

BERKELEY HEIGHTS PUBLIC SCHOOLS
BERKELEY HEIGHTS, NEW JERSEY

**COLUMBIA MIDDLE SCHOOL
SCIENCE DEPARTMENT**

FOUNDATIONS OF EARTH SCIENCE

Curriculum Guide

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This curriculum may be modified through varying techniques,
Strategies, and materials, as per an individual student's
Individualized Educational Plan (IEP).

Approved by the Berkeley Heights Board of Education
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PHILOSOPHY/RATIONALE

The goal of this program is to develop scientifically literate students who are capable of making informed decisions about current scientific and environmental issues that impact their lives. Students should recognize that science is a system of knowledge based on observations and involves trying to solve problems and answer questions about our world and its place in the universe by observing how things interact.

In this course, students develop an understanding of the Earth as a system. Students learn the interrelation of the atmosphere, the hydrosphere, the geosphere and the biosphere as they study the principles of Earth science.

Topics studied include the nature of science, physical and chemical properties of matter, weather and climate, Earth's materials, Earth's oceans, map reading and interpretation, space exploration, and a study of the solar system and universe.

Students in *Foundations of Earth Science* are expected to complete laboratory investigations that stress problem solving skills and cooperative group interaction. These investigations may include measurement activities, applications of the scientific method, and interpreting/creating map projections and topographic maps. Students will be expected to interpret and analyze data, draw conclusions and communicate their ideas in laboratory reports.

Foundations of Earth Science is intended for students in Grade 8. It is a comprehensive course that covers aspects of astronomy, geology, meteorology and oceanography.

COURSE PROFICIENCIES

COURSE OBJECTIVES

1. To identify and solve problems related to Earth Science.
5.1/8B1
2. To correctly use scientific instruments and apparatus and demonstrate the skills necessary to conduct science investigations.
5.1/8B1-3
C1,2
3. To recognize the development of scientific theories over time and the contributions of men and women from different cultures.
5.2/8A1-3
B1,2
4. To appreciate the role of mathematics in the study of Earth Science.
5.3/8A1
B1
C1
D1
5. To develop an understanding of the composition, properties and interactions of matter.
5.6/8A1-4
B1-4
6. To comprehend Earth's properties and composition, including minerals, rocks and soil. Also to recognize how scientists have developed an understanding of Earth's geologic history by studying these materials along with fossil remains.
5.8/8C1,2
7. To describe the composition, circulation and distribution of the Earth's oceans and marine environments.
5.8/6B1
8. To understand how weather is caused by atmospheric changes and to study the effects of weather upon the Earth.
5.8/8B1
9. To acquire a knowledge of Earth's physical features and how they are represented on maps and models.
5.8/8D2
10. To gain knowledge of the Earth, moon, and sun as a system of objects in space.
5.9/8A1-3

STUDENT PROFICIENCIES

The student will be able to:

1. Solve problems cooperatively and creatively using the scientific method. (5.1/8B1-3)
2. Gather, organize and summarize data in tables and graphs. Analyze, interpret, conclude and communicate results in a lab report. (5.1/8B3)
3. Represent data numerically and graphically using appropriate S.I. units and with the appropriate degree of precision. (5.3/8D1-4)
4. Design and conduct a controlled scientific experiment, practicing proper safety procedures. (5.1/8C1,2)
5. Recognize the contributions of scientists from different cultures. (5.2/8A1-3)
6. Understand that all matter is composed of atoms and combinations of atoms and that the atom is composed of elementary particles called protons, neutrons and electrons. (5.6/8A1)
7. Develop knowledge of the physical and chemical properties of the elements and understand that the Periodic Table is arranged in a manner to reflect the common properties of some elements in terms of their structure and reactivity. (5.6/8A3)
8. Apply one's knowledge of the Periodic Table and an understanding of how elements combine to form compounds and mixtures through chemical and physical changes. (5.6/8A4, B1,2)
9. Describe the composition and formation of minerals, rocks and soil as related to their chemical nature. (5.8/8C1,2)
10. Integrate their knowledge of mineral, rock and soil formation in a manner that will give them an understanding of the Earth's geologic record. (5.8/8C1,2)
11. Describe the development of weather systems and how these systems are represented on weather maps. (5.8/8B1)
12. Interpret information about physical features on the Earth's surface using different types of maps. (5.8/8B1)
13. Explain the relationship of the Earth's tilt, rotation and orbital pattern to the seasons, tides and weather patterns. (5.9/8A1-3)
14. Compare and contrast refracting and reflecting telescopes. (5.9/8A1-3, B1, C1, D1)

