Middle School Science
2009-2010

Middle School Science: STC/MS, *Science and Technology Concepts for Middle School*

Science and Technology Concepts for Middle Schools (STC/MS) is a middle school science curriculum program developed by the National Science Resources Center.

The primary goals of the STC/MC program are to:

- Make available a sequence of learning activities that fully address the National Science Education Standards
- Engage students directly with natural phenomena, the tools of science, real-world problems, and technological design challenges
- Build on students prior knowledge and experiences and allow them to apply problem-solving strategies in new contexts
- Provide opportunities for students to test procedures, collect and analyze data, use data to support conclusions, and communicate findings

The STC/MC modules incorporate a variety of assessments, including pre-assessments, those embedded in the lessons, journal entries, end-of-unit exams and performance based assessments.

Written products include what students write, what they produce in the form of data and other experimental results, and what they design and construct. Students maintain a science journal, which contains written observations, drawings, graphs, tables, and/or charts. These are an important part of all STC/MS modules, providing evidence of each student's ability to collect, record, and process information, as well as arrive at conclusions based on their inquiries. By referring back to their work in previous lessons, students can reflect on their learning and prepare for the written and performance based tests at the end of each section of the module.

6th Grade: STC/MS: *Human Body Systems,* Foss Science Program*: Diversity of Life*

The sixth grade studies life science in two parts: STC/MS, Human Body Systems, and the Foss Science Program: Diversity of Life.

Topics in the **Human Body Systems** Module include:

- *Body Mapping*: an overview of body systems
- *Digestive System*: movement of food through the digestive tract, digestion in the mouth, the stomach, and the small intestine.
- *Respiratory and Circulatory Systems*: mechanics of breathing, lung capacity, cellular respiration, releasing of energy from food, and double-pump heart action.
- *Musculoskeletal System*: overview (dissection of a chicken wing), muscles, joints and bones; muscle size and strength, the body in balance, and student presentations on diseases and health care careers.

Topics in the **Diversity of Life** Module include:

- *What is Life*: students think about characteristics that are common to all living organisms.
- *Introduction to the Microscope*: students use a microscope to observe and study microorganisms.
- *Microscopic Life*: students discover cells and begin to understand their importance as basic units of life. Elodea and paramecia are studied in depth, and students search for other microorganisms in pond water.
- *The Cell*: students become familiar with biological structures and functions at different levels of organization: cells, organs, tissues, organ systems, and whole organisms.
- *Seeds of Life*: students recognize that seeds are living organisms in a dormant state. They observe and describe the first development stages of a plant.
- *Transpiration*: students conduct investigations to understand how the vascular system transports water through a plant and how leaves regulate the rate of water flow through a plant.

6th Grade, continued:

- *Plant Reproduction*: students investigate the reproductive systems in flowers to understand the origin of seeds. They explore plant adaptations for seed dispersal.
- *Snails or Roaches*: students design and conduct an experiment to determine environmental preferences of land snails or of the Madagascar hissing cockroach. Students observe structures and behaviors of a multi-cellular organism.
- Kingdoms of Life: students are introduced to the great diversity of microorganisms found all around us — bacteria and fungi. They are introduced to the system of five kingdoms of living organisms.

7th Grade: STC/MS, *Catastrophic Events, Earth in Space*

The seventh grade studies earth science in two STC/MS modules, Catastrophic Events and Earth in Space.

Topics in the **Catastrophic Events** module include:

- *Storms*: uneven heating of earth's surfaces, heat transfer, convection currents, cloud formation and convection in the ocean.
- *Earthquakes*: earthquake waves, recording earthquake waves, plotting earthquakes, earth's structures, plate boundaries, mantle convection.
- *Volcanoes*: forming new land, viscosity, igneous rocks and crystallization, properties of ash, and ash fall and weather.

Topics in the **Earth in Space** module include:

- *Sun-Earth-Moon System*: tracking shadows, seasons, investigating lunar phases, solar and lunar eclipses, the sun as an energy source, changes in the sun's energy (sunspots and space weather) and the sun's rotation.
- *Solar System*: overview of the space program which has contributed to our knowledge of the solar system, looking at scale models, impact craters, planetary processes, gravity and weight, gravity and orbital motion, gravity and tides.
- *Earth's History as a Planet*: asteroids, comets, meteors; fossils: earths history in rocks; earth as a unique planet; and space technology.

8th Grade: STC/MS: *Light, Properties of Matter*

The eighth grade studies physical science in two STC/MS modules: Light and Properties of Matter.

Topics in **Light** Module include:

- *The Nature of Light*: sources of light, light as energy, linear nature of light transmission, effect of distance on illumination, transparent, translucent and opaque light, production of shadows, simple ray optics diagrams, production of images (pinhole camera), models of light as waves or particles, the visible spectrum and color, spectroscopy, infrared, ultraviolet and electromagnetic spectrum, wavelength model for color and subtractive and additive color mixing.
- *Reflection and Refractions*: reflection from mirrored and non-mirrored surfaces, reflection from a plane mirror, uses of plane mirrors, reflection from curved mirrors, refraction in blocks with parallel surfaces, images produced by convex and concave lenses, and wave and particle models for reflection and refraction.
- *Using Light*: optical devices, using combinations of lenses (a simple telescope), camera construction and function, eye structure and function, visual perception of humans and other animals, communication using light and total internal reflection and fiber-optic communications.

Topics in the **Properties of Matter** Module include:

- *Characteristic Properties of Matter*: mass, volume, and density are properties of liquids and solids; density can be used to predict the behavior of matter in terms of floating and sinking; gases have mass, volume and density; density varies with temperature; expansion and contraction are investigated; the way substances behave when heated; phase change, melting and boiling points, conservation of mass during phase change.
- *Mixtures and Solutions*: pure substances and mixtures, solutions, solubility, conservation of mass during dissolving, volume, soluble and insoluble substances, solvents, chromatography, aqueous solutions and alloys, technological applications.
- *Compounds, Elements and Chemical Reactions*: compounds and pure substances, properties of compounds, elements, synthesis reactions, chemical reactions, metals, technological applications of compounds.