

941 SCIENCE 9 SMALL GROUP

GRADE: 9

LEVEL: Small Group

CREDITS: 2.5

PREREQUISITE: An Individualized Educational Plan with this component

BASIC TEXT: Exploring Earth Science – Maton et al, Prentice Hall, 1995

REQUIRED MATERIALS: notebook, calculator, writing materials, agenda

MISSION RELATED GOALS:

- Foster communication
- Foster problem solving
- Academic excellence
- Intellectual curiosity
- Respect rights of others
- Self-confidence

COURSE DESCRIPTION: Students in Science 9 will receive small group instruction which addresses concepts and factual information in a manner consistent with their identified special needs. Students will be introduced to the four branches of Earth Science and learn how each branch applies to a specific aspect of the Earth. They will learn about the origin of the Solar System and the Universe, and the interrelationships of galaxies, stars, the Sun, planets, and their satellites. Included will be the concept that the Sun is a star and as such releases electromagnetic energy, as do all stars. This energy causes the unequal heating of the Earth's atmosphere and therefore creates climactic and daily weather changes, wind patterns, and air pressure systems. The concept of energy flow will also be related to the forces that cause the movement of tectonic plates in the Earth's crust and the resulting earthquakes, volcanoes, and mountain building processes. These forces also relate to the rock cycle and Earth's structural layers.

SCHOOLWIDE LEARNING EXPECTATIONS:

- 1) Demonstrate effective written and oral communication skills.
- 2) Research, focus, and apply resources to the solution of problems.
- 3) Demonstrate the ability to apply computational skills to the solution of problems.
- 4) Demonstrate the ability to apply the scientific method to the solution of problems

GENERAL PERFORMANCE OBJECTIVES:

- Identify and describe standard tests used to identify Earth's materials, e.g., carbon dating, chemical tests
- Describe geological and biological processes that result in changes in Earth's features and systems.
- Describe tools and methods used to explore the universe.

- Examine and describe evidence that explains characteristics of the universe, e.g., red and blue shifts, star clusters, and types of galaxies.
- Identify and compare scientific theories of how the universe was formed, e.g., the Big Bang theory.
- Define and describe characteristics of celestial objects, e.g., stars, planets, moons, etc.
- Describe stellar evolution with the use of the Hertzsprung-Russell diagram.
- Describe and provide examples of the effects of gravity and electromagnetism on the Earth.

MASSACHUSETTS FRAMEWORKS STRANDS

1. Matter and Energy in the Earth System 1.1, 1.2, 1.3, 1.4, 1.5, 1.8, 1.14
2. The Earth's Sources of Energy 2.1, 2.6
3. Earth Processes and Cycles 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.13, 3.14, 3.15, 3.16, 3.18, 3.19, 3.20, 3.21, 3.22
4. The Origin and Evolution of the Universe 4.1, 4.2, 4.3, 4.4, 4.5, 4.7, 4.8

MASSACHUSETTS FRAMEWORKS STANDARDS:

INQUIRY: DESIGNING AN INVESTIGATION:

- Distinguish those observations that are relevant to the question or problem at hand.
- Formulate testable questions and generate explanations using the results of predictions.
- Make decisions about the range and number of independent variables and how to control other variables in designing experiments.
- Select and use common and specialized tools to measure the dependent variable.
- Select appropriate methods of recording and interpreting data

INQUIRY: ANALYSIS & INTERPRETATION OF DATA:

- Accurately use scientific and technological nomenclature, symbols and conventions when representing and communication ideas, procedures and findings.
- Use mathematics to analyze and support findings and to model conclusions.
- Question interpretations or conclusions for which there is insufficient supporting evidence; recognize that any conclusion can be challenged by further evidence.
- Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- Formulate further testable hypotheses based on the knowledge and understanding generated. Interpret data in the light of experimental findings, appropriate scientific and technological knowledge and understanding.

UNITS AND THEMES:

- I. Branches of Earth Science
- II. Tools of Earth and Space Scientists
 - a. Optical telescopes
 - b. Radio telescopes
 - c. Infrared and Ultraviolet telescopes
 - d. X-ray and Gamma ray telescopes
 - e.

- III. Stars and Galaxies
 - a. Overview of the universe
 - b. Formation of the universe
 - c. Characteristics of stars
 - d. The Sun
 - e. Evolution of stars
- IV. Solar System
 - a. Evolution of the Solar System
 - b. Motion of the planets
 - c. Members of the Solar System
- V. Earth and it's Moon
 - a. Earth in space
 - b. Earth's Moon
- VI. Earth's Interior
 - a. Core
 - b. Mantle
 - c. Crust
- VII. Plate Tectonics
 - a. Earth's drifting continents
 - b. Earth's spreading ocean floor
 - c. Earth's moving plates
 - d. Earthquakes
 - e. Volcanoes
- VIII. Rocks and Minerals
 - a. What is a mineral?
 - b. Tests for mineral identification
 - c. What is a rock?
 - d. The rock cycle
 - e. Igneous, Sedimentary, and Metamorphic rocks
 - f. Topographic maps
- IX. Meteorology
 - a. Air pressure
 - b. Winds
 - c. Weather maps
- X. Oceanography
 - a. Ocean properties
 - b. Ocean currents
- XI. Earth's Nonliving Resources
 - a. Land and soil
 - b. Water
 - c. Mineral

SUGGESTED INSTRUCTIONAL ACTIVITIES:

- Collage created by groups of four students representing each branch of Earth Science.
- Count the number of stars visible in the night sky using a random sampling method.
- Identify well-known constellations and the North Star in the night sky.

- Observe stars of different magnitudes and colors; graph the magnitudes vs. temperatures to create a Hertzsprung-Russell diagram.
- Use spectroscopes to observe continuous and emission spectra.
- Plot the locations of volcanoes and earthquakes on a world map.
- Cut out, piece together, and label outlines of earth plates.
- Use world maps to locate and label trenches, ridges, and mountain ranges.
- Draw isotherms and isobars on weather maps.
- Label high and low pressure systems on weather maps.
- Use the information on a weather map to forecast the weather for several locations.
- As specified by Individual Education Plan

USE OF TOOLS/TECHNOLOGY:

- Use classroom computer and integrated software package.
- Use dedicated software for investigating different types of mapping.
- Use scientific calculators.
- Use overhead projectors.
- Use TV and VCR for viewing video selections.
- Use computer laboratory.

ASSESSMENTS: All assessments follow the school wide rubric.

- Quizzes and tests.
- Essay questions (including open-ended questions).
- Quizzes on comprehension of videotapes shown.
- Group projects.
- Lab reports.
- Collaborative efforts.
- Research projects.