STUDENT PROFICIENCIES (continued)

15. Compare and contrast the planets and minor bodies of the solar system. (5.9/8B1)
16. Explain the impact of environment on ecosystems. (5.10/8A1)
17. Summarize and evaluate scientific theories concerning atomic theory, origins of the solar system, extinction of the dinosaurs, plate tectonics, etc. (5.6/8A1; 5.9/8B1,2; 5.5/8B2)
18. Incorporate technology in identifying a problem, researching and developing ideas and sharing solutions with others. (5.4/8A1)
19. Recognize and apply the action of forces on objects on Earth and in space. (5.7/8A1,2)
20. Describe the transfer of energy from the sun via radiation, conduction and convection. (5.7/8B1,2)
21. To identify career opportunities in science. (9.1/8A1-7)

METHODS OF EVALUATION

1. Homework
2. Oral presentations
3. Class participation/work
4. Tests and quizzes
5. Demonstrations
6. Lab reports
7. Research reports
8. Projects
9. Final exam

SCOPE AND SEQUENCE
COURSE OUTLINE/STUDENT OBJECTIVES

The student will be able to:

N. J. Core Curriculum Standards	Indicators	Course Outline/Student Objectives
5.1 5.3 5.4 9.1	A2,3 B1,2,3 C1,2 A1 A1 B1-6	I. The Nature of Science A. Science All Around 1. Define science and Earth science 2. Identify the major branches of Earth Science 3. List and describe careers associated with each of the branches of Earth Science 4. Describe scientific methods 5. Distinguish among independent and dependent variables, constants and controls 6. Discuss the relationship between science and technology B. Scientific Enterprise 1. Explain why science is always changing 2. Distinguish among hypotheses, theories and laws C. Laboratory Practices 1. Differentiate among the following measurements and list appropriate SI units: length, mass, weight, area, volume and temperature 2. Explain the necessity of safety in the lab 3. Accurately measure length, mass, volume and temperature
5.6	A1,2 B1-4	II. Matter A. Atoms 1. Define atom, element 2. Describe the internal structure of the atom 3. Describe how the atomic model has changed over time 4. Compare atoms and isotopes B. Combinations of Atoms 1. Describe ways atoms combine to form compounds 2. Contrast compounds and mixtures 3. Distinguish between chemical and physical properties and describe the physical properties of matter 4. Contrast the four states of matter and describe how each phase is determined by the arrangement and movement of its atoms 5. Identify what causes matter to change state
5.8	A	III. Views of Earth A. Viewpoints 1. Differentiate between longitude and latitude

5.8	B1	VIII. Earth's Water A. Ocean Water 1. Identify the origin of the water in Earth's oceans 2. Create an events chain map that explains the hypothesis of the origin of the oceans 3. Create a pie graph to show the percentages of dissolved salts in ocean water
5.7	A1,2	B. Ocean Motion 1. Explain how winds and the Coriolis effect influence surface currents 2. Infer the origin of surface currents from the temperature of coastal waters 3. Compare and contrast surface and density currents 4. Relate density currents to circulation of the Earth's ocean water
5.10	B1	IX. Earth's Energy Resources A. Nonrenewable Energy Resources 1. Identify examples of nonrenewable resources 2. State the four stages in the formation of coal 3. Contrast the formation of coal to the evolution of petroleum and natural gas 4. Label parts of a nuclear power plant 5. Discuss how nuclear energy is used to produce electricity 6. Describe sources of renewable energy and list an advantage and disadvantage of each

SUGGESTED AUDIO VISUAL/COMPUTER AIDS

1. LCD Projector
2. VCR
3. Laser Disc player
4. Overhead projector
5. Microsoft Word Software
6. Microsoft PowerPoint Software
7. Microsoft Internet Explorer

SUGGESTED MATERIALS

Resources for Students

Text:

Feather, Ralph M. Jr., Susan Leach Snyder, Dinah Zike
Earth Science: National Geographic
Glencoe/McGraw-Hill
2005

Resources for Teacher

Text:

Feather, Ralph M. Jr., Susan Leach Snyder, Dinah Zike
Earth Science: National Geographic, Teacher's Edition
Glencoe/McGraw-Hill
2005