
Microscope
Camera
Video camera
Computer
Ruler, meter stick
Stopwatch
Calculators
Clock - (analog and digital)

Performance Assessment:

1. Tools will be selected and utilized in the various content standards throughout the year. Mastery will be determined in conjunction with the completion of the other content standards through teacher observation.